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146

THE

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OF

ARTS and SCIENCES.

SINES.

SINE, or *Right Sine*, in *Trigonometry*, a right line drawn from one extremity of an arc, perpendicular to the radius drawn from the other extremity: or, the ſine is half the chord of twice the arc.

Thus the line A D (*Plate* I. *Trigonometry*, *fig*. 4.) which is half the chord, A B, of the double arc A E B, is the right ſine; or, ſimply, the ſine of the arc A E.

Sine, *Whole*, *Sinus totus*, is the ſine of the quadrant H E, or of 90°; that is, the whole ſine is the ſame with the radius H C.

Sine, *Verſed*, is a part, E D, of the whole ſine or radius intercepted between the right ſine A D and the arc A E.

It is demonſtrated, 1. That, the right ſine A D being perpendicular to the radius E C, all ſines drawn to the ſame radius are parallel to each other.

2. Since the arc A E is the meaſure of the angle A C E, and A I the meaſure of the contiguous angle A C I, and the quadrant H E the meaſure of the right angle; A D is alſo the right ſine, and E D the verſed ſine, of the angles A C E and A C I, and the whole ſine is the ſine of the right angle.

3. Two angles contiguous, as A C E and A C I, have the ſame ſine.

4. The ſines of obtuſe angles are the ſame with thoſe of their complements to two right angles: or the ſine of any angle, and the ſine of its ſupplement, are the ſame; or the ſines of arcs leſs than 90°, ſerve equally for arcs as much greater than 90°; *i. e.* the ſines of 80° and 100°, of 60° and 120°, &c. are reſpectively equal.

5. All ſines of ſimilar arcs have the ſame ratio to their radii.

6. In every triangle the ſides are as the ſines of the oppoſite angles.

Sine-*Complement*, or *Coſine*, is the ſine of an arc A E, which is the complement of another arc A H, to a quadrant.

Thus alſo the ſine of the arc A H is called the *ſine-complement* of the arc A E. And it is plain, that the *verſed ſine* and *coſine*, taken together, are equal to the radius.

The ſine D E (*fig*. 10.) *and the verſed ſine* A E, *being given in common meaſure, not in parts of the radius, to find the arc* D A *in degrees.* Find the ſemidiameter A C: then in the triangle D E C, beſides the right angle E, by the ſides D E and D C we find the angle E C D (A C D), which ſhews the number of degrees in the arc D A; the double of which is the arc D A D. This problem is of uſe in finding the ſegment of a circle. See Segment.

Arithmetic of Sines is a term commonly employed to denote what is perhaps more properly called *analytical trigonometry*, being a modern branch of the analytical calculus, which we owe in a great meaſure to the celebrated Euler, though the principal geometrical theorem on which it is founded was firſt pointed out by Mayer, in a memoir publiſhed in the Acta Petro. for 1727; but the extenſion of the method, and a ſuitable mode of notation, are undoubtedly due to Euler.

The object of this branch of ſcience is to exhibit the relations of the ſines, coſines, tangents, cotangents, &c. of arcs, multiple arcs, &c.; and it is, without doubt, owing, in ſome meaſure, to the facilities this calculus has afforded, of expreſſing in a ſimple manner formulæ, which, without its aid, would have exceeded the powers of the human mind, that aſtronomy, which depends ſo much on theſe relations, has attained its preſent high degree of perfection.

In common arithmetic, our object is to combine together different ſimple numbers, by addition, multiplication, &c.;

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Or they may be reduced to two, by means of the double ſign $\pm$, thus:

$$1.\ \text{ſin.}\,(a \pm b) = \text{ſin.}\,a\,.\,\text{coſ.}\,b \pm \text{ſin.}\,b\,.\,\text{coſ.}\,a.$$

$$2.\ \text{coſ.}\,(a \pm b) = \text{coſ.}\,a\,.\,\text{coſ.}\,b \mp \text{ſin.}\,a\,.\,\text{ſin.}\,b.$$

In order to find ſimilar formulæ for the tangents, cotangents, ſecants, coſecants, &c. we may put our ſecond expreſſion under the form,

$$\text{coſ.}\,(a \pm b) = \left(1 \mp \frac{\text{ſin.}\,a\,.\,\text{ſin.}\,b}{\text{coſ.}\,a\,.\,\text{coſ.}\,b}\right) \text{coſ.}\,a\,.\,\text{coſ.}\,b.$$

And if now we divide formula 1 by this, we have, by obſerving that $\frac{\text{ſin.}\,a}{\text{coſ.}\,a} = \text{tan.}\,a$,

$$3.\ \text{tan.}\,(a \pm b) = \frac{\text{tan.}\,a \pm \text{tan.}\,b}{1 \mp \text{tan.}\,a\,.\,\text{tan.}\,b}.$$

$$4.\ \text{cot.}\,(a \pm b) = \frac{\text{cot.}\,a\,.\,\text{cot.}\,b \mp 1}{\text{cot.}\,b \pm \text{cot.}\,a};$$

the latter being obtained by dividing the ſecond formula by the firſt.

Again, taking the reciprocal of formula 2, we have

$$\frac{1}{\text{coſ.}\,(a \pm b)} = \frac{1}{1 \mp \text{tan.}\,a\,.\,\text{tan.}\,b}\,.\,\frac{1}{\text{coſ.}\,a\,.\,\text{coſ.}\,b};\ \text{or,}$$

$$5.\ \text{ſec.}\,(a \pm b) = \frac{\text{ſec.}\,a\,.\,\text{ſec.}\,b}{1 \mp \text{tan.}\,a\,.\,\text{tan.}\,b}.$$

$$6.\ \text{coſ.}\,(a \pm b) = \frac{\text{coſec.}\,a\,.\,\text{coſec.}\,b}{\text{cot.}\,b \pm \text{cot.}\,a}.$$

In like manner may be found,

$$7.\ \text{cho.}\,(a \pm b) = \text{cho.}\,a\,.\,\text{ſup. cho.}\,b \pm \text{cho.}\,b\,.\,\text{ſup. cho.}\,a.$$

$$8.\ \text{verſ.}\,(a \pm b) = \surd\,(\text{verſ.}\,a\,.\,\text{ſup. verſ.}\,b) \pm \surd\,(\text{verſ.}\,b\,.\,\text{ſup. verſ.}\,a).$$

The reader will find a different inveſtigation of theſe properties under the article *Geometry of* POSITION.

Let us now ſee how far theſe general formulæ will indicate the changes of ſigns in the trigonometrical lines, as connected with the ſeveral different magnitudes of their reſpective arcs; a ſubject that we have already conſidered geometrically.

Let π denote the ſemicircle, and let the arc $a = \frac{1}{2}\pi$; then becauſe $\text{ſin.}\,\frac{1}{2}\pi = 1$, and $\text{coſ.}\,\frac{1}{2}\pi = 0$, we have from

$$\begin{aligned}
&\text{Formula (1)}\ \text{ſin.}\,(\tfrac{1}{2}\pi + b) = +\,\text{coſ.}\,b.\\
&\phantom{\text{Formula }}(2)\ \text{coſ.}\,(\tfrac{1}{2}\pi + b) = -\,\text{ſin.}\,b.\\
&\phantom{\text{Formula }}(3)\ \text{ſin.}\,(\tfrac{1}{2}\pi - b) = +\,\text{coſ.}\,b.\\
&\phantom{\text{Formula }}(4)\ \text{coſ.}\,(\tfrac{1}{2}\pi - b) = +\,\text{ſin.}\,b.
\end{aligned}$$

Here we obtain the ſame reſults as before deduced; that is, it is obvious from theſe, that if we conſider the ſine and coſine of an arc leſs than a quadrant as poſitive quantities, the coſine of an arc greater than a quadrant, but leſs than a ſemicircle, will be negative, but its ſine poſitive.

Again, let the arc $a = \pi$; then becauſe $\text{ſin.}\,\pi = 0$, $\text{coſ.}\,\pi = -1$, we have

$$\text{ſin.}\,(\pi + b) = -\,\text{ſin.}\,b;\ \text{coſ.}\,(\pi + b) = -\,\text{coſ.}\,b;$$
$$\text{ſin.}\,(\pi - b) = +\,\text{ſin.}\,b;\ \text{coſ.}\,(\pi - b) = -\,\text{coſ.}\,b.$$

Whence it follows, that the ſines of angles greater than a ſemicircle, but leſs than a circle, have negative ſigns; while thoſe that are leſs than a ſemicircle are poſitive: whereas the coſines of angles equally above and below the ſemicircle have the ſame ſigns.

If now we aſſume the arc $a = \frac{3}{2}\pi$; then, becauſe $\text{ſin.}\,\frac{3}{2}\pi = -1$, and $\text{coſ.}\,\frac{3}{2}\pi = 0$, we have

$$\text{ſin.}\,(\tfrac{3}{2}\pi + b) = -\,\text{coſ.}\,b;\ \text{coſ.}\,(\tfrac{3}{2}\pi + b) = +\,\text{ſin.}\,b;$$
$$\text{ſin.}\,(\tfrac{3}{2}\pi - b) = -\,\text{coſ.}\,b;\ \text{coſ.}\,(\tfrac{3}{2}\pi - b) = -\,\text{ſin.}\,b.$$

Therefore, when the arc is comprehended between $\frac{3}{2}\pi$, 2π, its coſine is poſitive, and its ſine negative. Theſe reſults have all been previouſly eſtabliſhed geometrically; but they are here very readily extended to any arcs expreſſed by $\frac{n}{2}\pi \pm b$; n being any number whatever. Theſe are all contained in the following general formulæ, *viz.*

$$\text{ſin.}\left(\frac{4n+1}{2}\pi \pm b\right) = +\,\text{coſ.}\,b.$$

$$\text{ſin.}\left(\frac{4n+2}{2}\pi \pm b\right) = \mp\,\text{ſin.}\,b.$$

$$\text{ſin.}\left(\frac{4n+3}{2}\pi \pm b\right) = -\,\text{coſ.}\,b.$$

$$\text{ſin.}\left(\frac{4n+4}{2}\pi \pm b\right) = \pm\,\text{ſin.}\,b.$$

$$\text{coſ.}\left(\frac{4n+1}{2}\pi \pm b\right) = \mp\,\text{ſin.}\,b.$$

$$\text{coſ.}\left(\frac{4n+2}{2}\pi \pm b\right) = -\,\text{coſ.}\,b.$$

$$\text{coſ.}\left(\frac{4n+3}{2}\pi \pm b\right) = \pm\,\text{ſin.}\,b.$$

$$\text{coſ.}\left(\frac{4n+4}{2}\pi \pm b\right) = +\,\text{coſ.}\,b.$$

Hence it follows, that there is an indefinite number of arcs that have the ſame ſine and coſine, as alſo the ſame ſecant and tangent; the conditions of which latter are readily deduced from the above, by means of the formula $\text{tan.}\,a = \frac{\text{coſ.}\,a}{\text{ſin.}\,a}$, $\text{cot.}\,a = \frac{\text{ſin.}\,a}{\text{coſ.}\,a}$, $\text{ſec.}\,a = \frac{1}{\text{coſ.}\,a}$, &c.

For ſince $\text{tan.}\,a = \frac{\text{ſin.}\,a}{\text{coſ.}\,a}$, and $\text{cotan.}\,a = \frac{\text{coſ.}\,a}{\text{ſin.}\,a}$, it follows, that the tangent will be poſitive, while ſin. a and coſ. a have the ſame ſigns; and negative, when the ſigns are different; and the ſame alſo with the cotangents: theſe are, therefore, both poſitive in the firſt and third quadrants, and negative in the ſecond and fourth. Alſo the tangent is infinite when the coſ. $= 0$, and cotangent infinite when ſin. $= 0$. Again, ſince $\text{ſec.}\,a = \frac{1}{\text{coſ.}\,a}$, and $\text{coſec.}\,a = \frac{1}{\text{ſin.}\,a}$, it follows that theſe lines have the ſame ſigns as the coſ. and ſin. reſpectively; and that the ſecant is infinite when coſ. $= 0$, and the coſec. infinite when ſin. $= 0$.

Having thus ſhewn the relations between the ſeveral trigonometrical lines, their mutations and determinate values, under certain magnitudes of the arcs to which they appertain, we ſhall proceed in the next place to inveſtigate ſome of the principal formulæ for the ſines, coſines, &c. of multiple arcs.

SINES.

Of Multiple Arcs.

By referring to our formula (I), we have

$$\text{ſin.}\ (a+b) = \text{ſin.}\ a\ .\ \text{coſ.}\ b + \text{ſin.}\ b\ .\ \text{coſ.}\ a;$$

which, by writing $(n-1)\,a$ for a, and a for b, becomes

$$\text{ſin.}\ n\,a = \text{ſin.}\ (n-1)\,a\ .\ \text{coſ.}\ a + \text{coſ.}\ (n-1)\,a\ .\ \text{ſin.}\ a.$$

By ſubſtituting in this formula for ſin. $(n-1)\,a$, and coſ. $(n-1)\,a$, under the form

$$\text{ſin.}\ \left\{(n-2)\,a + a\right\} \text{ and coſ. } \left\{(n-1)\,a + a\right\}, \text{ we obtain}$$

$$\begin{aligned}\text{ſin.}\ n\,a = {} & \left\{\text{ſin.}\ (n-2)\ .\ \text{coſ.}\ a + \text{coſ.}\ (n-2)\,a\ .\ \text{ſin.}\ a\right\}\ \text{coſ.}\ a \\ & + \left\{\text{coſ.}\ (n-2)\,a\ .\ \text{coſ.}\ a - \text{ſin.}\ (n-2)\,a\ .\ \text{ſin.}\ a\right\}\ \text{ſin.}\ a\end{aligned}$$

Subſtituting here again for $(n-2)\,a$, under the form $(n-3)\,a + a$, and obſerving that the ſecond term of the firſt line is the ſame as the firſt of the ſecond, we have

$$\begin{aligned}\text{ſin.}\ n\,a = {} & \left\{\text{ſin.}\ (n-3)\,a\ .\ \text{coſ.}\ a + \text{coſ.}\ (n-3)\,a\ .\ \text{ſin.}\ a\right\}\ \text{coſ.}^2\ a \\ & + 2\left\{\text{coſ.}\ (n-3)\,a\ .\ \text{coſ.}\ a - \text{ſin.}\ (n-3)\,a\ .\ \text{ſin.}\ a\right\}\ \text{coſ.}\ a\ .\ \text{ſin.}\ a \\ & - \left\{\text{ſin.}\ (n-3)\,a\ .\ \text{coſ.}\ a + \text{coſ.}\ (n-3)\,a\ .\ \text{ſin.}\ a\right\}\ \text{ſin.}^2\ a\end{aligned}$$

$$= \text{ſin.}\ (n-3)\,a\ .\ \text{coſ.}^3\ a + 3\ \text{coſ.}\ (n-3)\,a\ .\ \text{coſ.}^2\ a\ .\ \text{ſin.}\ a - 3\ \text{ſin.}\ (n-3)\,a\ \text{coſ.}\ a\ .\ \text{ſin.}^2\ a - \text{coſ.}\ (n-3)\,a\ .\ \text{ſin.}^3\ a;$$

the laſt term of each of thoſe lines being ſtill the ſame as the firſt term of the following; and therefore, without purſuing the operation any farther, the law of continuation is obvious; *viz.* the ſeveral coefficients will be exactly thoſe of the binomial; but the ſigns will be two *plus* and two *minus* alternately, whence generally

$$\text{ſin.}\ n\,a = \text{ſin.}\ (n-m)\,a\ .\ \text{coſ.}^m\ a + \text{A}\ \text{coſ.}\ (n-m)\,a\ .\ \text{coſ.}^{m-1}\ a\ \text{ſin.}\ a - \text{B}\ \text{ſin.}\ (n-m)\,a\ .\ \text{coſ.}^{m-2}\ a\ \text{ſin.}^2\ a - \text{C}\ \text{coſ.}\ (n-m)\,a\ \text{coſ.}^{m-3}\ a\ .\ \text{ſin.}^3\ a + \&\text{c.}$$

where A, B, C, &c. are the coefficients of $(1+1)^m$.

And exactly in the ſame manner, we find

$$\text{coſ.}\ n\,a = \text{coſ.}\ (n-m)\,a\ .\ \text{coſ.}^m\ a - \text{A}\ \text{ſin.}\ (n-m)\,a\ \text{coſ.}^{m-1}\ a\ \text{ſin.}\ a - \text{B}\ \text{coſ.}\ (n-m)\,a\ .\ \text{coſ.}^{m-2}\ a\ .\ \text{ſin.}^2\ a + \text{C}\ \text{ſin.}\ (n-m)\,a\ .\ \text{coſ.}^{m-3}\ a\ .\ \text{ſin.}^3\ a + \&\text{c.}$$

In theſe formulæ m is indeterminate, and may be aſſumed at pleaſure; let us therefore take $m = n$, and we have

$$\text{ſin.}\ n\,a = \text{A}\ \text{coſ.}^{n-1}\ a\ .\ \text{ſin.}\ a - \text{C}\ \text{coſ.}^{n-3}\ a\ .\ \text{ſin.}^3\ a + \text{E}\ \text{coſ.}^{n-5}\ a\ .\ \text{ſin.}^5\ a - \&\text{c.} \quad \text{(II.)}$$

and

$$\text{coſ.}\ n\,a = \text{coſ.}^n\ a - \text{B}\ \text{coſ.}^{n-2}\ a\ .\ \text{ſin.}^2\ a + \text{D}\ \text{coſ.}^{n-4}\ a\ .\ \text{ſin.}^4\ a - \&\text{c.} \qquad \text{(III.)}$$

where A, B, C, &c. repreſent the coefficients of $(1+1)^n$.

From theſe two general formulæ we readily deduce the following particular caſes; *viz.*

1. $\text{ſin.}\ a = 1\ \text{ſin}\ a$
2. $\text{ſin.}\ 2\,a = 2\ \text{coſ.}\ a\ .\ \text{ſin.}\ a$
3. $\text{ſin.}\ 3\,a = 3\ \text{coſ.}^2\ a\ .\ \text{ſin.}\ a - \text{ſin.}^3\ a$
4. $\text{ſin.}\ 4\,a = 4\ \text{coſ.}^3\ a\ .\ \text{ſin.}\ a - 4\ \text{coſ.}\ a\ \text{ſin.}^3\ a$
5. $\text{ſin.}\ 5\,a = 5\ \text{coſ.}^4\ a\ .\ \text{ſin.}\ a - 10\ \text{coſ.}^2\ a\ \text{ſin.}^3\ a + \text{ſin.}^5\ a$

&c. = &c.

1. $\text{coſ.}\ a = \text{coſ.}\ a$
2. $\text{coſ.}\ 2\,a = \text{coſ.}^2\ a - \text{ſin.}^2\ a$
3. $\text{coſ.}\ 3\,a = \text{coſ.}^3\ a - 3\ \text{coſ.}\ a\ .\ \text{ſin.}^2\ a$
4. $\text{coſ.}\ 4\,a = \text{coſ.}^4\ a - 6\ \text{coſ.}^2\ a\ .\ \text{ſin.}^2\ a + \text{ſin.}^4\ a$
5. $\text{coſ.}\ 5\,a = \text{coſ.}^5\ a - 10\ \text{coſ.}^3\ a\ .\ \text{ſin.}^2\ a + 5\ \text{coſ.}\ a\ .\ \text{ſin.}^4\ a$

&c. = &c.

Theſe, it is obvious, may be continued at pleaſure, the law of the coefficients being exhibited in the above general formulæ.

or, $$\text{ſin.}\, n\, a = \left\{2^{n-1} - \frac{n-2}{1} \cdot 2^{n-3}\, \text{ſec.}^2 a + \frac{(n-3)(n-4)}{1 \cdot 2} \cdot 2^{n-5}\, \text{ſec.}\, a\right\} \frac{1}{\text{ſec.}^{n-1} a \cdot \text{coſec.}\, a}$$

$$\text{coſ.}\, n\, a = \left\{2^{n-1} - n \cdot 2^{n-3}\, \text{ſec.}^2 a + \frac{n(n-3)}{1 \cdot 2} \cdot 2^{n-5}\, \text{ſec.}^4 a - \&\text{c.}\right\} \frac{1}{\text{ſec.}^n a}$$

The reciprocal of the latter gives,

$$\text{ſec.}\, n\, a = \frac{\text{ſec.}^n a}{2^{n-1} - n \cdot 2^{n-3}\, \text{ſec.}^2 a + \frac{n(n-3)}{1 \cdot 2} \cdot 2^{n-5}\, \text{ſec.}^4 a - \&\text{c.}} \qquad \text{(XII.)}$$

And the reciprocal of the former,

$$\text{coſec.}\, n\, a = \frac{\text{ſec.}^{n-1} a \cdot \text{coſec.}\, a}{2^{n-1} - \frac{n-2}{1}\, 2^{n-3}\, \text{ſec.}^2 a + \frac{(n-3)(n-4)}{1 \cdot 2} \cdot 2^{n-5}\, \text{ſec.}^4 a - \&\text{c.}} \qquad \text{(XIII.)}$$

From theſe we draw the following particular caſes :

1. $\text{ſec.}\, a = \text{ſec.}\, a$	1. $\text{coſec.}\, a = \text{coſec.}\, a$
2. $\text{ſec.}\, 2\, a = \frac{\text{ſec.}^2 a}{2 - \text{ſec.}^2 a}$	2. $\text{coſec.}\, 2\, a = \frac{\text{ſec.}\, a \cdot \text{coſec.}\, a}{2}$
3. $\text{ſec.}\, 3\, a = \frac{\text{ſec.}^3 a}{4 - 3\, \text{ſec.}^2 a}$	3. $\text{coſec.}\, 3\, a = \frac{\text{ſec.}^2 a \cdot \text{coſec.}\, a}{4 - \text{ſec.}^2 a}$
4. $\text{ſec.}\, 4\, a = \frac{\text{ſec.}^4 a}{8 - 8\, \text{ſec.}^2 a + \text{ſec.}^4 a}$	4. $\text{coſec.}\, 4\, a = \frac{\text{ſec.}^3 a\; \text{coſec.}\, a}{8 - 4\, \text{ſec.}^2 a}$
5. $\text{ſec.}\, 5\, a = \frac{\text{ſec.}^5 a}{16 - 20\, \text{ſec.}^2 a + 5\, \text{ſec.}^4 a}$	5. $\text{coſec.}\, 5\, a = \frac{\text{ſec.}^4 a\; \text{coſec.}\, a}{16 - 12\, \text{ſec.}^2 a + \text{ſec.}^4 a}$
&c. = &c.	&c. = &c.

Theſe latter formulæ have the ſame defect as thoſe of the ſines from which they are derived ; *viz.* that both the ſecant and coſecant of the ſingle arc enter in the general expreſſion for the coſecant of the multiple arc.

We ſhall not inveſtigate the formula for the multiple verſed ſine, but ſhall content ourſelves with merely exhibiting the reſult, which is as follows :

$$\text{verſ.}\, n a = n^2\, \text{verſ.}\, a - \frac{n^2 - 1}{2 \cdot 3}\, (\text{A})\, \text{verſ.}^2 a - \frac{n^2 - 2^2}{3 \cdot 5}\, (\text{B})\, \text{verſ.}^3 a - \frac{n^2 - 3^2}{4 \cdot 7}\, (\text{C})\, \text{verſ.}^4 a - \&\text{c.}$$

where A, B, C, &c. are the coefficients of the preceding terms.

A variety of other formulæ for multiple arcs might be here inveſtigated, but our limits forbid a farther extenſion ; thoſe which we have given above are chiefly exhibited by means of the powers of the ſingle arc ; a few others, in the form of continued products, may be here enumerated, but we muſt not attempt their inveſtigation.

Let π denote the ſemicircumference, and we ſhall have

$$\text{ſin.}\, n a = 2^{n-1} \cdot \text{ſin.}\, a \cdot \text{ſin.}\left(\frac{\pi}{n} - a\right) \cdot \text{ſin.}\left(\frac{\pi}{n} + a\right) \cdot \text{ſin.}\left(\frac{2\pi}{n} - a\right) \cdot \text{ſin.}\left(\frac{2\pi}{n} + a\right) \cdot \text{ſin.}\left(\frac{3\pi}{n} - a\right) \cdot \text{ſin.}\left(\frac{3\pi}{n} + a\right)\ \&\text{c.}$$

$$\text{coſ.}\, n a = 2^{n-1}\, \text{coſ.}\left(\frac{n-1}{2n}\pi + a\right) \cdot \text{coſ.}\left(\frac{n-1}{2n}\pi - a\right) \cdot \text{coſ.}\left(\frac{n-3}{2n}\pi + a\right) \cdot \text{coſ.}\left(\frac{n-3}{2n}\pi - a\right) \cdot \text{coſ.}\left(\frac{n-5}{2n}\pi + a\right) \cdot \text{coſ.}\left(\frac{n-5}{2n}\pi - a\right)\ \&\text{c.}$$

$$\text{tan.}\, n a = \text{tan.}\, a \cdot \text{tan.}\left(\frac{\pi}{n} - a\right) \text{tan.}\left(\frac{\pi}{n} + a\right) \text{tan.}\left(\frac{2\pi}{n} - a\right) \text{tan.}\left(\frac{2\pi}{n} + a\right) \text{tan.}\left(\frac{3\pi}{n} - a\right) \text{tan.}\left(\frac{3\pi}{n} + a\right)\ \&\text{c.} \ldots \text{tan.}\left(\frac{n\pi}{2n} + a\right)$$

To theſe we add the following, which are very ſimple ; *viz.*

$$\text{ſin.}\, a + \text{ſin.}\,(a + b) + \text{ſin.}\,(a + 2b) + \text{ſin.}\,(a + 3b) + \&\text{c. } \textit{ad infinitum} = \frac{\text{coſ.}\,(a - \frac{1}{2}b)}{2\, \text{ſin.}\, \frac{1}{2}b} \text{ ; and}$$

$$\text{ſin.}\, a + \text{ſin.}\,(a + b) + \text{ſin.}\,(a + 2b) + \&\text{c. ſin.}\,(a + nb) = \frac{\text{ſin.}\,(a + \frac{1}{2}b)\, \text{ſin.}\, \frac{1}{2}(n + 1)\, b}{\text{ſin.}\, \frac{1}{2}b}$$

$$\text{coſ.}\, a + \text{coſ.}\,(a + b) + \text{coſ.}\,(a + 2b) + \text{coſ.}\,(a + 3b) + \&\text{c. } \textit{ad infinitum} = -\frac{\text{ſin.}\,(a - \frac{1}{2}b)}{2\, \text{ſin.}\, \frac{1}{2}b}$$

$$\text{coſ.}\, a + \text{coſ.}\,(a + b) + \text{coſ.}\,(a + 2b) + \&\text{c. coſ.}\,(a + nb) = \frac{\text{coſ.}\,(a + \frac{1}{2}nb)\, \text{ſin.}\, \frac{1}{2}(n + 1)\, b}{\text{ſin.}\, \frac{1}{2}b}$$

Of

Of the Powers of the Sines, Coſines, &c. of ſingle Arcs.

In order to exhibit the powers of the ſine, coſine, &c. of the ſingle arcs, in terms of the ſines and coſines of the multiple arcs, we may refer to our formulæ (VIII) and (IX), *viz.*

$$2\,\text{coſ.}\ a = y + \frac{1}{y} \qquad\Big|\qquad (-1)^{\frac{1}{2}}\,.\,2\,\text{ſin.}\ a = y - \frac{1}{y}$$

$$2\,\text{coſ.}\ na = y^n + \frac{1}{y^n} \qquad\Big|\qquad (-1)^{\frac{1}{2}}\,.\,2\,\text{ſin.}\ na = y^n - \frac{1}{y^n}$$

From the firſt of theſe we have $2^n\,.\,\text{coſ.}^n a = \left(y + \frac{1}{y}\right)^n = y^n + \text{A}\,y^{n-2} + \text{B}\,y^{n-4} + \text{C}\,y^{n-6} + \&\text{c.}\ \text{A}\,\frac{1}{y^{n-2}} + \frac{1}{y^n}$ A, B, C, &c. repreſenting the binomial coefficients; or, collecting the terms from each extreme,

$$2^n\,\text{coſ.}^n a = \left(y^n + \frac{1}{y^n}\right) + \text{A}\left(y^{n-2} + \frac{1}{y^{n-2}}\right) + \text{B}\left(y^{n-4} + \frac{1}{y^{n-4}}\right) + \&\text{c. or,}$$

$$2^{n-1}\,\text{coſ.}^n a = \text{coſ.}\ na + n\,.\,\text{coſ.}\ (n-2)\ a + \frac{n\,.\,(n-1)}{1\,.\,2}\ \text{coſ.}\ (n-4)\ a + \&\text{c.} \qquad \text{(XIV.)}$$

It is only neceſſary to obſerve here, that when n is even, the number of terms in the original expanſion will be odd, and its middle term, into which no power of y enters, will form the laſt term of the latter ſeries; and having, therefore, no coſine in it, it will be only one-half of the coefficient given in the general term.

Whence the following particular caſes.

1. $\text{coſ.}\ a = \text{coſ.}\ a$
2. $2\,\text{coſ.}^2 a = \text{coſ.}\ 2\,a + 1$
3. $4\,\text{coſ.}^3 a = \text{coſ.}\ 3\,a + 3\,\text{coſ.}\ a$
4. $8\,\text{coſ.}^4 a = \text{coſ.}\ 4\,a + 4\,\text{coſ.}\ 2\,a + 3$
5. $16\,\text{coſ.}^5 a = \text{coſ.}\ 5\,a + 5\,\text{coſ.}\ 3\,a + 10\,\text{coſ.}\ a$

&c. = &c.

For the ſines, we have $(-1)^{\frac{n}{2}}.\,2^n\,.\,\text{ſin.}^n a = \left(y - \frac{1}{y}\right)^n = y^n - \text{A}\,y^{n-2} + \text{B}\,y^{n-4} - \text{C}\,y^{n-6} + \&\text{c.} \pm \frac{1}{y^n}$, the laſt ſign being + when n is *even*, but − when n is *odd*. Collecting the terms from the two extremes, we have firſt, *when n is even,*

$$(-1)^{\frac{n}{2}}\,.\,2^n\,.\,\text{ſin.}^n a = \left(y^n + \frac{1}{y^n}\right) - \text{A}\left(y^{n-2} + \frac{1}{y^{n-2}}\right) + \text{B}\left(y^{n-4} + \frac{1}{y^{n-4}}\right) - \&\text{c. or,}$$

$$(-1)^{\frac{n}{2}}\,.\,2^{n-1}\,.\,\text{ſin.}^n a = \text{coſ.}\ n\,a - n\,\text{coſ.}\ (n-2)\ a + \frac{n\,(n-1)}{1\,.\,2}\ \text{coſ.}\ (n-4)\ a - \&\text{c.} \qquad \text{(XV.)}$$

obſerving here the ſame as above in reſpect to n, an even number; and *when n is odd,*

$$(-1)^{\frac{n}{2}}\,.\,2^n\ \text{ſin.}^n a = \left(y^n - \frac{1}{y^n}\right) - \text{A}\left(y^{n-2} - \frac{1}{y^{n-2}}\right) + \text{B}\left(y^{n-4} - \frac{1}{y^{n-4}}\right) - \&\text{c. or}$$

$$(-1)^{\frac{n-1}{2}}\,.\,2^{n-1}\,.\,\text{ſin.}^n a = \text{ſin.}\ n\,a - n\ \text{ſin.}\ (n-2)\ a + \frac{n\,(n-1)}{1\,.\,2}\ \text{ſin.}\ (n-4)\,a - \&\text{c.} \qquad \text{(XVI.)}$$

Obſerving now the change of ſign, which takes place in the imaginary coefficient $(-1)^{\frac{n}{2}}$ and $(-1)^{\frac{n-1}{2}}$, according as n is of the form $4\,m$, $4\,m + 1$, $4\,m + 2$, or $4\,m + 3$, we draw from the above two formulæ the following particular reſults *viz.*

1. $1\ \text{ſin.}\ a = +\ \text{ſin.}\ a$
2. $2\ \text{ſin.}^2 a = -\ \text{coſ.}\ 2\,a - 1$
3. $4\ \text{ſin.}^3 a = -\ \text{ſin.}\ 3\,a + 3\ \text{ſin.}\ a$
4. $8\ \text{ſin.}^4 a = +\ \text{coſ.}\ 4\,a - 4\ \text{coſ.}\ 2\,a + 3$
5. $16\ \text{ſin.}^5 a = +\ \text{ſin.}\ 5\,a - 5\ \text{ſin.}\ 32 + 10\ \text{ſin.}\ a$

&c- = &c.

We muſt now come to a concluſion of our inveſtigations relative to the doctrine of ſines; had our limits admitted of it, we might have carried them to a much greater extent, but the above will be ſufficient for illuſtrating the principles of the moſt important and uſeful transformations; and the following reſults, which would occupy too much ſpace to develope, but which at the ſame time are too important to be paſſed over unnoticed, the reader will be able to deduce, with facility, from the formulæ drawn from our general expreſſion, (No. I.) and many others equally curious may be ſeen in Cagnoli's "Traité de Trigonometrie;" vol. i. of Euler's "Analyſis Infinitorum;" Bonnycaſtle's and Keith's Treatiſes of Trigonometry, &c. &c.

The formulæ to which we have above referred are the following.

Miſcellaneous Formulæ of frequent Application in the Arithmetic of Sines.

1. $\text{ſin.}\ a\ .\ \text{coſ.}\ b = \frac{1}{2}\,\text{ſin.}\ (a + b) + \frac{1}{2}\,\text{ſin.}\ (a - b)$
2. $\text{coſ.}\ a\ .\ \text{ſin.}\ b = \frac{1}{2}\,\text{ſin.}\ (a + b) - \frac{1}{2}\,\text{ſin.}\ (a - b)$
3. $\text{ſin.}\ a\ .\ \text{ſin.}\ b = \frac{1}{2}\,\text{coſ.}\ (a \backsim b) - \frac{1}{2}\,\text{coſ.}\ (a + b)$

4. $\text{coſ.}\, a \,.\, \text{coſ.}\, b = \frac{1}{2}\text{coſ.}\,(a+b) + \frac{1}{2}\text{coſ.}\,(a \backsim b)$

5. $\text{ſin.}\, a + \text{ſin.}\, b = 2\,\text{ſin.}\,\frac{1}{2}(a+b) \,.\, \text{coſ.}\,\frac{1}{2}(a \backsim b)$

6. $\text{coſ.}\, a + \text{coſ.}\, b = 2\,\text{coſ.}\,\frac{1}{2}(a+b) \,.\, \text{coſ.}\,\frac{1}{2}(a \backsim b)$

7. $\text{tan.}\, a + \text{tan.}\, b = \dfrac{\text{ſin.}\,(a+b)}{\text{coſ.}\, a \,.\, \text{coſ.}\, b}$

8. $\text{cot.}\, a + \text{cot.}\, b = \dfrac{\text{ſin.}\,(a+b)}{\text{ſin.}\, a \,.\, \text{ſin.}\, b}$

9. $\text{ſin.}\, a - \text{ſin.}\, b = 2\,\text{ſin.}\,\frac{1}{2}(a-b) \,.\, \text{coſ.}\,\frac{1}{2}(a+b)$

10. $\text{coſ.}\, a \backsim \text{coſ.}\, b = 2\,\text{ſin.}\,\frac{1}{2}(a-b) \,.\, \text{ſin.}\,\frac{1}{2}(a+b)$

11. $\text{tan.}\, a - \text{tan.}\, b = \dfrac{\text{ſin.}\,(a-b)}{\text{coſ.}\, a \,.\, \text{coſ.}\, b}$

12. $\text{cot.}\, a \backsim \text{cot.}\, b = \dfrac{\text{ſin.}\,(a-b)}{\text{ſin.}\, a \,.\, \text{ſin.}\, b}$

13. $\dfrac{\text{ſin.}\,(a+b)}{\text{ſin.}\,(a-b)} = \dfrac{\text{tan.}\, a + \text{tan.}\, b}{\text{tan.}\, a - \text{tan.}\, b} = \dfrac{\text{cot.}\, a + \text{cot.}\, b}{\text{cot.}\, a - \text{cot.}\, b}$

14. $\dfrac{\text{coſ.}\,(a+b)}{\text{coſ.}\,(a \backsim b)} = \dfrac{\text{cot.}\, b - \text{tan.}\, a}{\text{cot.}\, b + \text{tan.}\, a} = \dfrac{\text{cot.}\, a - \text{tan.}\, b}{\text{cot.}\, a + \text{tan.}\, b}$

15. $\dfrac{\text{ſin.}\, a + \text{ſin.}\, b}{\text{ſin.}\, a - \text{ſin.}\, b} = \dfrac{\text{tan.}\,\frac{1}{2}(a+b)}{\text{tan.}\,\frac{1}{2}(a-b)}$

16. $\dfrac{\text{coſ.}\, a + \text{coſ.}\, b}{\text{coſ.}\, a \backsim \text{coſ.}\, b} = \dfrac{\text{cot.}\,\frac{1}{2}(a+b)}{\text{tan.}\,\frac{1}{2}(a-b)}$

17. $\text{ſin.}\,(a-b)\,\text{ſin.}\,(a+b) = \begin{cases} \text{ſin.}^2 a - \text{ſin.}^2 b, \text{ or} \\ \text{coſ.}^2 a \backsim \text{coſ.}^2 b \end{cases}$

18. $\text{coſ.}\,(a \backsim b)\,\text{coſ.}\,(a+b) = \text{coſ.}^2 a - \text{ſin.}^2 b$

19. $\dfrac{\text{ſin.}\,(a-b)\,\text{ſin.}\,(a+b)}{\text{coſ.}^2 a \,.\, \text{coſ.}^2 b} = \text{tan.}^2 a - \text{tan.}^2 b$

20. $\dfrac{\text{ſin.}\,(a-b)\,\text{ſin.}\,(a+b)}{\text{ſin.}^2 a \,.\, \text{ſin.}^2 b} = \text{cot.}^2 a - \text{cot.}^2 b$

If $a + b + c = 180°$, then

21. $\text{tan.}\, a \,.\, \text{tan.}\, b \,.\, \text{tan.}\, c = \text{tan.}\, a + \text{tan.}\, b + \text{tan.}\, c$

22. $\text{ſin.}\, a \,.\, \text{ſin.}\, b \,.\, \text{ſin.}\, c = \frac{1}{4}(\text{ſin.}\, 2a + \text{ſin.}\, 2b + \text{ſin.}\, 2c)$

It only remains now to exhibit the method of expreſſing the ſine, coſine, &c. of an arc, in terms of the arc itſelf; and reverſedly, to expreſs the arc in terms of its ſine, coſine, &c. This is performed with great facility, if we allow ourſelves to employ the principles of the doctrine of fluxions; but our object, in this place, is to perform the ſame by means of the *arithmetic of ſines* only.

For this purpoſe, let x repreſent any arc, then it is obvious that its ſine will be ſome function of this arc, and ſuch a function that it will change its ſign, without changing its magnitude, when the arc, without changing its magnitude changes its ſign, becauſe $\text{ſin.} -x = -\text{ſin.}\, x$; conſequently the developement of the ſine in functions of the arc, will contain only the odd powers of that arc; if, therefore, we repreſent the coefficients of the odd powers of x by A, B, C, &c. we ſhall have, or may aſſume,

$$\text{ſin.}\, x = \mathrm{A}x + \mathrm{B}x^3 + \mathrm{C}x^5 + \mathrm{D}x^7, \text{ \&c.} \qquad (\alpha)$$

And if z is another arc,

$$\text{ſin.}\, z = \mathrm{A}z + \mathrm{B}z^3 + \mathrm{C}z^5 + \mathrm{D}z^7 + \text{ \&c.}$$

by ſubtraction,

$$\text{ſin.}\, x - \text{ſin.}\, z = \mathrm{A}(x-z) + \mathrm{B}(x^3 - z^3) + \mathrm{C}(x^5 - z^5) + \text{ \&c.}$$

but $\text{ſin.}\, x - \text{ſin.}\, z = 2\,\text{ſin.}\,\frac{1}{2}(x-z) \,.\, \text{coſ.}\,\frac{1}{2}(x+z)$,

therefore $\dfrac{2\,\text{ſin.}\,\frac{1}{2}(x-z) \,.\, \text{coſ.}\,\frac{1}{2}(x+z)}{x-z} =$

$$\frac{\mathrm{A}(x-z) + \mathrm{B}(x^3-z^3) + \mathrm{C}(x^5-z^5)}{x-z} + \text{ \&c.}$$

Subſtituting now for $2\,\text{ſin.}\,\frac{1}{2}(x-z)$, its expanded value, by changing x, in the firſt ſeries, into $\frac{1}{2}(x-z)$, *viz.* $2\,\text{ſin.}\,\frac{1}{2}(x-z) = \mathrm{A}(x-z) + \frac{1}{4}\mathrm{B}(x-z)^3 + \frac{1}{16}\mathrm{C}(x-z)^5 + \text{ \&c.}$ and dividing both ſides by $(x-z)$, we have, by making, after the diviſion, $x = z$,

$$\mathrm{A}\,\text{coſ.}\, x = \mathrm{A} + 3\mathrm{B}x^2 + 5\mathrm{C}x^4 + 7\mathrm{D}x^6 + \text{ \&c.} \qquad (\beta)$$

and conſequently,

$$\mathrm{A}\,\text{coſ.}\, z = \mathrm{A} + 3\mathrm{B}z^2 + 5\mathrm{C}z^4 + 7\mathrm{D}z^6 + \text{ \&c.}$$

Whence, by ſubtraction, and obſerving that

$$\text{coſ.}\, x - \text{coſ.}\, z = -2\,\text{ſin.}\,\tfrac{1}{2}(x+z)\,\text{ſin.}\,\tfrac{1}{2}(x-z)$$

$$= -\text{ſin.}\,\tfrac{1}{2}(x+z)\left\{\mathrm{A}(x-z) + \mathrm{B}(x-z)^3 + \mathrm{C}(x-z)^5 + \text{ \&c.}\right\}$$

we ſhall have, after dividing both members by $x - z$, and then making $x = z$,

$$-\mathrm{A}^2\,\text{ſin.}\, x = 2\,.\,3\,\mathrm{B}x + 4\,.\,5\,\mathrm{C}x^3 + 6\,.\,7\,\mathrm{D}x^5 + \text{ \&c.}$$

But $\qquad \text{ſin.}\, x = \mathrm{A}x + \mathrm{B}x^3 + \mathrm{C}x^5 + \text{ \&c.}$

therefore

$$-\mathrm{A}^2\,\text{ſin.}\, x = -\mathrm{A}^3 x - \mathrm{A}^2\mathrm{B}x^3 - \mathrm{A}^2\mathrm{C}x^5 + \text{ \&c.}$$

Whence, by equating the coefficients of the homologous terms, we have

$$2\,.\,3\,\mathrm{B} = -\mathrm{A}^3;\ 4\,.\,5\,\mathrm{C} = -\mathrm{A}^2\mathrm{B};$$
$$6\,.\,7\,\mathrm{D} = -\mathrm{A}^2\mathrm{C}, \text{ \&c.}$$

$$\mathrm{B} = \frac{-\mathrm{A}^3}{2\,.\,3};\ \mathrm{C} = \frac{\mathrm{A}^5}{2\,.\,3\,.\,4\,.\,5};\ \mathrm{D} = -\frac{\mathrm{A}^7}{2\,.\,3\ldots7};\ \text{\&c.}$$

ſo that

$$\text{ſin.}\, x = \mathrm{A}x - \frac{\mathrm{A}^3x^3}{2\,.\,3} + \frac{\mathrm{A}^5x^5}{2\,.\,3\,.\,4\,.\,5} - \frac{\mathrm{A}^7x^7}{2\,.\,3\,.\,.\,7} + \text{ \&c.}$$

and it remains only to find the value of A; which is readily drawn from the following conſideration; *viz.* if we divide both ſides of this equation by x, it becomes

$$\frac{\text{ſin.}\, x}{x} = \mathrm{A} - \frac{\mathrm{A}^3x^2}{2\,.\,3} + \text{ \&c.}$$

which ought to anſwer to every value of x; but when x is indefinitely ſmall, $\text{ſin.}\, x = x$, and therefore the firſt number of the equation $= 1$; therefore the ſecond alſo equal 1, conſequently $\mathrm{A} = 1$; and we have therefore

$$\text{ſin.}\, x = x - \frac{x^3}{2\,.\,3} + \frac{x^5}{2\,.\,3\,.\,4\,.\,5} - \frac{x^7}{2\,.\,3\ldots7} + \text{ \&c.} \qquad \text{(XVII.)}$$

and by ſubſtituting, in equation (β), the above values of A, B, C, &c. we obtain

$$\text{coſ.}\, x = 1 - \frac{x^2}{2} + \frac{x^4}{2\,.\,3\,.\,4} - \frac{x^6}{2\,.\,3\ldots6} + \text{ \&c.} \qquad \text{(XVIII.)}$$

In order to expreſs the arc in terms of the ſine and coſine, let x and z be two arcs; let y be the ſine of the former, and u the ſine of the latter; and ſince, for the ſame reaſon as above, the expanded functions can contain only odd powers of y and u, we will ſuppoſe that

$$x = \mathrm{A}y + \mathrm{B}y^3 + \mathrm{C}y^5 + \mathrm{D}y^7 + \text{ \&c.} \qquad (\gamma)$$
$$z = \mathrm{A}u + \mathrm{B}u^3 + \mathrm{C}u^5 + \mathrm{D}u^7 + \text{ \&c.}$$

and, by ſubtraction, we have

$$x - z = A\,(y - u) + B\,(y^3 - n^3) + C\,(y^5 - u^5) + \text{\&c.}$$

Dividing here both ſides by $y - u$, and after the diviſion making $u = y$, it will become

$$\frac{x - z}{y - u} = A + 3\,By^2 + 5\,Cy^4 + 7\,Dy^6 + \text{\&c.} \qquad (\delta)$$

In order to eſtabliſh an identity, we muſt aſcertain what the firſt member becomes, on the ſuppoſition of $u = y$, after dividing by $y - u$. Now

$$\frac{x - z}{y - u} = \frac{x - z}{\text{ſin.}\,x - \text{ſin.}\,z} = \frac{x - z}{2\,\text{ſin.}\,\frac{1}{2}(x - z)\,\text{coſ.}\,\frac{1}{2}(x + z)}.$$

Subſtituting, in the latter denominator, for $2\,\text{ſin.}\,\frac{1}{2}(x - z)$, its value, as exhibited in No. (XVII.), and dividing both its members by $x - z$; that fraction becomes

$$\frac{1}{\left\{1 - \frac{1}{2 \cdot 3 \cdot 4}(x - z)^2 + \text{\&c.}\right\}\,\text{coſ.}\,\frac{1}{2}(x + z)};$$

and if now we make $x = z$, we ſhall find the reſult will be $= \frac{1}{\text{coſ.}\,x}$. Now

$$\frac{1}{\text{coſ.}\,x} = \frac{1}{\sqrt{(1 - \text{ſin.}^2 x)}} = \frac{1}{\sqrt{(1 - y^2)}} = (1 - y^2)^{-\frac{1}{2}}$$

$$= 1 + \frac{y^2}{2} + \frac{1 \cdot 3}{2 \cdot 4}y^4 + \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6}y^6 + \frac{1 \cdot 3 \cdot 5 \cdot 7}{2 \cdot 4 \cdot 6 \cdot 8}y^8 + \text{\&c.}$$

and conſequently this ſeries is identical with equation (δ), *viz.* with

$$A + 3\,By^2 + 5\,Cy^4 + 7\,Dy^6 + 9\,Ey^8 + \text{\&c.}$$

Comparing the homologous terms, we have

$$A = 1;\ B = \frac{1}{2 \cdot 3};\ C = \frac{1 \cdot 3}{2 \cdot 4 \cdot 5};\ D = \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6 \cdot 7};\ \text{\&c.}$$

carrying, therefore, theſe values into the equation (γ), and ſubſtituting ſin. x for y, we have

$$x = \text{ſin.}\,x + \frac{\text{ſin.}^3 x}{2 \cdot 3} + \frac{1 \cdot 3\,\text{ſin.}^5 x}{2 \cdot 4 \cdot 5} + \frac{1 \cdot 3 \cdot 5\,\text{ſin.}^7 x}{2 \cdot 4 \cdot 6 \cdot 7} + \text{\&c.} \quad \text{(XIX.)}$$

and ſince the ſin. $x = \text{coſ.}\left(\frac{\pi}{2} - x\right)$, we have, by ſubſtituting this expreſſion for ſin. x, in the above ſeries,

$$x = \frac{\pi}{2} - \text{coſ.}\,x - \frac{\text{coſ.}^3 x}{2 \cdot 3} - \frac{1 \cdot 3\,\text{coſ.}^5 x}{2 \cdot 4 \cdot 5} - \frac{1 \cdot 3 \cdot 5\,\text{coſ.}^7 x}{2 \cdot 4 \cdot 6 \cdot 7}$$

$-$ &c. (XX.) in which the arc is expreſſed in terms of its coſine.

In order to inveſtigate a formula, which ſhall expreſs the arc in terms of its tangent, it may be ſhewn, as before, for the ſines, that only the odd powers of the tangent can enter into the expreſſions; aſſuming, therefore, x and z as two arcs, whoſe tangents are t and t', we may aſſume

$$x = At + Bt^3 + Ct^5 + \text{\&c.} \qquad (\varepsilon)$$
$$z = At' + Bt'^3 + Ct'^5 + \text{\&c.}$$

and, by ſubtraction, we ſhall have

$$x - z = A\,(t - t') + B\,(t^3 - t'^3) + C\,(t^5 - t'^5) + \text{\&c.}$$

Dividing both members by $t - t'$, and afterwards making $t = t'$, we have

$$\frac{x - z}{t - t'} = A + 3\,Bt^2 + 5\,Ct^4 + 7\,Dt^6 + \text{\&c.} \qquad (\theta)$$

Alſo, to eſtabliſh an identity, we have

$$\frac{x - z}{t - t'} = \frac{x - z}{\text{tan.}\,x - \text{tan.}\,z} = \frac{(x - z)\,\text{ſin.}\,(x - z)}{\text{coſ.}\,x\ .\ \text{coſ.}\,z}$$

$$= \frac{(x - z)\,\text{coſ.}\,x\ .\ \text{coſ.}\,z}{\text{ſin.}\,(x - z)}.$$

$$\text{But ſin.}\,(x - z) = (x - z) - \frac{1}{2 \cdot 3}(x - z)^3 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}(x - z)^5 - \text{\&c.}$$

If, therefore, we ſubſtitute this value for ſin. $(x - z)$, in the denominator of the latter fraction, it becomes, after dividing both members by $(x - z)$,

$$\frac{x - z}{t - t'} = \frac{\text{coſ.}\,x\ .\ \text{coſ.}\,z}{1 - \frac{x - z}{2 \cdot 3} + \frac{(x - z)^3}{2 \cdot 3 \cdot 4 \cdot 5} - \text{\&c.}}$$

which, on the ſuppoſition we have made of $t = t'$; and, conſequently, $x = z$, reduces to

$$\text{coſ.}^2 x = \frac{1}{\text{ſec.}^2 x} = \frac{1}{1 + \text{tan.}^2 x} = \frac{1}{1 + t^2} =$$
$$1 - t^2 + t^4 - t^6 + t^8 - \text{\&c.}$$

which is therefore identical with our equation (θ), *viz.*

$$A + 3\,Bt^2 + 5\,Ct^4 + 7\,Dt^6 + \text{\&c.}$$

whence, by comparing the co-efficients of the like powers of t, we have

$$A = 1,\ B = -\tfrac{1}{3},\ C = \tfrac{1}{5},\ D = -\tfrac{1}{7},\ \text{\&c.}$$

which values ſubſtituted in equation (ε), gives

$$x = \text{tan.}\,x - \tfrac{1}{3}\,\text{tan.}^3 x + \tfrac{1}{5}\,\text{tan.}^5 x - \tfrac{1}{7}\,\text{tan.}^7 x + \text{\&c.} \qquad \text{(XXI.)}$$

We ſhall now conclude this article by exhibiting, in a connected order, a few of the moſt important developements of angular functions; obſerving that A, B, C, &c. are the preceding terms.

$$1.\ a = \text{ſin.}\,a + \frac{\text{ſin.}^2 a}{2 \cdot 3}\,A + \frac{3^2\,\text{ſin.}^2 a}{4 \cdot 5}\,B + \frac{5^2\,\text{ſin.}^2 a}{6 \cdot 7}\,C + \frac{7^2\,\text{ſin.}^2 a}{8 \cdot 9}\,D + \text{\&c.}$$

where A, B, C, &c. are the preceding terms.

$$2.\ \text{ſin.}\,a = a - \frac{a^2}{2 \cdot 3}\,A + \frac{a^2}{4 \cdot 5}\,B - \frac{a^2}{6 \cdot 7}\,C + \frac{a^2}{8 \cdot 9}\,D - \text{\&c.}$$

$$3.\ a = 90^\circ - \text{coſ.}\,a - \frac{\text{coſ.}^3 a}{2 \cdot 3} - \frac{3\,\text{coſ.}^5 a}{2 \cdot 4 \cdot 5} - \frac{3 \cdot 5\,\text{coſ.}^7 a}{2 \cdot 4 \cdot 6 \cdot 7} - \text{\&c.}$$

$$4.\ \text{coſ.}\,a = 1 - \frac{a^2}{2}\,A - \frac{a^2}{3 \cdot 4}\,B - \frac{a^2}{5 \cdot 6}\,C - \frac{a^2}{7 \cdot 8}\,D - \text{\&c.}$$

$$5.\ a = \text{tan.}\,a - \frac{\text{tan.}^3 a}{3} + \frac{\text{tan.}^5 a}{5} - \frac{\text{tan.}^7 a}{7} + \text{\&c.}$$

$$6.\ \text{tan.}\ a = a + \frac{a^3}{3} + \frac{2a^5}{15} + \frac{17a^7}{315} + \frac{62a^9}{2835} + \text{\&c.}$$

$$7.\ a = \frac{1}{\text{cot.}\,a} - \frac{1}{3\,\text{cot.}^3 a} + \frac{1}{5\,\text{cot.}^5 a} - \frac{1}{7\,\text{cot.}^7 a} + \text{\&c.}$$

$$8.\ \text{cot.}\ a = \frac{1}{a} - \frac{a}{3} - \frac{a^3}{45} - \frac{2a^5}{945} - \frac{a^7}{4725} - \text{\&c.}$$

$$9.\ a = 90^\circ - \frac{1}{\text{ſec.}\,a} - \frac{1}{2 \cdot 3\,\text{ſec.}^3 a} - \frac{3}{2 \cdot 4 \cdot 5\,\text{ſec.}^5 a} - \text{\&c.}$$

$$10.\ \text{ſec.}\,a = \left\{\frac{\text{ſec.}\,a - 1}{\text{ſec.}\,a} + \frac{\text{ſec.}^3 a - 1}{2 \cdot 3\,\text{ſec.}^3 a} + \frac{3\,(\text{ſec.}^5 a - 1)}{2 \cdot 4 \cdot 5\,\text{ſec.}^5 a} + \frac{3 \cdot 5\,(\text{ſec.}^7 a - 1)}{2 \cdot 4 \cdot 6 \cdot 7\,\text{ſec.}^7 a},\ \text{\&c.}\right\}$$

$$11.\ a = \frac{1}{\text{coſec.}\,a} + \frac{1}{2 \cdot 3\,\text{coſec.}^3 a} + \frac{1 \cdot 3}{2 \cdot 4 \cdot 5\,\text{coſec.}^5 a} + \frac{1 \cdot 3 \cdot 5}{2 \cdot 4 \cdot 6 \cdot 7\,\text{coſec.}^7 a} + \text{\&c.}$$

$$12.\ \text{coſec.}\ a = \frac{1}{a} + \frac{a}{6} + \frac{7a^3}{360} + \frac{31a^5}{15120} + \frac{127a^7}{604800} + \text{\&c.}$$

$$13.\ a = 2\sqrt{2\,\text{verſ.}\,a}\left\{1 + \frac{\text{verſ.}\,a}{2^2 \cdot 3} + \frac{1 \cdot 3\,\text{verſ.}\,a}{2^3 \cdot 4 \cdot 5} + \frac{1 \cdot 3 \cdot 5\,\text{verſ.}\,a}{2^4 \cdot 4 \cdot 6 \cdot 7} + \text{\&c.}\right\}$$

$$14.\ \text{log. ſin.}\ a = \text{log.}\,a - \frac{1}{M}\left\{\frac{a^2}{2 \cdot 3} + \frac{a^4}{2^2 \cdot 3 \cdot 5} + \frac{a^6}{3^4 \cdot 5 \cdot 7} + \text{\&c.}\right\}$$

$$15.\ \text{log. coſ.}\ a = \text{log.}\,1 - \frac{1}{M}\left\{\frac{a^2}{2} + \frac{a^4}{3 \cdot 4} + \frac{a^6}{3^2 \cdot 5} + \text{\&c.}\right\}$$

$$16.\ \text{log. tan.}\ a = \text{log.}\,a + \frac{1}{M}\left\{\frac{a^2}{3} + \frac{7a^4}{2 \cdot 3^2 \cdot 5} + \frac{62a^6}{3^4 \cdot 5 \cdot 7} + \text{\&c.}\right\}$$

In all theſe ſeries, as alſo throughout the entire article, we have ſuppoſed radius = 1; if in any caſe the radius r be required, it may be introduced by giving it ſuch a power as will render the quantities on both ſides of the equation of the ſame dimenſion with regard to the powers of its factors.

Sines, *Coſines, &c. Figures of,* are figures made by conceiving the circumference of a circle extended out in a right line, upon every point of which are erected perpendicular ordinates, equal to the ſines, coſines, &c. of the correſponding arcs, and drawing a curve line through the extremities of all the ordinates, which is then the figure of the ſines, coſines, &c.

It appears that theſe figures took their riſe from the circumſtance of the extenſion of the meridian line by Edward Wright, who computed that line by collecting the ſucceſſive ſums of the ſecants, which is the ſame thing as the area of the figures of the ſecants. This being made up of all the ordinates or ſecants by the conſtruction of the figure, and in imitation of this, the figures of the other lines have been invented. By means of the figures of the ſecants, James Gregory ſhewed how the logarithmic tangents may be conſtructed in his "Exercitations Geometricæ," 4to. 1668.

Conſtruction of the Figures of the Sines, Coſines, &c.—Let A D B, &c. (*Plate* I. *fig.* 10.) be the circle, A D an arc, D E its ſine, C E its coſine, A E the verſed ſine, A F the tangent, G H the cotangent, C F the ſecant, and C H the coſecant.

Draw a line *aa* (*fig.* 11.), equal to the whole circumference A D G B A of the circle, upon which lay off alſo the length of ſeveral arcs, as of every ten degrees, from 0 at *a*, to 360° at the other end at *a*; upon theſe points raiſe perpendicular ordinates upwards or downwards, according as the ſine, coſine, &c. is affirmative or negative in that part of the circle; laſtly, upon theſe ſet off the length of the ſines, coſines, &c. correſponding to the arcs at thoſe points, or circumference *a a*, drawing a curve line through the extremities of all theſe ordinates, which will be the figure of the ſines, coſines, verſed ſines, tangents, cotangents, ſecants, and coſecants, as in *figs.* 11, 12, 13, 14, 15, 16, 17, where it may be obſerved, that the following curves are the ſame, namely, thoſe of the ſines and coſines, tangents and cotangents, and thoſe of the ſecants and coſecants, only ſome of their parts a little differently placed.

It may be known when any of theſe lines, *viz.* the ſines, coſines, &c. are poſitive or negative; that is, to be ſet upwards or downwards; by obſerving the following general rules for thoſe lines, in the 1ſt, 2d, 3d, and 4th quadrants of the circle.

The ſines	in the 1ſt and 2d	are	affirmative,
	in the 2d and 4th		negative.
The coſines	in the 1ſt and 4th		affirmative,
	in the 2d and 3d		negative.
The tangents	in the 1ſt and 3d		affirmative,
	in the 2d and 4th		negative.
The cotangents	in the 1ſt and 3d		affirmative,
	in the 2d and 4th		negative.
The ſecants	in the 1ſt and 4th		affirmative,
	in the 2d and 3d		negative.

and all the verſed ſines are affirmative.

To find the Equation and Area of each of thoſe Curves.—Draw an ordinate, *de*, putting r = the radius A C of the given circle, $x = ad$, or A D any abſciſs or arc, and $y = de$, its ordinate, which will be either the ſine D E = s, coſine C E = c, verſed ſine A E = v, tangent A F = t, cotangent G H = τ, ſecant C F = $ſ$, or coſecant C H = σ, according to the nature of the particular conſtruction. Now, from the nature of the circle are obtained theſe following general equations, expreſſing the relations between the fluxions and the circular arc, and its ſine, coſine, &c.

$$\dot{x} = \frac{r\dot{s}}{\sqrt{(r^2 - s^2)}} = \frac{-r\dot{c}}{\sqrt{(r^2 - c^2)}} = \frac{r\dot{v}}{\sqrt{(2rv - v^2)}}$$

$$= \frac{r^2\dot{t}}{r^2 + t^2} = \frac{-r^2\dot{\tau}}{r^2 + \tau^2} = \frac{r^2\dot{ſ}}{ſ\sqrt{(ſ - r^2)}} = \frac{-r^2\dot{\sigma}}{\sigma\sqrt{(\sigma^2 - r^2)}}$$

and theſe alſo expreſs the relation between the abſciſs and ordinates of the curves in queſtion, each in the order in which it ſtands; where x is the common abſciſs to all of them, and the reſpective ordinates are s, c, v, t, τ, $ſ$, and σ; and hence the area of any of theſe curves may be found as follows.

1. *In the Figure of the Sines*, (*fig.* 11.) Here $x = ad$, and s = the ordinate de, and the equation of the curve, as above, is $\dot{x} = \frac{r\dot{s}}{\sqrt{(r^2 - s^2)}}$. Hence the fluxion of the area, or $s\dot{x} = \frac{rs\dot{s}}{\sqrt{(r^2 - s^2)}}$, the correct fluent of which is $r^2 \mp r\sqrt{(r^2 - s^2)} = r^2 - rc = rv$ = the rectangle of radius and verſed ſine *minus* or *plus*, according as s is increaſing or decreaſing; which is a general expreſſion for the area ade in the figure of ſines. When $s = 0$, as at a, or b, this expreſſion becomes 0, or $2r^2$; that is, 0 at a, and $2r^2$ at b; that is, the whole area $acb = 2r^2$.

2. *In the Figure of the Coſines*, (*fig.* 12.) Here $x = ad$, and $c = de$; and the equation of the curve is $\dot{x} = \frac{-r\dot{c}}{\sqrt{(r^2 - c^2)}}$; hence the fluxion of the area $= c\dot{x} = \frac{-rc\dot{c}}{\sqrt{(r^2 - c^2)}}$; and the correct fluent of this $= r\sqrt{(r^2 - c^2)} = sr$, the rectangle of the radius and ſine for the general area $adec$. When $s = r$, or $c = 0$, this becomes r^2 = area afc, whoſe abſciſs af is equal to a quadrant of the circumference; the ſame as the figure of the ſines upon an equal abſciſs.

3. *In the Figure of the verſed Sines*, (*fig.* 13.) Here $x = ad$, and $v = de$, and the equation of the curve is $\dot{x} = \frac{r\dot{v}}{\sqrt{(2rv - v^2)}}$; hence the fluxion of the area is $v\dot{x} = \frac{rv\dot{v}}{\sqrt{(2rv - v^2)}} = \frac{r\dot{v}\sqrt{v}}{\sqrt{(2r - v)}}$; and the fluent of this is $rx - rs = r(x - s)$ = the general area in the figure of the verſed ſines. When ad is a quadrant, this becomes $\frac{3.1416}{2}r^2 - r^2$ = the area afg; and when ad is a ſemicircle it becomes $3.1416\,r^2$, the whole area of the figure of verſed ſines.

4. *In the Figure of the Tangents*, (*fig.* 14.) Here $x = ad$, and $t = de$; and the equation of the curve becomes $\dot{x} = \frac{r^2\dot{t}}{r^2 + t^2}$; and hence the fluxion of the area is $t\dot{x} = \frac{r^2t\dot{t}}{r^2 + t^2}$; the correct fluent of which is $\frac{1}{2}r^2$. hyp. log. $\frac{r^2 + t^2}{r^2} = r^2$. hyp. log. $\frac{\sqrt{(r^2 + t^2)}}{r} = r^2$. hyp. log. $\frac{ſ}{r}$; and hence the figure of the tangents may be uſed for the conſtruction of the logarithmic ſecants; a property firſt pointed out by Gregory at the end of his "Exercit. Geometricæ."

When ad becomes the quadrant af, t being then infinite, this becomes infinite for the area afg: and the ſame for the figure of cotangents, beginning at f, inſtead of a. See *fig.* 15.

5. *Figure of the Secants*, (*fig.* 16.) Here $x = ad$, and $ſ = de$; and the equation of the curves is $\dot{x} = \frac{r^2\dot{ſ}}{ſ\sqrt{(ſ^2 - r^2)}}$, and the fluxion of the area is $ſ\dot{x} = \frac{r^2ſ\dot{ſ}}{ſ\sqrt{(ſ^2 - r^2)}}$, the fluent of which is r^2 . hyp. log. $\frac{ſ + \sqrt{(ſ^2 - r^2)}}{r}$ for the general area ade; which is infinite when ad becomes equal to a quadrant. The ſame proceſs anſwers for the coſecants, beginning at f inſtead of a. See *fig.* 17.

Hence the meridional parts in Mercator's chart may be calculated for any latitude A D or ad. For the meridional parts : arc of latitude :: the ſum of the ſecants : the ſum of as many radii, or :: area ade : ad × rad. ac; or A D × A C in *fig.* 10.

Sines, *Line of*, a line on the ſector, Gunter's ſcale, &c. the deſcription and uſe of which ſee under the articles Sector, and Gunter's *Scale*.

In eſtimating the quantity of ſines, &c. we aſſume radius for unity; and determine the quantity of the ſines, tangents, and ſecants, in fractions thereof. From Ptolemy's Almageſt we learn, that the ancients divided the radius into 60 parts; which they called degrees, and thence determined the chords in minutes, ſeconds, and thirds; that is, in ſexageſimal fractions of the radius, which they likewiſe uſed in the reſolution of triangles.

The ſines, or half chords, for aught that appears, were firſt uſed by the Saracens.

Regiomontanus, at firſt, with the ancients, divided the radius into ſixty degrees, and determined the ſines of the ſeveral degrees in decimal fractions of it. But he afterwards found it would be more commodious to aſſume radius for 1; and thus introduced the preſent method into trigonometry.

In the common tables of ſines and tangents, the radius is conceived divided into 10000000 parts, beyond which we never go, in determining the quantity of the ſines and tangents. Hence, as the ſide of an hexagon ſubtends the ſixth part of a circle, and is equal to radius, the ſine of 30° is half the radius, or 5000000.

1. *The ſine* A D *being given* (*fig.* 4.), *to find the ſine-complement.* From the ſquare of the radius A C ſubtract the ſquare of the ſine A D; the remainder will be the ſquare of the ſine-complement D C or A G: whence the ſquare root being extracted, we have the ſine-complement. *E. gr.* Suppoſing A C 10000000, and A D 5000000, A G will be found 8660254, the ſine of 60°.

2. *The ſine* A D *of the arc* A E *being given* (*fig.* 18.), *to find the*

the ſine of the half arc, or half of A B. Find the chord of the arc A B; for half of this is its ſine. Thus ſuppoſing A G and A D, as in the preceding problem: we ſhall find the ſine of half the arc A B, or the ſine of 15°, = 2588190.

3. *The ſine* D G *of the arc* D F *being given, to find the ſine* D E *of the double arc* D B (*fig.* 19.) Since the angles at E and G are right angles, and the angle B is common to each triangle B C G and D E B, we ſhall have B C : C G :: B D : D E; wherefore C G being found by the firſt problem, and B D being double of D G, D E is found by the rule of proportion.

4. *The ſines* F G *and* D E (*fig.* 20.) *of the arcs* F A *and* D A, *whoſe difference* D F *is not greater than* 45 *minutes, being given, to find any intermediate ſine, as* I L. To the difference F D of the arcs, whoſe ſines are given, the difference of the arc A I, whoſe ſine is required, and A F, *viz.* I F, and the difference of the given ſines D H, find a fourth proportional: this, added to the leſs given ſine F G, the aggregate will be the ſine required.

5. *To find the ſine of* 45 *degrees.* Let H I (*fig.* 4.) be a quadrant of a circle; then will H C I be a right angle; conſequently the triangle rectangular; therefore $HI^2 = HC^2 + CI^2 = 2\,HC^2$; wherefore, ſince H C the whole ſine is 10000000; if from $2\,HC^2$, 200000000000000, be extracted the ſquare root 14142136; we ſhall have the chord H I, whoſe half 7071068, is the ſine of 45° required.

6. *The ſide of a pentagon being given* (ſee POLYGON), *the ſine of* 36° *may be eaſily found.* For the ſine of 36° is equal to half 11755706, *i. e.* = 5877853.

7. *The ſine of a minute, or* 60″, F G (*fig.* 20.) *being given, to find the ſine of one or more ſeconds* M N. Since the arcs A M and A F are very ſmall, A M F may be taken for a right line, without any ſenſible error in the decimal fractions of the radius, in which the ſine is expreſſed; that is, the arcs A M and A F may be taken proportional to their chords. Wherefore, ſince M N is parallel to F G, we ſhall have A F : F G :: A M : M N; therefore, A F, F G, and A M, being given, M N is eaſily had.

SINES, *to conſtruct a canon of.* The ſines of 30°, 15°, 45°, and 36° (which we have already ſhewn how to find) being had; we can thence conſtruct a canon of all the ſines to every minute, or every ſecond. For from the ſine of 36° we find thoſe of 18° 9° 4° 30′, and 2° 15′, by the ſecond problem: the ſines of 54° 72° 81° 85° 30′, and 87° 45′, &c. by the firſt problem.

Again, from the ſine of 45°, find the ſine of 22° 30′ 11° 15′, &c. From the ſine of 30°, and the ſine of 54°, find the ſine of 12°. From the ſine of 12°, find the ſines of 6° 3° 1° 30′ 45′ 78° 84°, &c. From the ſine of 15°, find the ſine of 7° 30′ 3° 45′, &c. till you have 120 ſines ſucceeding each other orderly, at an interval of 44 minutes. Between theſe, find the intermediate ſines by the fourth problem: thus will the canon be complete.

From the ſine of an arc given, to find the tangent and ſecant. See TANGENT, SECANT, and ſequel of this article.

To find the logarithm of a given ſine, called the *artificial* ſine, ſee LOGARITHM. Wolfii Element. Math. vol. i. p. 214, &c.

There are various other methods of conſtructing the triangular or trigonometrical canon. We ſhall here ſubjoin the following, as the moſt ſimple and eaſy. But it will be neceſſary to premiſe the three ſubſequent propoſitions.

1. *The ſine* E F *of an arc* A E (*fig.* 21.) *being given, to find its coſine* C F, *verſed ſine* A F, *tangent* A T, *cotangent* D H, *ſecant* C T, *and coſecant* C H. The coſine C F is evidently $= \sqrt{CE^2 - EF^2}$, and the verſed ſine = C E or C A − C F. And the triangles C F E, C A T, and C D H being ſimilar, we ſhall have C F : F E :: C A : AT; or the tangent will be a fourth proportional to the coſine, the ſine, and radius; and C F : C E (C A) :: C A : C T, whence the ſecant is a third proportional to the coſine and radius; and E F : C F :: C D : D H, or the cotangent is a fourth proportional to the ſine, coſine, and radius; and E F : E C (C D) :: C D : D H, or the coſecant, is a third proportional to the ſine and radius. Moreover, becauſe A T : A C :: C D (A C) : D H, the rectangle of the tangent and cotangent is equal to the ſquare of the radius, and, therefore, the tangent of half a right angle, being equal to its cotangent, is equal to the radius; and the cotangents of any two different arcs (repreſented by P and Q), are to one another inverſely as their tangents; for tang. P × cotang. P = rad.^2 = tang. Q × cotang. Q: therefore cotang. P : cotang. Q :: tang. Q : tang. P, or cotang. P : tang. Q :: cotang. Q : tang. P.

2. *If there be three equidifferent arcs* A B, A C, A D, (*fig.* 22.) *we ſhall have radius to the coſine of their common difference* B C, *or* C D, *as the ſine* C F *of the mean, to half the ſum of the ſines* B E + D G *of the two extremes; and as radius to the ſine of the common difference, ſo is the coſine of the mean to half the difference of the ſines of the two extremes.* For let B D be drawn, interſecting O C in *m*; alſo draw *m n* parallel to C F, and B H and *m v* parallel to A O. The arcs B C and C D being equal, O C is perpendicular to B D, and biſects it; and, therefore, B *m* or D *m* will be the ſine of B C or D C, and O *m* its coſine. Moreover *m n*, being an arithmetical mean between the ſines B E, D G, of the two extremes (becauſe B *m* = D *m*) is, therefore, equal to half their ſum, and D *v* equal to half their difference. But the triangles O C F, O *m n*, and D *v m*, being ſimilar, we ſhall have O C : O *m* :: C F : *m n*, and O C : D *m* :: F O : D *v*. Whence $mn\left(\frac{DG+BE}{2}\right) = \frac{Om \times CF}{OC}$, and $Dv\left(\frac{DG-BE}{2}\right) = \frac{Dm \times FO}{OC}$, and conſequently $DG + BE = \frac{2\,Om \times CF}{OC}$, and $DG - BE = \frac{2\,Dm \times FO}{OC}$. And, moreover, if the mean arc A C be 60°, O F its coſine will be = ſine 30° = $\frac{1}{2}$ chord 60° = $\frac{1}{2}$ O C; conſequently D G − B E will, in this caſe, be barely = D *m*, and D G = D *m* + B E. Hence it follows: 1. That if the ſine of the mean of three equidifferent arcs (radius being unity) be multiplied by twice the coſine of the common difference, and the ſine of either extreme be ſubtracted from the product, the remainder will be the ſine of the other extreme. And, 2. The ſine of any arc above 60° is equal to the ſine of another arc, as much below 60°, together with the ſine of its exceſs above 60°.

3. *To find the ſine of a very ſmall arc,* e. gr. *of* 15′. The chords of very ſmall arcs being to each other nearly as the arcs themſelves, we ſhall have $\frac{1}{384}$th of the ſemiperiphery : $\frac{1}{360}$th (:: 360 : 384) :: .00818121, the chord of $\frac{1}{384}$th : .008726624, the chord of $\frac{1}{360}$th of the ſemiperiphery, or half a degree, whoſe half, or .004363312, is the ſine of 15′, very nearly; and, therefore, 15′ : 1′ :: .004363312 : .000290888, the ſine of the arc of 1′ nearly.

Upon the foregoing principles the canon may be eaſily conſtructed. For, the ſine of 1′ being .0002908882, its ſquare is .00000008461594, which ſubtracted from the ſquare of the radius 1, leaves .99999991538406, whoſe ſquare root .9999999577 is the coſine of 1′, or the ſine of 89° 59′. Now having the ſine and coſine of 1′, the other ſines may be found in the following manner. Let the coſine of 1′ be called C, and we ſhall have by prop. 2. ſupra.

2 C × ſine 1′ — ſine 0′ = ſine 2′ = .0005817764
2 C × ſine 2′ — ſine 1′ = ſine 3′ = .0008726645
2 C × ſine 3′ — ſine 2′ = ſine 4′ = .0011635526
2 C × ſine 4′ — ſine 3′ = ſine 5′ = .0014544406
2 C × ſine 5′ — ſine 4′ = ſine 6′ = .0017453283, &c.

Thus are the ſines of 7′, 8′, 9′, &c. ſucceſſively derived from each other. The ſines of every degree and minute, up to 60°, being thus found; thoſe of above 60° will be had by addition only, by prop. 2. ſupra; and the ſines being all known, the tangents and ſecants will likewiſe become known by prop. 1. ſupra. If all theſe numbers be multiplied by the radius of any table (radius being here ſuppoſed unity), we ſhall have the natural ſines, tangents, &c. of ſuch a table. It will be ſufficient to compute the ſine of every fifth minute only by the preceding method; becauſe the ſines of all the intermediate arcs may be had from them, by taking the proportional parts of the differences ſo near, as to give the firſt ſix places true in each number. *Æ. gr.* 2 C 5′ × ſine 5′ — ſine 0′ = ſine 10′; ſubtract the ſine 5′ from that of 10′; add $\frac{1}{5}$th of the remainder to the ſine 5′, for the ſine of 6′, to which add the ſame $\frac{1}{5}$th for the ſine of 7′, &c. to 10′. Again, 2 C 5′ × ſine 10′ — ſine 5′ = ſine 15′, &c. Simpſon's Trigonometry, p. 10, &c. Robertſon's Elem. Navig. book iii. § 2.

The tables now chiefly uſed in trigonometrical computations, exhibit the logarithms of thoſe numbers, which expreſs the lengths of the ſines, tangents, &c. which, in order to diſtinguiſh them from the natural ones, are called logarithmic or artificial ſines, tangents, &c. A table of this kind, the uſe of which often occurs in the courſe of this work, is here annexed. The ſines, tangents, &c. of any arc are eaſily found, by ſeeking the degree at the top, if the arc be leſs than 45°, and the minutes at the ſide, beginning from the top, and by ſeeking the degree, &c. at the bottom, if the arc be greater than 45°. If a given logarithmic ſine, or tangent, falls between thoſe in the tables, the correſponding degrees and minutes may be reckoned $\frac{1}{4}$, $\frac{1}{3}$, or $\frac{1}{2}$, &c. minutes more than thoſe belonging to the neareſt leſs logarithm in the tables, according as its difference from the given one is $\frac{1}{4}$, or $\frac{1}{3}$, or $\frac{1}{2}$, &c. of the difference between the logarithm next greater and next leſs than the given log. Or generally, as 60″ is to the difference between any two conſecutive tabular ſines; ſo is the number of ſeconds beyond the leſs tabular ſine, to the proportional part that is to be added to it. Thus if it were required to find the ſine of 1° 28′ 45″:

Sine 1° 29′ is - - - - 8.4130676
Sine 1° 28′ is - - - - 8.4081614

Difference - - 49062

Then as 60″ : 49062 :: 45″ : 36796.

Therefore to - - - 8.4081614
Add - - - - 36796

Sine 1° 28′ 45″ is - - 8.4118410

And in the ſame manner may the tangent or cotangent of any angle be found to ſeconds. The ſecants and coſecants are not given in the table, but they are readily found as follows; *viz.* any coſecant is found by ſubtracting the ſine from 20.0000000, and the ſecant by ſubtracting the coſine from 20.0000000. See Sherwin's Mathematical Tables, which contain both the natural and artificial ſines, &c. and Gardiner's Tables of Logarithms, &c. in which the logarithms of the ſines are computed to every ſecond in the firſt ſeventy-two minutes of the quadrant. But the moſt correct Engliſh table at preſent extant is Dr. Hutton's, containing the logarithms of all numbers to 100000, and the natural and logarithmic ſines, coſines, tangents, &c. to every minute of the quadrant.

TABLE of Logarithmic Sines and Tangents to every Minute of the Quadrant.

Min.	0 Degree.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	0.0000000	10.0000000	0.0000000	Infinite.	60
1	6.4637261	9.9999999	6.4637261	13.5362739	59
2	6.7647561	9.9999999	6.7647562	13.2352438	58
3	6.9408473	9.9999998	6.9408475	13.0591525	57
4	7.0657860	9.9999997	7.0657863	12.9342137	56
5	7.1626960	9.9999995	7.1626964	12.8373036	55
6	7.2418771	9.9999993	7.2418778	12.7581222	54
7	7.3088239	9.9999991	7.3088248	12.6911752	53
8	7.3668157	9.9999988	7.3668169	12.6331831	52
9	7.4179681	9.9999985	7.4179696	12.5820304	51
10	7.4637255	9.9999982	7.4637273	12.5362727	50
11	7.5051181	9.9999978	7.5051203	12.4948797	49
12	7.5429065	9.9999974	7.5429091	12.4570909	48
13	7.5776684	9.9999969	7.5776715	12.4223285	47
14	7.6098530	9.9999964	7.6098566	12.3901434	46
15	7.6398160	9.9999959	7.6398201	12.3601799	45
16	7.6678445	9.9999953	7.6678492	12.3321508	44
17	7.6941733	9.9999947	7.6941786	12.3058214	43
18	7.7189966	9.9999940	7.7190026	12.2809974	42
19	7.7424775	9.9999934	7.7424841	12.2575159	41
20	7.7647537	9.9999927	7.7647610	12.2352390	40
21	7.7859427	9.9999919	7.7859508	12.2140492	39
22	7.8061458	9.9999911	7.8061547	12.1938453	38
23	7.8254507	9.9999903	7.8254604	12.1745396	37
24	7.8439338	9.9999894	7.8439444	12.1560556	36
25	7.8616623	9.9999885	7.8616738	12.1383262	35
26	7.8786953	9.9999876	7.8787077	12.1212923	34
27	7.8950854	9.9999866	7.8950988	12.1049012	33
28	7.9108793	9.9999856	7.9108938	12.0891062	32
29	7.9261190	9.9999845	7.9261344	12.0738656	31
30	7.9408419	9.9999835	7.9408584	12.0591416	30
31	7.9550819	9.9999823	7.9550996	12.0449004	29
32	7.9688698	9.9999812	7.9688886	12.0311114	28
33	7.9822334	9.9999800	7.9822534	12.0177466	27
34	7.9951980	9.9999788	7.9952192	12.0047808	26
35	8.0077867	9.9999775	8.0078092	11.9921908	25
36	8.0200207	9.9999762	8.0200445	11.9799555	24
37	8.0319195	9.9999748	8.0319446	11.9680554	23
38	8.0435009	9.9999735	8.0435274	11.9564726	22
39	8.0547814	9.9999721	8.0548094	11.9451906	21
40	8.0657763	9.9999706	8.0658057	11.9341943	20
41	8.0764997	9.9999691	8.0765306	11.9234694	19
42	8.0869646	9.9999676	8.0869970	11.9130030	18
43	8.0971832	9.9999660	8.0972172	11.9027828	17
44	8.1071669	9.9999644	8.1072025	11.8927975	16
45	8.1169262	9.9999628	8.1169634	11.8830366	15
46	8.1264710	9.9999611	8.1265099	11.8734901	14
47	8.1358104	9.9999594	8.1358510	11.8641490	13
48	8.1449532	9.9999577	8.1449956	11.8550044	12
49	8.1539075	9.9999559	8.1539516	11.8460484	11
50	8.1626808	9.9999541	8.1627267	11.8372733	10
51	8.1712804	9.9999522	8.1713282	11.8286718	9
52	8.1797129	9.9999503	8.1797626	11.8202374	8
53	8.1879848	9.9999484	8.1880364	11.8119636	7
54	8.1961020	9.9999464	8.1961556	11.8038444	6
55	8.2040703	9.9999444	8.2041259	11.7958741	5
56	8.2118949	9.9999424	8.2119526	11.7880474	4
57	8.2195811	9.9999403	8.2196408	11.7803592	3
58	8.2271335	9.9999382	8.2271953	11.7728047	2
59	8.2345568	9.9999360	8.2346208	11.7653792	1
60	8.2418553	9.9999338	8.2419215	11.7580785	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	89 Degrees.				

Min.	1 Degree.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	8.2418553	9.9999338	8.2419215	11.7580785	60
1	8.2490332	9.9999316	8.2491015	11.7508985	59
2	8.2560943	9.9999294	8.2561649	11.7438351	58
3	8.2630424	9.9999271	8.2631153	11.7368847	57
4	8.2698810	9.9999247	8.2699563	11.7300437	56
5	8.2766136	9.9999224	8.2766912	11.7233088	55
6	8.2832434	9.9999200	8.2833234	11.7166766	54
7	8.2897734	9.9999175	8.2898559	11.7101441	53
8	8.2962067	9.9999150	8.2962917	11.7037083	52
9	8.3025460	9.9999125	8.3026335	11.6973665	51
10	8.3087941	9.9999100	8.3088842	11.6911158	50
11	8.3149536	9.9999074	8.3150462	11.6849538	49
12	8.3210269	9.9999047	8.3211221	11.6788779	48
13	8.3270163	9.9999021	8.3271143	11.6728857	47
14	8.3329243	9.9998994	8.3330249	11.6669751	46
15	8.3387529	9.9998966	8.3388563	11.6611437	45
16	8.3445043	9.9998939	8.3446105	11.6553895	44
17	8.3501805	9.9998911	8.3502895	11.6497105	43
18	8.3557835	9.9998882	8.3558953	11.6441047	42
19	8.3613150	9.9998853	8.3614297	11.6385703	41
20	8.3667769	9.9998824	8.3668945	11.6331055	40
21	8.3721710	9.9998794	8.3722915	11.6277085	39
22	8.3774988	9.9998764	8.3776223	11.6223777	38
23	8.3827620	9.9998734	8.3828886	11.6171114	37
24	8.3879622	9.9998703	8.3880918	11.6119082	36
25	8.3931008	9.9998672	8.3932336	11.6067664	35
26	8.3981793	9.9998641	8.3983152	11.6016848	34
27	8.4031990	9.9998609	8.4033381	11.5966619	33
28	8.4081614	9.9998577	8.4083037	11.5916963	32
29	8.4130676	9.9998544	8.4132132	11.5867868	31
30	8.4179190	9.9998512	8.4180679	11.5819321	30
31	8.4227168	9.9998478	8.4228690	11.5771310	29
32	8.4274621	9.9998445	8.4276176	11.5723824	28
33	8.4321561	9.9998411	8.4323150	11.5676850	27
34	8.4367999	9.9998376	8.4369622	11.5630378	26
35	8.4413944	9.9998342	8.4415603	11.5584397	25
36	8.4459409	9.9998306	8.4461103	11.5538897	24
37	8.4504402	9.9998271	8.4506131	11.5493869	23
38	8.4548934	9.9998235	8.4550699	11.5449301	22
39	8.4593013	9.9998199	8.4594814	11.5405186	21
40	8.4636649	9.9998162	8.4638486	11.5361514	20
41	8.4679850	9.9998125	8.4681725	11.5318275	19
42	8.4722626	9.9998088	8.4724538	11.5275462	18
43	8.4764984	9.9998050	8.4766933	11.5233067	17
44	8.4806932	9.9998012	8.4808920	11.5191080	16
45	8.4848479	9.9997974	8.4850505	11.5149495	15
46	8.4889632	9.9997935	8.4891696	11.5108304	14
47	8.4930398	9.9997896	8.4932502	11.5067498	13
48	8.4970784	9.9997856	8.4972928	11.5027072	12
49	8.5010798	9.9997817	8.5012982	11.4987018	11
50	8.5050447	9.9997776	8.5052671	11.4947329	10
51	8.5089736	9.9997736	8.5092001	11.4907999	9
52	8.5128673	9.9997695	8.5130978	11.4869022	8
53	8.5167264	9.9997653	8.5169610	11.4830390	7
54	8.5205514	9.9997612	8.5207902	11.4792098	6
55	8.5243430	9.9997570	8.5245860	11.4754140	5
56	8.5281017	9.9997527	8.5283490	11.4716510	4
57	8.5318281	9.9997484	8.5320797	11.4679203	3
58	8.5355228	9.9997441	8.5357787	11.4642213	2
59	8.5391863	9.9997398	8.5394466	11.4605534	1
60	8.5428192	9.9997354	8.5430838	11.4569162	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	88 Degrees.				

Min.	2 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	8.5428192	9.9997354	8.5430838	11.4569162	60
1	8.5464218	9.9997309	8.5466909	11.4533091	59
2	8.5499948	9.9997265	8.5502683	11.4497317	58
3	8.5535386	9.9997220	8.5538166	11.4461834	57
4	8.5570536	9.9997174	8.5573362	11.4426638	56
5	8.5605404	9.9997128	8.5608276	11.4391724	55
6	8.5639994	9.9997082	8.5642912	11.4357088	54
7	8.5674310	9.9997036	8.5677275	11.4322725	53
8	8.5708357	9.9996989	8.5711368	11.4288632	52
9	8.5742139	9.9996942	8.5745197	11.4254803	51
10	8.5775660	9.9996894	8.5778766	11.4221234	50
11	8.5808923	9.9996846	8.5812077	11.4187923	49
12	8.5841933	9.9996798	8.5845136	11.4154864	48
13	8.5874694	9.9996749	8.5877945	11.4122055	47
14	8.5907209	9.9996700	8.5910509	11.4089491	46
15	8.5939483	9.9996650	8.5942832	11.4057168	45
16	8.5971517	9.9996601	8.5974917	11.4025083	44
17	8.6003317	9.9996550	8.6006767	11.3993233	43
18	8.6034886	9.9996500	8.6038386	11.3961614	42
19	8.6066226	9.9996449	8.6069777	11.3930223	41
20	8.6097341	9.9996398	8.6100943	11.3899057	40
21	8.6128235	9.9996346	8.6131889	11.3868111	39
22	8.6158910	9.9996294	8.6162616	11.3837384	38
23	8.6189369	9.9996242	8.6193127	11.3806873	37
24	8.6219616	9.9996189	8.6223427	11.3776573	36
25	8.6249653	9.9996136	8.6253518	11.3746482	35
26	8.6279484	9.9996082	8.6283402	11.3716598	34
27	8.6309111	9.9996028	8.6313083	11.3686917	33
28	8.6338537	9.9995974	8.6342563	11.3657437	32
29	8.6367764	9.9995919	8.6371845	11.3628155	31
30	8.6396796	9.9995865	8.6400931	11.3599069	30
31	8.6425634	9.9995809	8.6429825	11.3570175	29
32	8.6454282	9.9995753	8.6458528	11.3541472	28
33	8.6482742	9.9995697	8.6487044	11.3512956	27
34	8.6511016	9.9995641	8.6515375	11.3484625	26
35	8.6539107	9.9995584	8.6543522	11.3456478	25
36	8.6567017	9.9995527	8.6571490	11.3428510	24
37	8.6594748	9.9995469	8.6599279	11.3400721	23
38	8.6622303	9.9995411	8.6626891	11.3373109	22
39	8.6649684	9.9995353	8.6654331	11.3345669	21
40	8.6676893	9.9995295	8.6681598	11.3318402	20
41	8.6703932	9.9995236	8.6708697	11.3291303	19
42	8.6730804	9.9995176	8.6735628	11.3264372	18
43	8.6757510	9.9995116	8.6762393	11.3237607	17
44	8.6784052	9.9995056	8.6788996	11.3211004	16
45	8.6810433	9.9994996	8.6815437	11.3184563	15
46	8.6836654	9.9994935	8.6841719	11.3158281	14
47	8.6862718	9.9994874	8.6867844	11.3132156	13
48	8.6888625	9.9994812	8.6893813	11.3106187	12
49	8.6914379	9.9994750	8.6919629	11.3080371	11
50	8.6939980	9.9994688	8.6945292	11.3054708	10
51	8.6965431	9.9994625	8.6970806	11.3029194	9
52	8.6990734	9.9994562	8.6996172	11.3003828	8
53	8.7015889	9.9994498	8.7021390	11.2978610	7
54	8.7040899	9.9994435	8.7046465	11.2953535	6
55	8.7065766	9.9994370	8.7071395	11.2928605	5
56	8.7090490	9.9994306	8.7096185	11.2903815	4
57	8.7115075	9.9994241	8.7120834	11.2879166	3
58	8.7139520	9.9994176	8.7145345	11.2854655	2
59	8.7163829	9.9994110	8.7169719	11.2830281	1
60	8.7188002	9.9994044	8.7193958	11.2806042	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	87 Degrees.				

Min.	3 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	8.7188002	9.9994044	8.7193958	11.2806042	60
1	8.7212040	9.9993978	8.7218063	11.2781937	59
2	8.7235946	9.9993911	8.7242035	11.2757965	58
3	8.7259721	9.9993844	8.7265877	11.2734123	57
4	8.7283366	9.9993776	8.7289589	11.2710411	56
5	8.7306882	9.9993708	8.7313174	11.2686826	55
6	8.7330272	9.9993640	8.7336631	11.2663369	54
7	8.7353535	9.9993572	8.7359964	11.2640036	53
8	8.7376675	9.9993503	8.7383172	11.2616828	52
9	8.7399691	9.9993433	8.7406258	11.2593742	51
10	8.7422586	9.9993364	8.7429222	11.2570778	50
11	8.7445360	9.9993293	8.7452067	11.2547933	49
12	8.7468015	9.9993223	8.7474792	11.2525208	48
13	8.7490553	9.9993152	8.7497400	11.2502600	47
14	8.7512973	9.9993081	8.7519892	11.2480108	46
15	8.7535278	9.9993009	8.7542269	11.2457731	45
16	8.7557469	9.9992938	8.7564531	11.2435469	44
17	8.7579546	9.9992865	8.7586681	11.2413319	43
18	8.7601512	9.9992793	8.7608719	11.2391281	42
19	8.7623366	9.9992720	8.7630647	11.2369353	41
20	8.7645111	9.9992646	8.7652465	11.2347535	40
21	8.7666747	9.9992572	8.7674175	11.2325825	39
22	8.7688275	9.9992498	8.7695777	11.2304223	38
23	8.7709697	9.9992424	8.7717274	11.2282726	37
24	8.7731014	9.9992349	8.7738665	11.2261335	36
25	8.7752226	9.9992274	8.7759952	11.2240048	35
26	8.7773334	9.9992198	8.7781136	11.2218864	34
27	8.7794340	9.9992122	8.7802218	11.2197782	33
28	8.7815244	9.9992046	8.7823199	11.2176801	32
29	8.7836048	9.9991969	8.7844079	11.2155921	31
30	8.7856753	9.9991892	8.7864861	11.2135139	30
31	8.7877359	9.9991815	8.7885544	11.2114456	29
32	8.7897867	9.9991737	8.7906130	11.2093870	28
33	8.7918278	9.9991659	8.7926620	11.2073380	27
34	8.7938594	9.9991580	8.7947014	11.2052986	26
35	8.7958814	9.9991501	8.7967313	11.2032687	25
36	8.7978941	9.9991422	8.7987519	11.2012481	24
37	8.7998974	9.9991342	8.8007632	11.1992368	23
38	8.8018915	9.9991262	8.8027653	11.1972347	22
39	8.8038764	9.9991182	8.8047583	11.1952417	21
40	8.8058523	9.9991101	8.8067422	11.1932578	20
41	8.8078192	9.9991020	8.8087172	11.1912828	19
42	8.8097772	9.9990938	8.8106834	11.1893166	18
43	8.8117264	9.9990856	8.8126407	11.1873593	17
44	8.8136668	9.9990774	8.8145894	11.1854106	16
45	8.8155985	9.9990691	8.8165294	11.1834706	15
46	8.8175217	9.9990608	8.8184608	11.1815392	14
47	8.8194363	9.9990525	8.8203838	11.1796162	13
48	8.8213425	9.9990441	8.8222984	11.1777016	12
49	8.8232404	9.9990357	8.8242046	11.1757954	11
50	8.8251299	9.9990273	8.8261026	11.1738974	10
51	8.8270112	9.9990188	8.8279924	11.1720076	9
52	8.8288844	9.9990103	8.8298741	11.1701259	8
53	8.8307495	9.9990017	8.8317478	11.1682522	7
54	8.8326066	9.9989931	8.8336134	11.1663866	6
55	8.8344557	9.9989845	8.8354712	11.1645288	5
56	8.8362969	9.9989758	8.8373211	11.1626789	4
57	8.8381304	9.9989671	8.8391633	11.1608367	3
58	8.8399561	9.9989584	8.8409977	11.1590023	2
59	8.8417741	9.9989496	8.8428245	11.1571755	1
60	8.8435845	9.9989408	8.8446437	11.1553563	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	86 Degrees.				

Min.	4 Degrees.				
	Sine.	Cosine.	Tang.	Cotangent.	
0	8.8435845	9.9989408	8.8446437	11.1553563	60
1	8.8453874	9.9989319	8.8464554	11.1535446	59
2	8.8471827	9.9989230	8.8482597	11.1517403	58
3	8.8489707	9.9989141	8.8500566	11.1499434	57
4	8.8507512	9.9989052	8.8518461	11.1481539	56
5	8.8525245	9.9988962	8.8536283	11.1463717	55
6	8.8542905	9.9988871	8.8554069	11.1445946	54
7	8.8560493	9.9988780	8.8571713	11.1428287	53
8	8.8578010	9.9988689	8.8589321	11.1410679	52
9	8.8595457	9.9988598	8.8606859	11.1393141	51
10	8.8612833	9.9988506	8.8624327	11.1375673	50
11	8.8630139	9.9988414	8.8641725	11.1358275	49
12	8.8647376	9.9988321	8.8659055	11.1340945	48
13	8.8664545	9.9988228	8.8676317	11.1323683	47
14	8.8681646	9.9988135	8.8693511	11.1306489	46
15	8.8698680	9.9988041	8.8710638	11.1289362	45
16	8.8715646	9.9987947	8.8727699	11.1272301	44
17	8.8732546	9.9987853	8.8744694	11.1255306	43
18	8.8749381	9.9987758	8.8761623	11.1238377	42
19	8.8766150	9.9987663	8.8778487	11.1221513	41
20	8.8782854	9.9987567	8.8795286	11.1204714	40
21	8.8799493	9.9987471	8.8812022	11.1187978	39
22	8.8816069	9.9987375	8.8828694	11.1171306	38
23	8.8832581	9.9987278	8.8845303	11.1154697	37
24	8.8849031	9.9987181	8.8861850	11.1138150	36
25	8.8865418	9.9987084	8.8878334	11.1121666	35
26	8.8881743	9.9986986	8.8894757	11.1105243	34
27	8.8898007	9.9986888	8.8911119	11.1088881	33
28	8.8914209	9.9986790	8.8927420	11.1072580	32
29	8.8930351	9.9986691	8.8943660	11.1056340	31
30	8.8946433	9.9986591	8.8959842	11.1040158	30
31	8.8962455	9.9986492	8.8975963	11.1024037	29
32	8.8978418	9.9986392	8.8992026	11.1007974	28
33	8.8994322	9.9986292	8.9008030	11.0991970	27
34	8.9010168	9.9986191	8.9023977	11.0976023	26
35	8.9025955	9.9986090	8.9039866	11.0960134	25
36	8.9041685	9.9985988	8.9055697	11.0944303	24
37	8.9057358	9.9985886	8.9071472	11.0928528	23
38	8.9072975	9.9985784	8.9087190	11.0912810	22
39	8.9088535	9.9985682	8.9102853	11.0897147	21
40	8.9104039	9.9985579	8.9118460	11.0881540	20
41	8.9119487	9.9985475	8.9134012	11.0865988	19
42	8.9134881	9.9985372	8.9149509	11.0850491	18
43	8.9150219	9.9985268	8.9164952	11.0835048	17
44	8.9165504	9.9985163	8.9180340	11.0819660	16
45	8.9180734	9.9985058	8.9195675	11.0804325	15
46	8.9195911	9.9984953	8.9210957	11.0789043	14
47	8.9211034	9.9984848	8.9226186	11.0773814	13
48	8.9226105	9.9984742	8.9241363	11.0758637	12
49	8.9241123	9.9984636	8.9256487	11.0743513	11
50	8.9256089	9.9984529	8.9271560	11.0728440	10
51	8.9271003	9.9984422	8.9286581	11.0713419	9
52	8.9285866	9.9984315	8.9301552	11.0698448	8
53	8.9300678	9.9984207	8.9316471	11.0683529	7
54	8.9315439	9.9984099	8.9331340	11.0668660	6
55	8.9330150	9.9983990	8.9346160	11.0653840	5
56	8.9344811	9.9983881	8.9360929	11.0639071	4
57	8.9359422	9.9983772	8.9375650	11.0624350	3
58	8.9373983	9.9983663	8.9390321	11.0609679	2
59	8.9388496	9.9983553	8.9404944	11.0595956	1
60	8.9402960	9.9983442	8.9419518	11.0580482	0
	Cosine.	Sine.	Cotangent.	Tang.	Min.
	85 Degrees.				

Min.	5 Degrees.				
	Sine.	Cosine.	Tang.	Cotangent.	
0	8.9402960	9.9983442	8.9419518	11.0580482	60
1	8.9417376	9.9983332	8.9434044	11.0565956	59
2	8.9431743	9.9983220	8.9448523	11.0551477	58
3	8.9446063	9.9983109	8.9462954	11.0537046	57
4	8.9460335	9.9982997	8.9477338	11.0522662	56
5	8.9474561	9.9982885	8.9491676	11.0508324	55
6	8.9488739	9.9982772	8.9505967	11.0494033	54
7	8.9502871	9.9982660	8.9520211	11.0479789	53
8	8.9516957	9.9982546	8.9534410	11.0465590	52
9	8.9530996	9.9982433	8.9548564	11.0451436	51
10	8.9544991	9.9982318	8.9562672	11.0437328	50
11	8.9558940	9.9982204	8.9576735	11.0423265	49
12	8.9572843	9.9982089	8.9590754	11.0409246	48
13	8.9586703	9.9981974	8.9604728	11.0395272	47
14	8.9600517	9.9981859	8.9618659	11.0381341	46
15	8.9614288	9.9981743	8.9632545	11.0367455	45
16	8.9628014	9.9981626	8.9646388	11.0353612	44
17	8.9641697	9.9981510	8.9660188	11.0339812	43
18	8.9655337	9.9981393	8.9673944	11.0326056	42
19	8.9668934	9.9981275	8.9687658	11.0312342	41
20	8.9682487	9.9981158	8.9701330	11.0298670	40
21	8.9695999	9.9981040	8.9714959	11.0285041	39
22	8.9709468	9.9980921	8.9728547	11.0271453	38
23	8.9722895	9.9980802	8.9742092	11.0257908	37
24	8.9736280	9.9980683	8.9755597	11.0244403	36
25	8.9749624	9.9980563	8.9769060	11.0230940	35
26	8.9762926	9.9980443	8.9782483	11.0217517	34
27	8.9776188	9.9980323	8.9795865	11.0204135	33
28	8.9789408	9.9980202	8.9809206	11.0190794	32
29	8.9802589	9.9980081	8.9822507	11.0177493	31
30	8.9815729	9.9979960	8.9835769	11.0164231	30
31	8.9828829	9.9979838	8.9848991	11.0151009	29
32	8.9841889	9.9979716	8.9862173	11.0137827	28
33	8.9854910	9.9979593	8.9875317	11.0124683	27
34	8.9867891	9.9979470	8.9888421	11.0111579	26
35	8.9880834	9.9979347	8.9901487	11.0098513	25
36	8.9893737	9.9979223	8.9914514	11.0085486	24
37	8.9906602	9.9979099	8.9927503	11.0072497	23
38	8.9919429	9.9978975	8.9940454	11.0059546	22
39	8.9932217	9.9978850	8.9953367	11.0046633	21
40	8.9944968	9.9978725	8.9966243	11.0033757	20
41	8.9957681	9.9978599	8.9979081	11.0020919	19
42	8.9970356	9.9978473	8.9991883	11.0008117	18
43	8.9982994	9.9978347	9.0004647	10.9995353	17
44	8.9995595	9.9978220	9.0017375	10.9982625	16
45	9.0008160	9.9978093	9.0030066	10.9969934	15
46	9.0020687	9.9977966	9.0042721	10.9957279	14
47	9.0033179	9.9977838	9.0055340	10.9944660	13
48	9.0045634	9.9977710	9.0067924	10.9932076	12
49	9.0058053	9.9977582	9.0080471	10.9919529	11
50	9.0070436	9.9977453	9.0092984	10.9907016	10
51	9.0082784	9.9977323	9.0105461	10.9894539	9
52	9.0095096	9.9977194	9.0117903	10.9882097	8
53	9.0107374	9.9977064	9.0130310	10.9869690	7
54	9.0119616	9.9976933	9.0142682	10.9857318	6
55	9.0131823	9.9976803	9.0155021	10.9844979	5
56	9.0143996	9.9976672	9.0167325	10.9832675	4
57	9.0156135	9.9976540	9.0179594	10.9820406	3
58	9.0168239	9.9976408	9.0191831	10.9808169	2
59	9.0180309	9.9976276	9.0204033	10.9795967	1
60	9.0192346	9.9976143	9.0216202	10.9783798	0
	Cosine.	Sine.	Cotangent.	Tang.	Min.
	84 Degrees.				

Min.	6 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.0192346	9.9976143	9.0216202	10.9783798	60
1	9.0204348	9.9976011	9.0228338	10.9771662	59
2	9.0216318	9.9975877	9.0240441	10.9759559	58
3	9.0228254	9.9975743	9.0252510	10.9747490	57
4	9.0240157	9.9975609	9.0264548	10.9735452	56
5	9.0252027	9.9975475	9.0276552	10.9723448	55
6	9.0263865	9.9975340	9.0288524	10.9711476	54
7	9.0275669	9.9975205	9.0300464	10.9699536	53
8	9.0287442	9.9975069	9.0312373	10.9687627	52
9	9.0299182	9.9974933	9.0324249	10.9675751	51
10	9.0310890	9.9974797	9.0336093	10.9663907	50
11	9.0322567	9.9974660	9.0347906	10.9652094	49
12	9.0334212	9.9974523	9.0359688	10.9640312	48
13	9.0345825	9.9974386	9.0371439	10.9628561	47
14	9.0357407	9.9974248	9.0383159	10.9616841	46
15	9.0368958	9.9974110	9.0394848	10.9605152	45
16	9.0380477	9.9973971	9.0406506	10.9593494	44
17	9.0391966	9.9973833	9.0418134	10.9581866	43
18	9.0403424	9.9973693	9.0429731	10.9570269	42
19	9.0414852	9.9973554	9.0441299	10.9558701	41
20	9.0426249	9.9973414	9.0452836	10.9547164	40
21	9.0437617	9.9973273	9.0464343	10.9535657	39
22	9.0448954	9.9973132	9.0475821	10.9524179	38
23	9.0460261	9.9972991	9.0487270	10.9512730	37
24	9.0471538	9.9972850	9.0498689	10.9501311	36
25	9.0482786	9.9972708	9.0510078	10.9489922	35
26	9.0494005	9.9972566	9.0521439	10.9478561	34
27	9.0505194	9.9972423	9.0532771	10.9467229	33
28	9.0516354	9.9972280	9.0544074	10.9455926	32
29	9.0527485	9.9972137	9.0555349	10.9444651	31
30	9.0538588	9.9971993	9.0566595	10.9433405	30
31	9.0549661	9.9971849	9.0577813	10.9422187	29
32	9.0560706	9.9971704	9.0589002	10.9410998	28
33	9.0571723	9.9971559	9.0600164	10.9399836	27
34	9.0582711	9.9971414	9.0611297	10.9388703	26
35	9.0593672	9.9971268	9.0622403	10.9377597	25
36	9.0604604	9.9971122	9.0633482	10.9366518	24
37	9.0615509	9.9970976	9.0644533	10.9355467	23
38	9.0626386	9.9970829	9.0655556	10.9344444	22
39	9.0637235	9.9970682	9.0666553	10.9333447	21
40	9.0648057	9.9970535	9.0677522	10.9322478	20
41	9.0658852	9.9970387	9.0688465	10.9311535	19
42	9.0669619	9.9970239	9.0699381	10.9300619	18
43	9.0680360	9.9970090	9.0710270	10.9289730	17
44	9.0691074	9.9969941	9.0721133	10.9278867	16
45	9.0701761	9.9969792	9.0731969	10.9268031	15
46	9.0712421	9.9969642	9.0742779	10.9257221	14
47	9.0723055	9.9969492	9.0753563	10.9246437	13
48	9.0733663	9.9969342	9.0764321	10.9235679	12
49	9.0744244	9.9969191	9.0775053	10.9224947	11
50	9.0754799	9.9969040	9.0785760	10.9214240	10
51	9.0765329	9.9968888	9.0796441	10.9203559	9
52	9.0775832	9.9968736	9.0807096	10.9192904	8
53	9.0786310	9.9968584	9.0817726	10.9182274	7
54	9.0796762	9.9968431	9.0828331	10.9171669	6
55	9.0807189	9.9968278	9.0838911	10.9161089	5
56	9.0817590	9.9968125	9.0849466	10.9150534	4
57	9.0827966	9.9967971	9.0859996	10.9140004	3
58	9.0838317	9.9967817	9.0870501	10.9129499	2
59	9.0848643	9.9967662	9.0880981	10.9119019	1
60	9.0858945	9.9967507	9.0891438	10.9108562	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	83 Degrees.				

Min.	7 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.0858945	9.9967507	9.0891438	10.9108562	60
1	9.0869221	9.9967352	9.0901869	10.9098131	59
2	9.0879473	9.9967196	9.0912277	10.9087723	58
3	9.0889700	9.9967040	9.0922660	10.9077340	57
4	9.0899903	9.9966884	9.0933020	10.9066980	56
5	9.0910082	9.9966727	9.0943355	10.9056645	55
6	9.0920237	9.9966570	9.0953667	10.9046333	54
7	9.0930367	9.9966412	9.0963955	10.9036045	53
8	9.0940474	9.9966254	9.0974219	10.9025781	52
9	9.0950556	9.9966096	9.0984460	10.9015540	51
10	9.0960615	9.9965937	9.0994678	10.9005322	50
11	9.0970651	9.9965778	9.1004872	10.8995128	49
12	9.0980662	9.9965619	9.1015044	10.8984956	48
13	9.0990651	9.9965459	9.1025192	10.8974808	47
14	9.1000616	9.9965299	9.1035317	10.8964683	46
15	9.1010558	9.9965138	9.1045420	10.8954580	45
16	9.1020477	9.9964977	9.1055500	10.8944500	44
17	9.1030373	9.9964816	9.1065557	10.8934443	43
18	9.1040246	9.9964655	9.1075591	10.8924409	42
19	9.1050096	9.9964493	9.1085604	10.8914396	41
20	9.1059924	9.9964330	9.1095594	10.8904406	40
21	9.1069729	9.9964167	9.1105562	10.8894438	39
22	9.1079512	9.9964004	9.1115508	10.8884492	38
23	9.1089272	9.9963841	9.1125431	10.8874569	37
24	9.1099010	9.9963677	9.1135333	10.8864667	36
25	9.1108726	9.9963513	9.1145213	10.8854787	35
26	9.1118420	9.9963348	9.1155072	10.8844928	34
27	9.1128092	9.9963183	9.1164909	10.8835091	33
28	9.1137742	9.9963018	9.1174724	10.8825276	32
29	9.1147370	9.9962852	9.1184518	10.8815482	31
30	9.1156977	9.9662686	9.1194291	10.8805709	30
31	9.1166562	9.9962519	9.1204043	10.8795957	29
32	9.1176125	9.9962352	9.1213773	10.8786227	28
33	9.1185667	9.9962185	9.1223482	10.8776518	27
34	9.1195188	9.9962017	9.1233171	10.8766829	26
35	9.1204688	9.9961849	9.1242839	10.8757161	25
36	9.1214167	9.9961681	9.1252486	10.8747514	24
37	9.1223624	9.9961512	9.1262112	10.8737888	23
38	9.1233061	9.9961343	9.1271718	10.8728282	22
39	9.1242477	9.9961174	9.1281303	10.8718697	21
40	9.1251872	9.9961004	9.1290868	10.8709132	20
41	9.1261246	9.9960834	9.1300413	10.8699587	19
42	9.1270600	9.9960663	9.1309937	10.8690063	18
43	9.1279934	9.9960492	9.1319442	10.8680558	17
44	9.1289247	9.9960321	9.1328926	10.8671074	16
45	9.1298539	9.9960149	9.1338391	10.8661609	15
46	9.1307812	9.9959977	9.1347835	10.8652165	14
47	9.1317064	9.9959804	9.1357260	10.8642740	13
48	9.1326297	9.9959631	9.1366665	10.8633335	12
49	9.1335509	9.9959458	9.1376051	10.8623949	11
50	9.1344702	9.9959284	9.1385417	10.8614583	10
51	9.1353875	9.9959111	9.1394764	10.8605236	9
52	9.1363028	9.9958936	9.1404092	10.8595908	8
53	9.1372161	9.9958761	9.1413400	10.8586600	7
54	9.1381275	9.9958586	9.1422689	10.8577311	6
55	9.1390370	9.9958411	9.1431959	10.8568041	5
56	9.1399445	9.9958235	9.1441210	10.8558790	4
57	9.1408501	9.9958059	9.1450442	10.8549558	3
58	9.1417537	9.9957882	9.1459655	10.8540345	2
59	9.1426555	9.9957705	9.1468849	10.8531151	1
60	9.1435553	9.9957528	9.1478025	10.8521975	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	82 Degrees.				

Min.	8 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.1435553	9.9957528	9.1478025	10.8521975	60
1	9.1444532	9.9957350	9.1487182	10.8512818	59
2	9.1453493	9.9957172	9.1496321	10.8503679	58
3	9.1462435	9.9956993	9.1505441	10.8494559	57
4	9.1471358	9.9956815	9.1514543	10.8485457	56
5	9.1480262	9.9956635	9.1523627	10.8476373	55
6	9.1489148	9.9956456	9.1532692	10.8467308	54
7	9.1498015	9.9956276	9.1541739	10.8458261	53
8	9.1506864	9.9956095	9.1550769	10.8449231	52
9	9.1515694	9.9955915	9.1559780	10.8440220	51
10	9.1524507	9.9955734	9.1568773	10.8431227	50
11	9.1533301	9.9955552	9.1577748	10.8422252	49
12	9.1542076	9.9955370	9.1586706	10.8413294	48
13	9.1550834	9.9955188	9.1595646	10.8404354	47
14	9.1559574	9.9955005	9.1604569	10.8395431	46
15	9.1568296	9.9954822	9.1613473	10.8386527	45
16	9.1577000	9.9954639	9.1622361	10.8377639	44
17	9.1585686	9.9954455	9.1631231	10.8368769	43
18	9.1594354	9.9954271	9.1640083	10.8359917	42
19	9.1603005	9.9954087	9.1648919	10.8351081	41
20	9.1611639	9.9953902	9.1657737	10.8342263	40
21	9.1620254	9.9953717	9.1666538	10.8333462	39
22	9.1628853	9.9953531	9.1675322	10.8324678	38
23	9.1637434	9.9953345	9.1684989	10.8315911	37
24	9.1645998	9.9953159	9.1692839	10.8307161	36
25	9.1654544	9.9952972	9.1701572	10.8298428	35
26	9.1663074	9.9952785	9.1710289	10.8289711	34
27	9.1671586	9.9952597	9.1718989	10.8281011	33
28	9.1680081	9.9952409	9.1727672	10.8272328	32
29	9.1688559	9.9952221	9.1736338	10.8263662	31
30	9.1697021	9.9952033	9.1744988	10.8255012	30
31	9.1705465	9.9951844	9.1753622	10.8246378	29
32	9.1713893	9.9951654	9.1762239	10.8237761	28
33	9.1722305	9.9951464	9.1770840	10.8229160	27
34	9.1730699	9.9951274	9.1779425	10.8220575	26
35	9.1739077	9.9951084	9.1787993	10.8212007	25
36	9.1747439	9.9950893	9.1796546	10.8203454	24
37	9.1755784	9.9950702	9.1805082	10.8194918	23
38	9.1764112	9.9950510	9.1813602	10.8186398	22
39	9.1772425	9.9950318	9.1822106	10.8177894	21
40	9.1780721	9.9950126	9.1830595	10.8169405	20
41	9.1789001	9.9949933	9.1839068	10.8160932	19
42	9.1797265	9.9949740	9.1847525	10.8152475	18
43	9.1805512	9.9949546	9.1855966	10.8144034	17
44	9.1813744	9.9949352	9.1864392	10.8135608	16
45	9.1821960	9.9949158	9.1872802	10.8127198	15
46	9.1830160	9.9948964	9.1881196	10.8118804	14
47	9.1838344	9.9948769	9.1889575	10.8110425	13
48	9.1846512	9.9948573	9.1897939	10.8102061	12
49	9.1854665	9.9948377	9.1906287	10 8093713	11
50	9.1862802	9.9948181	9.1914621	10.8085379	10
51	9.1870923	9.9947985	9.1922939	10.8077061	9
52	9.1879029	9.9947788	9.1931241	10.8068759	8
53	9.1887120	9.9947591	9.1939529	10.8060471	7
54	9.1895195	9.9947393	9.1947802	10.8052198	6
55	9.1903254	9.9947195	9.1956059	10.8043941	5
56	9.1911299	9.9946997	9.1964302	10.8035698	4
57	9.1919328	9.9946798	9.1972530	10.8027470	3
58	9.1927342	9.9946599	9.1980743	10.8019257	2
59	9.1935341	9.9946399	9.1988941	10.8011059	1
60	9.1943324	9.9946199	9.1997125	10.8002875	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	81 Degrees.				

Min.	9 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.1943324	9.9946199	9.1997125	10.8002875	60
1	9.1951293	9.9945999	9.2005294	10.7994706	59
2	9.1959247	9.9945798	9.2013449	10.7986551	58
3	9.1967186	9.9945597	9.2021588	10.7978412	57
4	9.1975110	9.9945396	9.2029714	10.7970286	56
5	9.1983019	9.9945194	9.2037825	10.7962175	55
6	9.1990913	9.9944992	9.2045922	10.7954078	54
7	9.1998793	9.9944789	9.2054004	10.7945996	53
8	9.2006658	9.9944587	9.2062072	10.7937928	52
9	9.2014509	9.9944383	9.2070126	10.7929874	51
10	9.2022345	9.9944180	9.2078165	10.7921835	50
11	9.2030167	9.9943975	9.2086191	10.7913809	49
12	9.2037974	9.9943771	9.2094203	10.7905797	48
13	9.2045766	9.9943566	9.2102200	10.7897800	47
14	9.2053545	9.9943361	9.2110184	10.7889816	46
15	9.2061309	9.9943156	9.2118153	10.7881847	45
16	9.2069059	9.9942950	9.2126109	10.7873891	44
17	9.2076795	9.9942743	9.2134051	10.7865949	43
18	9.2084516	9.9942537	9.2141980	10.7858020	42
19	9.2092224	9.9942330	9.2149894	10.7850106	41
20	9.2099917	9.9942122	9.2157795	10.7842205	40
21	9.2107597	9.9941914	9.2165683	10.7834317	39
22	9.2115263	9.9941706	9.2173556	10.7826444	38
23	9.2122914	9.9941498	9.2181417	10.7818583	37
24	9.2130552	9.9941289	9.2189264	10.7810736	36
25	9.2138176	9.9941079	9.2197097	10.7802903	35
26	9.2145787	9.9940870	9.2204917	10.7795083	34
27	9.2153384	9.9940659	9.2212724	10.7787276	33
28	9.2160967	9.9940449	9.2220518	10.7779482	32
29	9.2168536	9.9940238	9.2228298	10.7771702	31
30	9.2176092	9.9940027	9.2236065	10.7763935	30
31	9.2183635	9.9939815	9.2243819	10.7756181	29
32	9.2191164	9.9939603	9.2251561	10.7748439	28
33	9.2198680	9.9939391	9.2259289	10.7740711	27
34	9.2206182	9.9939178	9.2267004	10.7732996	26
35	9.2213671	9.9938965	9.2274706	10.7725294	25
36	9.2221147	9.9938752	9.2282395	10.7717605	24
37	9.2228609	9.9938538	9.2290071	10.7709929	23
38	9.2236059	9.9938324	9.2297735	10.7702265	22
39	9.2243495	9.9938109	9.2305386	10.7694614	21
40	9.2250918	9.9937894	9.2313024	10.7686976	20
41	9.2258328	9.9937679	9.2320650	10.7679350	19
42	9.2265725	9.9937463	9.2328262	10.7671738	18
43	9.2273110	9.9937247	9.2335863	10.7664137	17
44	9.2280481	9.993703	9.2343451	10.7656549	16
45	9.2287839	9.9936813	9.2351026	10.7648974	15
46	9.2295185	9.9936596	9.2358589	10.7641411	14
47	9.2302518	9.9936378	9.2366139	10.7633861	13
48	9.2309838	9.9936160	9.2373678	10.7626322	12
49	9.2317145	9.9935942	9.2381203	10.7618797	11
50	9.2324440	9.9935723	9.2388717	10.7611283	10
51	9.2331722	9.9935504	9.2396218	10.7603782	9
52	9.2338992	9.9935285	9.2403708	10.7596292	8
53	9.2346249	9.9935065	9.2411185	10.7588815	7
54	9.2353494	9.9934844	9.2418650	10.7581350	6
55	9.2360726	9.9934624	9.2426103	10.7573897	5
56	9.2367946	9.9934403	9.2433543	10.7566457	4
57	9.2375153	9.9934181	9.2440972	10.7559028	3
58	9.2382349	9.9933959	9.2448389	10.7551611	2
59	9.2389532	9.9933737	9.2455794	10.7544206	1
60	9.2396702	9.9933515	9.2463188	10.7536812	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	80 Degrees.				

Min.	10 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.2396702	9.9933515	9.2463188	10.7536812	60
1	9.2403861	9.9933292	9.2470569	10.7539431	59
2	9.2411007	9.9933068	9.2477939	10.7522061	58
3	9.2418141	9.9932845	9.2485297	10.7514703	57
4	9.2425264	9.9932621	9.2492643	10.7507357	56
5	9.2432374	9.9932396	9.2499978	10.7500022	55
6	9.2439472	9.9932171	9.2507301	10.7492699	54
7	9.2446558	9.9931946	9.2514612	10.7485388	53
8	9.2453632	9.9931720	9.2521912	10.7478088	52
9	9.2460695	9.9931494	9.2529200	10.7470800	51
10	9.2467746	9.9931268	9.2536477	10.7463523	50
11	9.2474784	9.9931041	9.2543743	10.7456257	49
12	9.2481811	9.9930814	9.2550997	10.7449003	48
13	9.2488827	9.9930587	9.2558240	10.7441760	47
14	9.2495830	9.9930359	9.2565472	10.7434528	46
15	9.2502822	9.9930131	9.2572692	10.7427308	45
16	9.2509803	9.9929902	9.2579901	10.7420099	44
17	9.2516772	9.9929673	9.2587099	10.7412901	43
18	9.2523729	9.9929444	9.2594285	10.7405715	42
19	9.2530675	9.9929214	9.2601461	10.7398539	41
20	9.2537609	9.9928984	9.2608625	10.7391375	40
21	9.2544532	9.9928753	9.2615779	10.7384221	39
22	9.2551444	9.9928522	9.2622921	10.7377079	38
23	9.2558344	9.9928291	9.2630053	10.7369947	37
24	9.2565233	9.9928059	9.2637173	10.7362827	36
25	9.2572110	9.9927827	9.2644283	10.7355717	35
26	9.2578977	9.9927595	9.2651382	10.7348618	34
27	9.2585832	9.9927362	9.2658470	10.7341530	33
28	9.2592676	9.9927129	9.2665547	10.7334453	32
29	9.2599509	9.9926895	9.2672613	10.7327387	31
30	9.2606330	9.9926661	9.2679669	10.7320331	30
31	9.2613141	9.9926427	9.2686714	10.7313286	29
32	9.2619941	9.9926192	9.2693749	10.7306251	28
33	9.2626729	9.9925957	9.2700772	10.7299228	27
34	9.2633507	9.9925722	9.2707786	10.7292214	26
35	9.2640274	9.9925486	9.2714788	10.7285212	25
36	9.2647030	9.9925250	9.2721780	10.7278220	24
37	9.2653775	9.9925013	9.2728762	10.7271238	23
38	9.2660509	9.9924776	9.2735733	10.7264267	22
39	9.2667232	9.9924539	9.2742694	10.7257306	21
40	9.2673945	9.9924301	9.2749644	10.7250356	20
41	9.2680647	9.9924063	9.2756584	10.7243416	19
42	9.2687338	9.9923824	9.2763514	10.7236486	18
43	9.2694019	9.9923585	9.2770434	10.7229566	17
44	9.2700689	9.9923346	9.2777343	10.7226257	16
45	9.2707348	9.9923106	9.2784242	10.7215758	15
46	9.2713997	9.9922866	9.2791131	10.7208869	14
47	9.2720635	9.9922626	9.2798009	10.7201991	13
48	9.2727263	9.9922385	9.2804878	10.7195122	12
49	9.2733880	9.9922144	9.2811736	10.7188264	11
50	9.2740487	9.9921902	9.2818585	10.7181415	10
51	9.2747083	9.9921660	9.2825423	10.7174577	9
52	9.2753669	9.9921418	9.2832251	10.7167749	8
53	9.2760245	9.9921175	9.2839070	10.7160930	7
54	9.2766811	9.9920932	9.2845878	10.7154122	6
55	9.2773366	9.9920689	9.2852677	10.7147323	5
56	9.2779911	9.9920445	9.2859466	10.7140534	4
57	9.2786445	9.9920201	9.2866245	10.7133755	3
58	9.2792970	9.9919956	9.2873014	10.7126986	2
59	9.2799484	9.9919711	9.2879773	10.7120227	1
60	9.2805988	9.9919466	9.2886523	10.7113477	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	79 Degrees.				

Min.	11 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.2805988	9.9919466	9.2886523	10.7113477	60
1	9.2812483	9.9919220	9.2893263	10.7106737	59
2	9.2818967	9.9918974	9.2899993	10.7100007	58
3	9.2825441	9.9918727	9.2906713	10.7093287	57
4	9.2831905	9.9918480	9.2913424	10.7086576	56
5	9.2838359	9.9918233	9.2920126	10.7079874	55
6	9.2844803	9.9917986	9.2926817	10.7073183	54
7	9.2851237	9.9917737	9.2933500	10.7066500	53
8	9.2857661	9.9917489	9.2940172	10.7059828	52
9	9.2864076	9.9917240	9.2946836	10.7053164	51
10	9.2870480	9.9916991	9.2953489	10.7046511	50
11	9.2876875	9.9916741	9.2960134	10.7039866	49
12	9.2883260	9.9916492	9.2966769	10.7033231	48
13	9.2889636	9.9916241	9.2973395	10.7026605	47
14	9.2896001	9.9915990	9.2980011	10.7019989	46
15	9.2902357	9.9915739	9.2986618	10.7013382	45
16	9.2908704	9.9915488	9.2993216	10.7006784	44
17	9.2915040	9.9915236	9.2999804	10.7000196	43
18	9.2921367	9.9914984	9.3006383	10.6993617	42
19	9.2927685	9.9914731	9.3012954	10.6987046	41
20	9.2933993	9.9914478	9.3019514	10.6980486	40
21	9.2940291	9.9914225	9.3026066	10.6973934	39
22	9.2946580	9.9913971	9.3032609	10.6967391	38
23	9.2952859	9.9913717	9.3039143	10.6960857	37
24	9.2959129	9.9913462	9.3045667	10.6954333	36
25	9.2965390	9.9913207	9.3052183	10.6947817	35
26	9.2971641	9.9912952	9.3058689	10.6941311	34
27	9.2977883	9.9912696	9.3065187	10.6934813	33
28	9.2984116	9.9912440	9.3071675	10.6928325	32
29	9.2990339	9.9912184	9.3078155	10.6921845	31
30	9.2996553	9.9911927	9.3084626	10.6915374	30
31	9.3002758	9.9911670	9.3091088	10.6908912	29
32	9.3008953	9.9911412	9.3097541	10.6902459	28
33	9.3015140	9.9911154	9.3103985	10.6896015	27
34	9.3021317	9.9910896	9.3110421	10.6889579	26
35	9.3027485	9.9910637	9.3116848	10.6883152	25
36	9.3033644	9.9910378	9.3123266	10.6876734	24
37	9.3039794	9.9910119	9.3129675	10.6870325	23
38	9.3045934	9.9909859	9.3136076	10.6863924	22
39	9.3052066	9.9909598	9.3142468	10.6857532	21
40	9.3058189	9.9909338	9.3148851	10.6851149	20
41	9.3064303	9.9909077	9.3155226	10.6844774	19
42	9.3070407	9.9908815	9.3161592	10.6838408	18
43	9.3076503	9.9908553	9.3167950	10.6832050	17
44	9.3082590	9.9908291	9.3174299	10.6825701	16
45	9.3088668	9.9908029	9.3180640	10.6819360	15
46	9.3094737	9.9907766	9.3186972	10.6813028	14
47	9.3100798	9.9907502	9.3193295	10.6806705	13
48	9.3106849	9.9907239	9.3199611	10.6800389	12
49	9.3112892	9.9906974	9.3205918	10.6794082	11
50	9.3118926	9.9906710	9.3212216	10.6787784	10
51	9.3124951	9.9906445	9.3218506	10.6781494	9
52	9.3130968	9.9906180	9.3224788	10.6775212	8
53	9.3136976	9.9905914	9.3231061	10.6768939	7
54	9.3142975	9.9905648	9.3237327	10.6762673	6
55	9.3148965	9.9905382	9.3243584	10.6756416	5
56	9.3154947	9.9905115	9.3249832	10.6750168	4
57	9.3160921	9.9904848	9.3256073	10.6743927	3
58	9.3166885	9.9904580	9.3262305	10.6737695	2
59	9.3172841	9.9904312	9.3268529	10.6731471	1
60	9.3178789	9.9904044	9.3274745	10.6725255	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	78 Degrees.				

Min.	12 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.3178789	9.9904044	9.3274745	10.6725255	60
1	9.3184728	9.9903775	9.3280953	10.6719047	59
2	9.3190659	9.9903506	9.3287153	10.6712847	58
3	9.3196581	9.9903237	9.3293345	10.6706655	57
4	9.3202495	9.9902967	9.3299528	10.6700472	56
5	9.3208400	9.9902697	9.3305704	10.6694296	55
6	9.3214297	9.9902426	9.3311872	10.6688128	54
7	9.3220186	9.9902155	9.3318031	10.6681969	53
8	9.3226066	9.9901883	9.3324183	10.6675817	52
9	9.3231938	9.9901612	9.3330327	10.6669673	51
10	9.3237802	9.9901339	9.3336463	10.6663537	50
11	9.3243657	9.9901067	9.3342591	10.6657409	49
12	9.3249505	9.9900794	9.3348711	10.6651289	48
13	9.3255344	9.9900521	9.3354823	10.6645177	47
14	9.3261174	9.9900247	9.3360927	10.6639073	46
15	9.3266997	9.9899973	9.3367024	10.6632976	45
16	9.3272811	9.9899698	9.3373113	10.6626887	44
17	9.3278617	9.9899423	9.3379194	10.6620806	43
18	9.3284416	9.9899148	9.3385267	10.6614733	42
19	9.3290206	9.9898873	9.3391333	10.6608667	41
20	9.3295988	9.9898597	9.3397391	10.6602609	40
21	9.3301761	9.9898320	9.3403441	10.6596559	39
22	9.3307527	9.9898043	9.3409484	10.6590516	38
23	9.3313285	9.9897766	9.3415519	10.6584481	37
24	9.3319059	9.9897489	9.3421546	10.6578454	36
25	9.3324777	9.9897211	9.3427566	10.6572434	35
26	9.3330511	9.9896932	9.3433578	10.6566422	34
27	9.3336237	9.9896654	9.3439583	10.6560417	33
28	9.3341955	9.9896374	9.3445580	10.6554420	32
29	9.3347665	9.9896095	9.3451570	10.6548430	31
30	9.3353368	9.9895815	9.3457552	10.6542448	30
31	9.3359062	9.9895535	9.3463527	10.6536473	29
32	9.3364749	9.9895254	9.3469494	10.6530506	28
33	9.3370428	9.9894973	9.3475454	10.6524546	27
34	9.3376099	9.9894692	9.3481407	10.6518593	26
35	9.3381762	9.9894410	9.3487352	10.6512648	25
36	9.3387418	9.9894128	9.3493290	10.6506710	24
37	9.3393065	9.9893845	9.3499220	10.6500780	23
38	9.3398706	9.9893562	9.3505143	10.6494857	22
39	9.3404338	9.9893279	9.3511059	10.6488941	21
40	9.3409963	9.9892995	9.3516968	10.6483032	20
41	9.3415580	9.9892711	9.3522869	10.6477131	19
42	9.3421190	9.9892427	9.3528763	10.6471237	18
43	9.3426792	9.9892142	9.3534650	10.6465350	17
44	9.3432386	9.9891856	9.3540530	10.6459470	16
45	9.3437973	9.9891571	9.3546402	10.6453598	15
46	9.3443552	9.9891285	9.3552267	10.6447733	14
47	9.3449124	9.9890998	9.3558126	10.6441874	13
48	9.3454688	9.9890711	9.3563977	10.6436023	12
49	9.3460245	9.9890424	9.3569821	10.6430179	11
50	9.3465794	9.9890137	9.3575658	10.6424342	10
51	9.3471336	9.9889849	9.3581487	10.6418513	9
52	9.3476870	9.9889560	9.3587310	10.6412690	8
53	9.3482397	9.9889271	9.3593126	10.6406874	7
54	9.3487917	9.9888982	9.3598935	10.6401065	6
55	9.3493429	9.9888693	9.3604736	10.6395264	5
56	9.3498934	9.9888403	9.3610531	10.6389469	4
57	9.3504432	9.9888113	9.3616319	10.6383681	3
58	9.3509922	9.9887822	9.3622100	10.6377900	2
59	9.3515405	9.9887531	9.3627874	10.6372126	1
60	9.3520880	9.9887239	9.3633641	10.6366359	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	77 Degrees.				

Min.	13 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.3520880	9.9887239	9.3633641	10.6366359	60
1	9.3526349	9.9886947	9.3639401	10.6360599	59
2	9.3531810	9.9886655	9.3645155	10.6354845	58
3	9.3537264	9.9886363	9.3650901	10.6349099	57
4	9.3542710	9.9886070	9.3656641	10.6343359	56
5	9.3548150	9.9885776	9.3662374	10.6337626	55
6	9.3553582	9.9885482	9.3668100	10.6331900	54
7	9.3559007	9.9885188	9.3673819	10.6326181	53
8	9.3564426	9.9884894	9.3679532	10.6320468	52
9	9.3569836	9.9884599	9.3685238	10.6314762	51
10	9.3575240	9.9884303	9.3690937	10.6309063	50
11	9.3580637	9.9884008	9.3696629	10.6303371	49
12	9.3586027	9.9883712	9.3702315	10.6297685	48
13	9.3591409	9.9883415	9.3707994	10.6292006	47
14	9.3596785	9.9883118	9.3713667	10.6286333	46
15	9.3602154	9.9882821	9.3719333	10.6280667	45
16	9.3607515	9.9882523	9.3724992	10.6275008	44
17	9.3612870	9.9882225	9.3730645	10.6269355	43
18	9.3618217	9.9881927	9.3736291	10.6263709	42
19	9.3623558	9.9881628	9.3741930	10.6258070	41
20	9.3628892	9.9881329	9.3747563	10.6252437	40
21	9.3634219	9.9881029	9.3753190	10.6246810	39
22	9.3639539	9.9880729	9.3758810	10.6241190	38
23	9.3644852	9.9880429	9.3764423	10.6235577	37
24	9.3650158	9.9880128	9.3770030	10.6229970	36
25	9.3655458	9.9879827	9.3775631	10.6224369	35
26	9.3660750	9.9879525	9.3781225	10.6218775	34
27	9.3666036	9.9879223	9.3786813	10.6213187	33
28	9.3671315	9.9878921	9.3792394	10.6207606	32
29	9.3676587	9.9878618	9.3797969	10.6202031	31
30	9.3681853	9.9878315	9.3803537	10.6196463	30
31	9.3687111	9.9878012	9.3809100	10.6190900	29
32	9.3692363	9.9877708	9.3814655	10.6185345	28
33	9.3697608	9.9877404	9.3820205	10.6179795	27
34	9.3702847	9.9877099	9.3825748	10.6174252	26
35	9.3708079	9.9876794	9.3831285	10.6168715	25
36	9.3713304	9.9876488	9.3836816	10.6163184	24
37	9.3718523	9.9876183	9.3842340	10.6157660	23
38	9.3723735	9.9875876	9.3847858	10.6152142	22
39	9.3728940	9.9875570	9.3853370	10.6146630	21
40	9.3734139	9.9875263	9.3858876	10.6141124	20
41	9.3739331	9.9874955	9.3864376	10.6135624	19
42	9.3744517	9.9874648	9.3869869	10.6130131	18
43	9.3749696	9.9874339	9.3875356	10.6124644	17
44	9.3754868	9.9874031	9.3880837	10.6119163	16
45	9.3760034	9.9873722	9.3886312	10.6113688	15
46	9.3765194	9.9873413	9.3891781	10.6108219	14
47	9.3770347	9.9873103	9.3897244	10.6102756	13
48	9.3775493	9.9872793	9.3902700	10.6097300	12
49	9.3780633	9.9872482	9.3908151	10.6091849	11
50	9.3785767	9.9872171	9.3913595	10.6086405	10
51	9.3790894	9.9871860	9.3919034	10.6080966	9
52	9.3796015	9.9871549	9.3924466	10.6075534	8
53	9.3801129	9.9871236	9.3929893	10.6070107	7
54	9.3806237	9.9870924	9.3935313	10.6064687	6
55	9.3811339	9.9870611	9.3940727	10.6059273	5
56	9.3816434	9.9870298	9.3946136	10.6053864	4
57	9.3821523	9.9869984	9.3951538	10.6048462	3
58	9.3826605	9.9869670	9.3956935	10.6043065	2
59	9.3831682	9.9869356	9.3962326	10.6037674	1
60	9.3836752	9.9869041	9.3967711	10.6032289	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	76 Degrees.				

SINES.

Min.	14 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.3836752	9.9869041	9.3967711	10.6032289	60
1	9.3841815	9.9868726	9.3973089	10.6026911	59
2	9.3846873	9.9868410	9.3978463	10.6021537	58
3	9.3851924	9.9868094	9.3983830	10.6016170	57
4	9.3856969	9.9867778	9.3989191	10.6010809	56
5	9.3862008	9.9867461	9.3994547	10.6005453	55
6	9.3867040	9.9867144	9.3999896	10.6000104	54
7	9.3872067	9.9866827	9.4005240	10.5994760	53
8	9.3877087	9.9866509	9.4010578	10.5989422	52
9	9.3882101	9.9866191	9.4015910	10.5984090	51
10	9.3887109	9.9865872	9.4021237	10.5978763	50
11	9.3892111	9.9865553	9.4026558	10.5973442	49
12	9.3897106	9.9865233	9.4031873	10.5968127	48
13	9.3902096	9.9864913	9.4037182	10.5962818	47
14	9.3907079	9.9864593	9.4042486	10.5957514	46
15	9.3912057	9.9864273	9.4047784	10.5952216	45
16	9.3917028	9.9863952	9.4053076	10.5946924	44
17	9.3921993	9.9863630	9.4058363	10.5941637	43
18	9.3926952	9.9863308	9.4063644	10.5936356	42
19	9.3931905	9.9862986	9.4068919	10.5931081	41
20	9.3936852	9.9862663	9.4074189	10.5925811	40
21	9.3941794	9.9862340	9.4079453	10.5920547	39
22	9.3946729	9.9862017	9.4084712	10.5915288	38
23	9.3951658	9.9861693	9.4089965	10.5910035	37
24	9.3956581	9.9861369	9.4095212	10.5904788	36
25	9.3961499	9.9861045	9.4100454	10.5899546	35
26	9.3966410	9.9860720	9.4105690	10.5894310	34
27	9.3971315	9.9860394	9.4110921	10.5889079	33
28	9.3976215	9.9860069	9.4116146	10.5883854	32
29	9.3981109	9.9859742	9.4121366	10.5878634	31
30	9.3985996	9.9859416	9.4126581	10.5873419	30
31	9.3990878	9.9859089	9.4131789	10.5868211	29
32	9.3995754	9.9858762	9.4136993	10.5863007	28
33	9.4000625	9.9858434	9.4142191	10.5857809	27
34	9.4005489	9.9858106	9.4147383	10.5852617	26
35	9.4010348	9.9857777	9.4152570	10.5847430	25
36	9.4015201	9.9857449	9.4157752	10.5842248	24
37	9.4020048	9.9857119	9.4162928	10.5837072	23
38	9.4024889	9.9856790	9.4168099	10.5831901	22
39	9.4029724	9.9856460	9.4173265	10.5826735	21
40	9.4034554	9.9856129	9.4178425	10.5821575	20
41	9.4039378	9.9855798	9.4183580	10.5816420	19
42	9.4044196	9.9855467	9.4188729	10.5811271	18
43	9.4049009	9.9855135	9.4193874	10.5806126	17
44	9.4053816	9.9854803	9.4199013	10.5800987	16
45	9.4058617	9.9854471	9.4204146	10.5795854	15
46	9.4003413	9.9854138	9.4209275	10.5790725	14
47	9.4068203	9.9853805	9.4214398	10.5785602	13
48	9.4072987	9.9853471	9.4219515	10.5780485	12
49	9.4077766	9.9853138	9.4224628	10.5775372	11
50	9.4082539	9.9852803	9.4229735	10.5770265	10
51	9.4087306	9.9852468	9.4234838	10.5765162	9
52	9.4092068	9.9852133	9.4239935	10.5760065	8
53	9.4096824	9.9851798	9.4245026	10.5754974	7
54	9.4101575	9.9851462	9.4250113	10.5749887	6
55	9.4106320	9.9851125	9.4255194	10.5744806	5
56	9.4111059	9.9850789	9.4260271	10.5739729	4
57	9.4115793	9.9850452	9.4265342	10.5734658	3
58	9.4120522	9.9850114	9.4270408	10.5729592	2
59	9.4125245	9.9849776	9.4275469	10.5724531	1
60	9.4129962	9.9849438	9.4280525	10.5719475	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	75 Degrees.				

Min.	15 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.4129962	9.9849438	9.4280525	10.5719475	60
1	9.4134674	9.9849099	9.4285575	10.5714425	59
2	9.4139381	9.9848760	9.4290621	10.5709379	58
3	9.4144082	9.9848420	9.4295661	10.5704339	57
4	9.4148778	9.9848081	9.4300697	10.5699303	56
5	9.4153468	9.9847740	9.4305727	10.5694273	55
6	9.4158152	9.9847400	9.4310753	10.5689247	54
7	9.4162832	9.9847059	9.4315773	10.5684227	53
8	9.4167506	9.9846717	9.4320789	10.5679211	52
9	9.4172174	9.9846375	9.4325799	10.5674201	51
10	9.4176837	9.9846033	9.4330804	10.5669196	50
11	9.4181495	9.9845690	9.4335805	10.5664195	49
12	9.4186148	9.9845347	9.4340800	10.5659200	48
13	9.4190795	9.9845004	9.4345791	10.5654209	47
14	9.4195436	9.9844660	9.4350776	10.5649224	46
15	9.4200073	9.9844316	9.4355757	10.5644243	45
16	9.4204704	9.9843971	9.4360733	10.5639267	44
17	9.4209330	9.9843626	9.4365704	10.5634296	43
18	9.4213950	9.9843281	9.4370670	10.5629330	42
19	9.4218566	9.9842935	9.4375631	10.5624369	41
20	9.4223176	9.9842589	9.4380587	10.5619413	40
21	9.4227780	9.9842242	9.4385538	10.5614462	39
22	9.4232380	9.9841895	9.4390485	10.5609515	38
23	9.4236974	9.9841548	9.4395426	10.5604574	37
24	9.4241563	9.9841200	9.4400363	10.5599637	36
25	9.4246147	9.9840852	9.4405295	10.5594705	35
26	9.4250726	9.9840503	9.4410222	10.5589778	34
27	9.4255299	9.9840154	9.4415145	10.5584855	33
28	9.4259867	9.9839805	9.4420062	10.5579938	32
29	9.4264430	9.9839455	9.4424975	10.5575025	31
30	9.4268988	9.9839105	9.4429883	10.5570117	30
31	9.4273541	9.9838755	9.4434786	10.5565214	29
32	9.4278089	9.9838404	9.4439685	10.5560315	28
33	9.4282631	9.9838052	9.4444579	10.5555421	27
34	9.4287169	9.9837701	9.4449468	10.5550532	26
35	9.4291701	9.9837348	9.4454352	10.5545648	25
36	9.4296228	9.9836996	9.4459232	10.5540768	24
37	9.4300750	9.9836643	9.4464107	10.5535893	23
38	9.4305267	9.9836290	9.4468978	10.5531022	22
39	9.4309779	9.9835936	9.4473843	10.5526157	21
40	9.4314286	9.9835582	9.4478704	10.5521296	20
41	9.4318788	9.9835227	9.4483561	10.5516439	19
42	9.4323285	9.9834872	9.4488413	10.5511587	18
43	9.4327777	9.9834517	9.4493260	10.5506740	17
44	9.4332264	9.9834161	9.4498102	10.5501898	16
45	9.4336746	9.9833805	9.4502940	10.5497060	15
46	9.4341223	9.9833449	9.4507774	10.5492226	14
47	9.4345694	9.9833092	9.4512602	10.5487398	13
48	9.4350161	9.9832735	9.4517427	10.5482573	12
49	9.4354623	9.9832377	9.4522246	10.5477754	11
50	9.4359080	9.9832019	9.4527061	10.5472939	10
51	9.4363532	9.9831661	9.4531872	10.5468128	9
52	9.4367980	9.9831302	9.4536678	10.5463322	8
53	9.4372422	9.9830942	9.4541479	10.5458521	7
54	9.4376859	9.9830583	9.4546276	10.5453724	6
55	9.4381292	9.9830223	9.4551069	10.5448931	5
56	9.4385719	9.9829862	9.4555857	10.5444143	4
57	9.4390142	9.9829501	9.4560641	10.5439359	3
58	9.4394560	9.9829140	9.4565420	10.5434580	2
59	9.4398973	9.9828778	9.4570194	10.5429806	1
60	9.4403381	9.9828416	9.4574964	10.5425036	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	74 Degrees.				

Min.	16 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.4403381	9.9828416	9.4574964	10.5425036	60
1	9.4407784	9.9828054	9.4579730	10.5420270	59
2	9.4412182	9.9827691	9.4584491	10.5415509	58
3	9.4416576	9.9827328	9.4589248	10.5410752	57
4	9.4420965	9.9826964	9.4594001	10.5405999	56
5	9.4425349	9.9826600	9.4598749	10.5401251	55
6	9.4429728	9.9826236	9.4603492	10.5396508	54
7	9.4434103	9.9825871	9.4608232	10.5391768	53
8	9.4438472	9.9825506	9.4612967	10.5387033	52
9	9.4442837	9.9825140	9.4617697	10.5382303	51
10	9.4447197	9.9824774	9.4622423	10.5377577	50
11	9.4451553	9.9824408	9.4627145	10.5372855	49
12	9.4455904	9.9824041	9.4631863	10.5368137	48
13	9.4460250	9.9823674	9.4636576	10.5363424	47
14	9.4464591	9.9823306	9.4641285	10.5358715	46
15	9.4468927	9.9822938	9.4645990	10.5354010	45
16	9.4473259	9.9822569	9.4650690	10.5349310	44
17	9.4477586	9.9822201	9.4655386	10.5344614	43
18	9.4481909	9.9821831	9.4660078	10.5339922	42
19	9.4486227	9.9821462	9.4664765	10.5335235	41
20	9.4490540	9.9821092	9.4669448	10.5330552	40
21	9.4494849	9.9820721	9.4674127	10.5325873	39
22	9.4499153	9.9820351	9.4678802	10.5321198	38
23	9.4503452	9.9819979	9.4683473	10.5316527	37
24	9.4507747	9.9819608	9.4688139	10.5311861	36
25	9.4512037	9.9819236	9.4692801	10.5307199	35
26	9.4516322	9.9818863	9.4697459	10.5302541	34
27	9.4520603	9.9818490	9.4702112	10.5297888	33
28	9.4524879	9.9818117	9.4706762	10.5293238	32
29	9.4529151	9.9817744	9.4711407	10.5288593	31
30	9.4533418	9.9817370	9.4716048	10.5283952	30
31	9.4537681	9.9816995	9.4720685	10.5279315	29
32	9.4541939	9.9816620	9.4725318	10.5274682	28
33	9.4546192	9.9816245	9.4729947	10.5270053	27
34	9.4550441	9.9815870	9.4734578	10.5265422	26
35	9.4554686	9.9815494	9.4739192	10.5260808	25
36	9.4558926	9.9815117	9.4743808	10.5256192	24
37	9.4563161	9.9814740	9.4748421	10.5251579	23
38	9.4567392	9.9814363	9.4753029	10.5246971	22
39	9.4571618	9.9813986	9.4757633	10.5242367	21
40	9.4575840	9.9813608	9.4762233	10.5237767	20
41	9.4580058	9.9813229	9.4766829	10.5233171	19
42	9.4584271	9.9812850	9.4771421	10.5228579	18
43	9.4588480	9.9812471	9.4776009	10.5223991	17
44	9.4592684	9.9812091	9.4780592	10.5219408	16
45	9.4596884	9.9811711	9.4785172	10.5214828	15
46	9.4601079	9.9811331	9.4789748	10.5210252	14
47	9.4605270	9.9810950	9.4794319	10.5205681	13
48	9.4609456	9.9810569	9.4798887	10.5201113	12
49	9.4613638	9.9810187	9.4803451	10.5196549	11
50	9.4617816	9.9809805	9.4808011	10.5191989	10
51	9.4621989	9.9809423	9.4812566	10.5187434	9
52	9.4626158	9.9809040	9.4817118	10.5182882	8
53	9.4630323	9.9808657	9.4821666	10.5178334	7
54	9.4634483	9.9808273	9.4826210	10.5173790	6
55	9.4638639	9.9807889	9.4830750	10.5169250	5
56	9.4642790	9.9807505	9.4835286	10.5164714	4
57	9.4646938	9.9807120	9.4839818	10.5160182	3
58	9.4651081	9.9806735	9.4844346	10.5155654	2
59	9.4655219	9.9806349	9.4848870	10.5151130	1
60	9.4659353	9.9805963	9.4853390	10.5146610	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	73 Degrees.				

Min.	17 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.4659353	9.9805963	9.4853390	10.5146610	60
1	9.4663483	9.9805577	9.4857907	10.5142093	59
2	9.4667609	9.9805190	9.4862419	10.5137581	58
3	9.4671730	9.9804803	9.4866928	10.5133072	57
4	9.4675848	9 9804415	9.4871433	10.5128567	56
5	9.4679960	9.9804027	9.4875933	10.5124067	55
6	9.4684069	9.9803639	9.4880430	10.5119570	54
7	9.4688173	9.9803250	9.4884924	10.5115076	53
8	9.4692273	9.9802860	9.4889413	10.5110587	52
9	9.4696369	9.9802471	9.4893898	10.5106102	51
10	9.4700461	9.9802081	9.4898380	10.5101620	50
11	9.4704548	9.9801690	9.4902858	10.5097142	49
12	9.4708631	9.9801299	9.4907332	10.5092668	48
13	9.4712710	9.9800908	9.4911802	10.5088198	47
14	9.4716785	9.9800516	9.4916269	10.5083731	46
15	9.4720856	9.9800124	9.4920731	10 5079269	45
16	9.4724922	9.9799732	9.4925190	10.5074810	44
17	9.4728985	9.9799339	9.4929646	10.5070354	43
18	9.4733043	9.9798946	9.4934097	10.5065903	42
19	9.4737097	9.9798552	9.4938545	10.5061455	41
20	9.4741146	9.9798158	9.4942988	10.5057012	40
21	9.4745192	9.9797764	9.4947429	10.5052571	39
22	9.4749234	9.9797369	9.4951865	10.5048135	38
23	9.4753271	9.9796973	9.4956298	10.5043702	37
24	9.4757304	9.9796578	9.4960727	10.5039273	36
25	9.4761334	9.9796182	9.4965152	10.5034848	35
26	9.4765359	9.9795785	9.4969574	10.5030426	34
27	9.4769380	9.9795388	9.4973991	10.5026009	33
28	9.4773396	9.9794991	9.4978406	10.5021594	32
29	9.4777409	9.9794593	9.4982816	10.5017184	31
30	9.4781418	9.9794195	9.4987223	10.5012777	30
31	9.4785423	9.9793796	9.4991626	10.5008374	29
32	9.4789423	9.9793398	9.4996026	10.5003974	28
33	9.4793420	9.9792998	9.5000422	10.4999578	27
34	9.4797412	9.9792599	9.5004814	10.4995186	26
35	9.4801401	9.9792198	9.5009203	10.4990797	25
36	9.4805385	9.9791798	9.5013588	10.4986412	24
37	9.4809366	9.9791397	9.5017969	10.4982031	23
38	9.4813342	9.9790996	9.5022347	10.4977653	22
39	9.4817315	9.9790594	9.5026721	10.4973279	21
40	9.4821283	9.9790192	9.5031092	10.4968908	20
41	9.4825248	9.9789789	9.5035459	10.4964541	19
42	9.4829208	9.9789386	9.5039822	10.4960178	18
43	9.4833165	9.9788983	9.5044182	10.4955818	17
44	9.4837117	9.9788579	9.5048538	10.4951462	16
45	9.4841066	9.9788175	9.5052891	10.4947109	15
46	9.4845010	9.9787770	9.5057240	10.4942760	14
47	9.4848951	9.9787365	9.5061586	10.4938414	13
48	9.4852888	9.9786960	9.5065928	10.4934072	12
49	9.4856820	9.9786554	9.5070267	10.4929733	11
50	9.4860749	9.9786148	9.5074602	10.4925398	10
51	9.4864674	9.9785741	9.5078933	10.4921067	9
52	9.4868595	9.9785334	9.5083261	10.4916739	8
53	9.4872512	9.9784927	9.5087586	10.4912414	7
54	9.4876426	9.9784519	9.5091907	10.4908093	6
55	9.4880335	9.9784111	9.5096224	10.4903776	5
56	9.4884240	9.9783702	9.5100539	10.4899461	4
57	9.4888142	9.9783293	9.5104849	10.4895151	3
58	9.4892040	9.9782883	9.5109156	10.4890844	2
59	9.4895934	9.9782474	9.5113460	10.4886540	1
60	9.4899824	9.9782063	9.5117760	10.4882240	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	72 Degrees.				

Min.	18 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.4899824	9.9782062	9.5117760	10.4882240	60
1	9.4903710	9.9781653	9.5122057	10.4877943	59
2	9.4907592	9.9781241	9.5126351	10.4873649	58
3	9.4911471	9.9780830	9.5130641	10.4869359	57
4	9.4915345	9.9780418	9.5134927	10.4865073	56
5	9.4919216	9.9780006	9.5139210	10.4860790	55
6	9.4923083	9.9779593	9.5143490	10.4856510	54
7	9.4926946	9.9779180	9.5147766	10.4852234	53
8	9.4930806	9.9778766	9.5152039	10.4847961	52
9	9.4934661	9.9778353	9.5156309	10.4843691	51
10	9.4938513	9.9777938	9.5160575	10.4839425	50
11	9.4942361	9.9777523	9.5164838	10.4835162	49
12	9.4946205	9.9777108	9.5169097	10.4830903	48
13	9.4950046	9.9776693	9.5173353	10.4826647	47
14	9.4953883	9.9776277	9.5177606	10.4822394	46
15	9.4957716	9.9775860	9.5181855	10.4818145	45
16	9.4961545	9.9775444	9.5186101	10.4813899	44
17	9.4965370	9.9775026	9.5190344	10.4809656	43
18	9.4969192	9.9774609	9.5194583	10.4805417	42
19	9.4973010	9.9774191	9.5198819	10.4801181	41
20	9.4976824	9.9773772	9.5203052	10.4796948	40
21	9.4980635	9.9773354	9.5207282	10.4792718	39
22	9.4984442	9.9772934	9.5211508	10.4788492	38
23	9.4988245	9.9772515	9.5215730	10.4784270	37
24	9.4992045	9.9772095	9.5219950	10.4780050	36
25	9.4995840	9.9771674	9.5224166	10.4775834	35
26	9.4999633	9.9771253	9.5228379	10.4771621	34
27	9.5003421	9.9770832	9.5232589	10.4767411	33
28	9.5007206	9.9770410	9.5236795	10.4763205	32
29	9.5010987	9.9760988	9.5240999	10.4759001	31
30	9.5014764	9.9769566	9.5245199	10.4754801	30
31	9.5018538	9.9769143	9.5249395	10.4750605	29
32	9.5022308	9.9768720	9.5253589	10.4746411	28
33	9.5026075	9.9768296	9.5257779	10.4742221	27
34	9.5029838	9.9767872	9.5261966	10.4738034	26
35	9.5033597	9.9767447	9.5266150	10.4733850	25
36	9.5037353	9.9767022	9.5270331	10.4729669	24
37	9.5041105	9.9766597	9.5274508	10.4725492	23
38	9.5044853	9.9766171	9.5278682	10.4721318	22
39	9.5048598	9.9765745	9.5282853	10.4717147	21
40	9.5052339	9.9765318	9.5287021	10.4712979	20
41	9.5056077	9.9764891	9.5291186	10.4708814	19
42	9.5059811	9.9764464	9.5295347	10.4704653	18
43	9.5063542	9.9764036	9.5299505	10.4700495	17
44	9.5067269	9.9763608	9.5303661	10.4696339	16
45	9.5070992	9.9763179	9.5307813	10.4692187	15
46	9.5074712	9.9762750	9.5311961	10.4688039	14
47	9.5078428	9.9762321	9.5316107	10.4683893	13
48	9.5082141	9.9761891	9.5320250	10.4679750	12
49	9.5085850	9.9761461	9.5324389	10.4675611	11
50	9.5089556	9.9761030	9.5328526	10.4671474	10
51	9.5093258	9.9760599	9.5332659	10.4667341	9
52	9.5096956	9.9760167	9.5336789	10.4663211	8
53	9.5100651	9.9759736	9.5340916	10.4659084	7
54	9.5104343	9.9759303	9.5345040	10.4654960	6
55	9.5108031	9.9758870	9.5349161	10.4650839	5
56	9.5111716	9.9758437	9.5353278	10.4646722	4
57	9.5115397	9.9758004	9.5357393	10.4642607	3
58	9.5119074	9.9757570	9.5361505	10.4638495	2
59	9.5122749	9.9757135	9.5365613	10.4634387	1
60	9.5126419	9.9756701	9.5369719	10.4630281	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	71 Degrees.				

Min.	19 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.5126419	9.9756701	9.5369719	10.4630281	60
1	9.5130086	9.9756265	9.5373821	10.4626179	59
2	9.5133750	9.9755830	9.5377920	10.4621080	58
3	9.5137410	9.9755394	9.5382017	10.4617983	57
4	9.5141067	9.9754957	9.5386110	10.4613890	56
5	9.5144721	9.9754521	9.5390200	10.4609800	55
6	9.5148371	9.9754083	9.5394287	10.4605713	54
7	9.5152017	9.9753646	9.5398371	10.4601629	53
8	9.5155660	9.9753208	9.5402453	10.4597547	52
9	9.5159300	9.9752769	9.5406531	10.4593469	51
10	9.5162936	9.9752330	9.5410606	10.4589394	50
11	9.5166569	9.9751891	9.5414678	10.4585322	49
12	9.5170198	9.9751451	9.5418747	10.4581253	48
13	9.5173824	9.9751011	9.5422813	10.4577187	47
14	9.5177447	9.9750570	9.5426877	10.4573123	46
15	9.5181066	9.9750129	9.5430937	10.4569063	45
16	9.5184682	9.9749688	9.5434994	10.4565006	44
17	9.5188295	9.9749246	9.5439048	10.4560952	43
18	9.5191904	9.9748804	9.5443100	10.4556900	42
19	9.5195510	9.9747361	9.5447148	10.4552852	41
20	9.5199112	9.9747918	9.5451193	10.4548807	40
21	9.5202711	9.9747475	9.5455236	10.4544764	39
22	9.5206307	9.9747031	9.5459276	10.4540724	38
23	9.5209899	9.9746587	9.5463312	10.4536688	37
24	9.5213488	9.9746142	9.5467346	10.4532654	36
25	9.5217074	9.9745697	9.5471377	10.4528623	35
26	9.5220656	9.9745252	9.5475405	10.4524595	34
27	9.5224235	9.9744806	9.5479430	10.4520570	33
28	9.5227811	9.9744359	9.5483452	10.4516548	32
29	9.5231383	9.9743913	9.5487471	10.4512529	31
30	9.5234953	9.9743466	9.5491487	10.4508513	30
31	9.5238518	9.9743018	9.5495500	10.4504500	29
32	9.5242081	9.9742570	9.5499511	10.4500489	28
33	9.5245640	9.9742122	9.5503519	10.4496481	27
34	9.5249196	9.9741673	9.5507523	10.4492477	26
35	9.5252749	9.9741224	9.5511525	10.4488475	25
36	9.5256298	9.9740774	9.5515524	10.4484476	24
37	9.5259844	9.9740324	9.5519521	10.4480479	23
38	9.5263387	9.9739873	9.5523514	10.4476486	22
39	9.5266927	9.9739422	9.5527504	10.4472496	21
40	9.5270463	9.9738971	9.5531492	10.4468508	20
41	9.5273997	9.9738519	9.5535477	10.4464523	19
42	9.5277526	9.9738067	9.5539459	10.4460541	18
43	9.5281053	9.9737615	9.5543438	10.4456562	17
44	9.5284577	9.9737162	9.5547415	10.4452585	16
45	9.5288097	9.9736709	9.5551388	10.4448612	15
46	9.5291614	9.9736255	9.5555359	10.4444641	14
47	9.5295128	9.9735801	9.5559327	10.4440673	13
48	9.5298638	9.9735346	9.5563292	10.4436708	12
49	9.5302146	9.9734891	9.5567255	10.4432745	11
50	9.5305650	9.9734435	9.5571214	10.4428786	10
51	9.5309151	9.9733980	9.5575171	10.4424829	9
52	9.5312649	9.9733523	9.5579125	10.4420875	8
53	9.5316143	9.9733067	9.5583077	10.4416923	7
54	9.5319635	9.9732610	9.5587025	10.4412975	6
55	9.5323123	9.9732152	9.5590971	10.4409029	5
56	9.5326608	9.9731694	9.5594914	10.4405086	4
57	9.5330090	9.9731236	9.5598854	10.4401146	3
58	9.5333569	9.9730777	9.5602792	10.4397208	2
59	9.5337044	9.9730318	9.5606727	10.4393273	1
60	9.5340517	9.9729858	9.5610659	10.4389341	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	70 Degrees.				

Min.	20 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.5340517	9.9729858	9.5610659	10.4389341	60
1	9.5343986	9.9729398	9.5614588	10.4385412	59
2	9.5347452	9.9728938	9.5618515	10.4381485	58
3	9.5350915	9.9728477	9.5622439	10.4377561	57
4	9.5354375	9.9728016	9.5626360	10.4373640	56
5	9.5357832	9.9727554	9.5630278	10.4369722	55
6	9.5361286	9.9727092	9.5634194	10.4365806	54
7	9.5364737	9.9726629	9.5638107	10.4361893	53
8	9.5368184	9.9726166	9.5642018	10.4357982	52
9	9.5371629	9.9725703	9.5645925	10.4354075	51
10	9.5375070	9.9725239	9.5649831	10.4350169	50
11	9.5378508	9.9724775	9.5653733	10.4346267	49
12	9.5381943	9.9724310	9.5657633	10.4342367	48
13	9.5385375	9.9723845	9.5661530	10.4338470	47
14	9.5388804	9.9723380	9.5665424	10.4334576	46
15	9.5392230	9.9722914	9.5669316	10.4330684	45
16	9.5395653	9.9722448	9.5673205	10.4326795	44
17	9.5399073	9.9721981	9.5677091	10.4322909	43
18	9.5402489	9.9721514	9.5680975	10.4319025	42
19	9.5405903	9.9721047	9.5684856	10.4315144	41
20	9.5409314	9.9720579	9.5688735	10.4311265	40
21	9.5412721	9.9720110	9.5692611	10.4307389	39
22	9.5416126	9.9719642	9.5696484	10.4303516	38
23	9.5419527	9.9719172	9.5700355	10.4299645	37
24	9.5422926	9.9718703	9.5704223	10.4295777	36
25	9.5426321	9.9718233	9.5708088	10.4291912	35
26	9.5429713	9.9717762	9.5711951	10.4288049	34
27	9.5433103	9.9717291	9.5715811	10.4284189	33
28	9.5436489	9.9716820	9.5719669	10.4280331	32
29	9.5439873	9.9716348	9.5723524	10.4276476	31
30	9.5443253	9.9715876	9.5727377	10.4272623	30
31	9.5446630	9.9715404	9.5731227	10.4268773	29
32	9.5450005	9.9714931	9.5735074	10.4264926	28
33	9.5453376	9.9714457	9.5738919	10.4261081	27
34	9.5456745	9.9713984	9.5742761	10.4257239	26
35	9.5460110	9.9713509	9.5746601	10.4253399	25
36	9.5463472	9.9713035	9.5750438	10.4249562	24
37	9.5466832	9.9712560	9.5754272	10.4245728	23
38	9.5470189	9.9712084	9.5758104	10.4241896	22
39	9.5473542	9.9711608	9.5761934	10.4238066	21
40	9.5476893	9.9711132	9.5765761	10.4234239	20
41	9.5480240	9.9710655	9.5769585	10.4230415	19
42	9.5483585	9.9710178	9.5773407	10.4226593	18
43	9.5486927	9.9709701	9.5777226	10.4222774	17
44	9.5490266	9.9709223	9.5781043	10.4218957	16
45	9.5493602	9.9708744	9.5784858	10.4215142	15
46	9.5496935	9.9708265	9.5788669	10.4211331	14
47	9.5500265	9.9707786	9.5792479	10.4207521	13
48	9.5503592	9.9707306	9.5796286	10.4203714	12
49	9.5506916	9.9706826	9.5800090	10.4199910	11
50	9.5510237	9.9706346	9.5803892	10.4196108	10
51	9.5513556	9.9705865	9.5807691	10.4192309	9
52	9.5516871	9.9705383	9.5811488	10.4188512	8
53	9.5520184	9.9704902	9.5815282	10.4184718	7
54	9.5523494	9.9704419	9.5819074	10.4180926	6
55	9.5526801	9.9703937	9.5822864	10.4177136	5
56	9.5530105	9.9703454	9.5826651	10.4173349	4
57	9.5533406	9.9702970	9.5830435	10.4169565	3
58	9.5536704	9.9702486	9.5834217	10.4165783	2
59	9.5539999	9.9702002	9.5837997	10.4162003	1
60	9.5543292	9.9701517	9.5841774	10.4158226	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	69 Degrees.				

Min.	21 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.5543292	9.9701517	9.5841774	10.4158226	60
1	9.5546581	9.9701032	9.5845549	10.4154451	59
2	9.5549868	9.9700547	9.5849321	10.4150679	58
3	9.5553152	9.9700061	9.5853091	10.4146909	57
4	9.5556433	9.9699574	9.5856859	10.4143141	56
5	9.5559711	9.9699087	9.5860624	10.4139376	55
6	9.5562987	9.9698600	9.5864386	10.4135614	54
7	9.5566259	9.9698112	9.5868147	10.4131853	53
8	9.5569529	9.9697624	9.5871904	10.4128096	52
9	9.5572796	9.9697136	9.5875660	10.4124340	51
10	9.5576060	9.9696647	9.5879413	10.4120587	50
11	9.5579321	9.9696158	9.5883163	10.4116837	49
12	9.5582579	9.9695668	9.5886912	10.4113088	48
13	9.5585835	9.9695177	9.5890657	10.4109343	47
14	9.5589088	9.9694687	9.5894401	10.4105599	46
15	9.5592338	9.9694196	9.5898142	10.4101858	45
16	9.5595585	9.9693704	9.5901881	10.4098119	44
17	9.5598829	9.9693212	9.5905617	10.4094383	43
18	9.5602071	9.9692720	9.5909351	10.4090649	42
19	9.5605310	9.9692227	9.5913082	10.4086918	41
20	9.5608546	9.9691734	9.5916812	10.4083188	40
21	9.5611779	9.9691241	9.5920539	10.4079461	39
22	9.5615010	9.9690746	9.5924263	10.4075737	38
23	9.5618237	9.9690252	9.5927985	10.4072015	37
24	9.5621462	9.9689757	9.5931705	10.4068295	36
25	9.5624685	9.9689262	9.5935423	10.4064577	35
26	9.5627904	9.9688766	9.5939138	10.4060862	34
27	9.5631121	9.9688270	9.5942851	10.4057149	33
28	9.5634335	9.9687773	9.5946561	10.4053439	32
29	9.5637546	9.9687276	9.5950269	10.4049731	31
30	9.5640754	9.9686779	9.5953975	10.4046025	30
31	9.5643960	9.9686281	9.5957679	10.4042321	29
32	9.5647163	9.9685783	9.5961380	10.4038620	28
33	9.5650363	9.9685284	9.5965079	10.4034921	27
34	9.5653561	9.9684785	9.5968776	10.4031224	26
35	9.5656756	9.9684286	9.5972470	10.4027530	25
36	9.5659948	9.9683786	9.5976162	10.4023838	24
37	9.5663137	9.9683285	9.5979852	10.4020148	23
38	9.5666324	9.9682784	9.5983540	10.4016460	22
39	9.5669508	9.9682283	9.5987225	10.4012775	21
40	9.5672689	9.9681781	9.5990908	10.4009092	20
41	9.5675868	9.9681279	9.5994588	10.4005412	19
42	9.5679044	9.9680777	9.5998267	10.4001733	18
43	9.5682217	9.9680274	9.6001943	10.3998057	17
44	9.5685387	9.9679771	9.6005617	10.3994383	16
45	9.5688555	9.9679267	9.6009289	10.3990711	15
46	9.5691721	9.9678763	9.6012958	10.3987042	14
47	9.5694883	9.9678258	9.6016625	10.3983375	13
48	9.5698043	9.9677753	9.6020290	10.3979710	12
49	9.5701200	9.9677247	9.6023953	10.3976047	11
50	9.5704355	9.9676741	9.6027613	10.3972387	10
51	9.5707506	9.9676235	9.6031271	10.3968729	9
52	9.5710656	9.9675728	9.6034927	10.3965073	8
53	9.5713802	9.9675221	9.6038581	10.3961419	7
54	9.5716946	9.9674713	9.6042233	10.3957767	6
55	9.5720087	9.9674205	9.6045882	10.3954118	5
56	9.5723226	9.9673697	9.6049529	10.3950471	4
57	9.5726362	9.9673188	9.6053174	10.3946826	3
58	9.5729495	9.9672679	9.6056817	10.3943183	2
59	9.5732626	9.9672169	9.6060457	10.3939543	1
60	9.5735754	9.9671659	9.6064096	10.3935904	0
	Coſine.	Sine.	Cotangent.	Tang.	
	68 Degrees.				

SINES.

Min.	22 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.5735754	9.9671659	9.6064096	10.3935904	60
1	9.5738880	9.9671148	9.6067732	10.3932268	59
2	9.5742003	9.9670637	9.6071366	10.3928634	58
3	9.5745123	9.9670125	9.6074997	10.3925003	57
4	9.5748240	9.9669614	9.6078627	10.3921373	56
5	9.5751356	9.9669101	9.6082254	10.3917746	55
6	9.5754468	9.9668588	9.6085880	10.3914120	54
7	9.5757578	9.9668075	9.6089503	10.3910497	53
8	9.5760685	9.9667562	9.6093124	10.3906876	52
9	9.5763790	9.9667048	9.6096742	10.3903258	51
10	9.5766892	9.9666533	9.6100359	10.3899641	50
11	9.5769991	9.9666018	9.6103973	10.3896027	49
12	9.5773088	9.9665503	9.6107586	10.3892414	48
13	9.5776183	9.9664986	9.6111196	10.3888804	47
14	9.5779275	9.9664471	9.6114804	10.3885196	46
15	9.5782364	9.9663954	9.6118409	10.3881591	45
16	9.5785450	9.9663437	9.6122013	10.3877937	44
17	9.5788535	9.9662920	9.6125615	10.3874385	43
18	9.5791616	9.9662402	9.6129214	10.3870786	42
19	9.5794695	9.9661884	9.6132812	10.3867188	41
20	9.5797772	9.9661365	9.6136407	10.3863593	40
21	9.5800845	9.9660846	9.6140000	10.3860000	39
22	9.5803917	9.9660326	9.6143591	10.3856409	38
23	9.5806986	9.9659806	9.6147180	10.3852820	37
24	9.5810052	9.9659285	9.6150766	10.3849234	36
25	9.5813116	9.9658764	9.6154351	10.3845649	35
26	9.5816177	9.9658243	9.6157934	10.3842066	34
27	9.5819236	9.9657721	9.6161514	10.3838486	33
28	9.5822292	9.9657199	9.6165093	10.3834907	32
29	9.5825345	9.9656677	9.6168669	10.3831331	31
30	9.5828397	9.9656153	9.6172243	10.3827757	30
31	9.5831445	9.9655630	9.6175815	10.3824185	29
32	9.5834491	9.9655106	9.6179385	10.3820615	28
33	9.5837535	9.9654582	9.6182953	10.3817047	27
34	9.5840576	9.9654057	9.6186519	10.3813481	26
35	9.5843615	9.9653532	9.6190083	10.3809917	25
36	9.5846651	9.9653006	9.6193645	10.3806355	24
37	9.5849685	9.9652480	9.6197205	10.3802795	23
38	9.5852716	9.9651953	9.6200762	10.3799238	22
39	9.5855745	9.9651426	9.6204318	10.3795682	21
40	9.5858771	9.9650899	9.6207872	10.3792128	20
41	9.5861795	9.9650371	9.6211423	10.3788577	19
42	9.5864816	9.9649843	9.6214977	10.3785026	18
43	9.5867835	9.9649314	9.6218520	10.3781480	17
44	9.5870851	9.9648785	9.6222066	10.3777934	16
45	9.5873865	9.9648256	9.6225609	10.3774391	15
46	9.5876876	9.9647726	9.6229150	10.3770850	14
47	9.5879885	9.9647195	9.6232690	10.3767310	13
48	9.5882892	9.9646665	9.6236227	10.3763773	12
49	9.5885896	9.9646133	9.6239763	10.3760237	11
50	9.5888897	9.9645602	9.6243296	10.3756704	10
51	9.5891897	9.9645069	9.6246827	10.3753173	9
52	9.5894893	9.9644537	9.6250356	10.3749644	8
53	9.5897888	9.9644004	9.6253884	10.3746116	7
54	9.5900880	9.9643470	9.6257409	10.3742591	6
55	9.5903869	9.9642937	9.6260932	10.3739068	5
56	9.5906856	9.9642402	9.6264454	10.3735546	4
57	9.5909841	9.9641868	9.6267973	10.3732027	3
58	9.5912823	9.9641332	9.6271491	10.3728509	2
59	9.5915803	9.9640797	9.6275006	10.3724994	1
60	9.5918780	9.9640261	9.6278519	10.3721481	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	67 Degrees.				

Min.	23 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.5918780	9.9640261	9.6278519	10.3721481	60
1	9.5921755	9.9639724	9.6282031	10.3717969	59
2	9.5924728	9.9639187	9.6285540	10.3714460	58
3	9.5927698	9.9638650	9.6289048	10.3710952	57
4	9.5930666	9.9638112	9.6292553	10.3707447	56
5	9.5933631	9.9637574	9.6296057	10.3703943	55
6	9.5936594	9.9637036	9.6299558	10.3700442	54
7	9.5939555	9.9636496	9.6303058	10.3696942	53
8	9.5942513	9.9635957	9.6306556	10.3693444	52
9	9.5945469	9.9635417	9.6310052	10.3689948	51
10	9.5948422	9.9634877	9.6313545	10.3686455	50
11	9.5951373	9.9634336	9.6317037	10.3682963	49
12	9.5954322	9.9633795	9.6320527	10.3679473	48
13	9.5957268	9.9633253	9.6324015	10.3675985	47
14	9.5960212	9.9632711	9.6327501	10.3672499	46
15	9.5963154	9.9632168	9.6330985	10.3669015	45
16	9.5966093	9.9631625	9.6334468	10.3665532	44
17	9.5969030	9.9631082	9.6337948	10.3662052	43
18	9.5971965	9.9630538	9.6341426	10.3658574	42
19	9.5974897	9.9629994	9.6344903	10.3655097	41
20	9.5977827	9.9629449	9.6348378	10.3651622	40
21	9.5980754	9.9628904	9.6351850	10.3648150	39
22	9.5983679	9.9628358	9.6355321	10.3644679	38
23	9.5986602	9.9627812	9.6358790	10.3641210	37
24	9.5989523	9.9627266	9.6362257	10.3637743	36
25	9.5992441	9.9626719	9.6365722	10.3634278	35
26	9.5995357	9.9626172	9.6369185	10.3630815	34
27	9.5998270	9.9625624	9.6372646	10.3627354	33
28	9.6001181	9.9625076	9.6376106	10.3623894	32
29	9.6004090	9.9624527	9.6379563	10.3620437	31
30	9.6006997	9.9623978	9.6383019	10.3616981	30
31	9.6009901	9.9623428	9.6386473	10.3613527	29
32	9.6012803	9.9622878	9.6389925	10.3610075	28
33	9.6015703	9.9622328	9.6393375	10.3606625	27
34	9.6018600	9.9621777	9.6396823	10.3603177	26
35	9.6021495	9.9621226	9.6400269	10.3599731	25
36	9.6024388	9.9620674	9.6403714	10.3596286	24
37	9.6027278	9.9620122	9.6407156	10.3592844	23
38	9.6030166	9.9619569	9.6410597	10.3589403	22
39	9.6033052	9.9619016	9.6414036	10.3585964	21
40	9.6035936	9.9618463	9.6417473	10.3582527	20
41	9.6038817	9.9617909	9.6420908	10.3579092	19
42	9.6041696	9.9617355	9.6424342	10.3575658	18
43	9.6044573	9.9616800	9.6427773	10.3572227	17
44	9.6047448	9.9616245	9.6431203	10.3568797	16
45	9.6050320	9.9615689	9.6434631	10.3565369	15
46	9.6053190	9.9615133	9.6448057	10.3561943	14
47	9.6056057	9.9614576	9.6441481	10.3558519	13
48	9.6058923	9.9614020	9.6444903	10.3555097	12
49	9.6061786	9.9613462	9.6448324	10.3551676	11
50	9.6064647	9.9612904	9.6451743	10.3548257	10
51	9.6067506	9.9612346	9.6455160	10.3544840	9
52	9.6070362	9.9611787	9.6458575	10.3541425	8
53	9.6073216	9.9611228	9.6461988	10.3538012	7
54	9.6076068	9.9610668	9.6465400	10.3534600	6
55	9.6078918	9.9610108	9.6468810	10.3531190	5
56	9.6081765	9.9609548	9.6472217	10.3527783	4
57	9.6084611	9.9608987	9.6475624	10.3524376	3
58	9.6087454	9.9608426	9.6479028	10.3520972	2
59	9.6090294	9.9607864	9.6482431	10.3517569	1
60	9.6093133	9.9607302	9.6485831	10.3514169	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	66 Degrees.				

SINES.

Min.	24 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6093133	9.9607302	9.6485831	10.3514169	60
1	9.6095969	9.9606739	9.6489230	10.3510770	59
2	9.6098803	9.9606176	9.6492628	10.3507372	58
3	9.6101635	9.9605612	9.6496023	10.3503977	57
4	9.6104465	9.9605048	9.6499417	10.3500583	56
5	9.6107293	9.9604484	9.6502809	10.3497191	55
6	9.6110118	9.9603919	9.6506199	10.3493801	54
7	9.6112941	9.9603354	9.6509587	10.3490413	53
8	9.6115762	9.9602788	9.6512974	10.3487026	52
9	9.6118580	9.9602222	9.6516359	10.3483641	51
10	9.6121397	9.9601655	9.6519742	10.3480258	50
11	9.6124211	9.9601088	9.6523123	10.3476877	49
12	9.6127023	9.9600520	9.6526503	10.3473497	48
13	9.6129833	9.9599952	9.6529881	10.3470119	47
14	9.6132641	9.9599384	9.6533257	10.3466743	46
15	9.6135446	9.9598815	9.6536631	10.3463369	45
16	9.6138250	9.9598246	9.6540004	10.3459996	44
17	9.6141051	9.9597676	9.6543375	10.3456625	43
18	9.6143850	9.9597106	9.6546744	10.3453256	42
19	9.6146647	9.9596535	9.6550112	10.3449888	41
20	9.6149441	9.9595964	9.6553477	10.3446523	40
21	9.6152234	9.9595393	9.6556841	10.3443159	39
22	9.6155024	9.9594821	9.6560204	10.3439796	38
23	9.6157812	9.9594248	9.6563564	10.3436436	37
24	9.6160599	9.9593675	9.6566923	10.3433077	36
25	9.6163382	9.9593102	9.6570280	10.3429720	35
26	9.6166164	9.9592528	9.6573636	10.3426364	34
27	9.6168944	9.9591954	9.6576989	10.3423011	33
28	9.6171721	9.9591380	9.6580341	10.3419659	32
29	9.6174496	9.9590805	9.6583692	10.3416308	31
30	9.6177270	9.9590229	9.6587041	10.3412959	30
31	9.6180041	9.9589653	9.6590387	10.3409613	29
32	9.6182809	9.9589077	9.6593733	10.3406267	28
33	9.6185576	9.9588500	9.6597076	10.3402924	27
34	9.6188341	9.9587923	9.6600418	10.3399582	26
35	9.6191103	9.9587345	9.6603758	10.3396242	25
36	9.6193864	9.9586767	9.6607097	10.3392903	24
37	9.6196622	9.9586188	9.6610434	10.3389566	23
38	9.6199378	9.9585609	9.6613769	10.3386231	22
39	9.6202132	9.9585030	9.6617103	10.3382897	21
40	9.6204884	9.9584450	9.6620434	10.3379566	20
41	9.6207634	9.9583869	9.6623765	10.3376235	19
42	9.6210382	9.9583288	9.6627093	10.3372907	18
43	9.6213127	9.9582707	9.6630420	10.3369580	17
44	9.6215871	9.9582125	9.6633745	10.3366255	16
45	9.6218612	9.9581543	9.6637069	10.3362931	15
46	9.6221351	9.9580961	9.6640391	10.3359609	14
47	9.6224088	9.9580378	9.6643711	10.3356289	13
48	9.6226824	9.9579794	9.6647030	10.3352970	12
49	9.6229557	9.9579210	9.6650346	10.3349654	11
50	9.6232287	9.9578626	9.6653662	10.3346338	10
51	9.6235016	9.9578041	9.6656975	10.3343025	9
52	9.6237743	9.9577456	9.6660288	10.3339712	8
53	9.6240468	9.9576870	9.6663598	10.3336402	7
54	9.6243190	9.9576284	9.6666907	10.3333093	6
55	9.6245911	9.9575697	9.6670214	10.3329786	5
56	9.6248629	9.9575110	9.6673519	10.3326481	4
57	9.6251346	9.9574522	9.6676823	10.3323177	3
58	9.6254060	9.9573934	9.6680126	10.3319874	2
59	9.6256772	9.9573346	9.6683426	10.3316574	1
60	9.6259483	9.9572757	9.6686725	10.3313275	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	65 Degrees.				

Min.	25 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6259483	9.9572757	9.6686725	10.3313275	60
1	9.6262191	9.9572168	9.6690023	10.3309977	59
2	9.6264897	9.9571578	9.6693319	10.3306681	58
3	9.6267601	9.9570988	9.6696613	10.3303387	57
4	9.6270303	9.9570397	9.6699906	10.3300094	56
5	9.6273003	9.9569806	9.6703197	10.3296803	55
6	9.6275701	9.9569215	9.6706486	10.3293514	54
7	9.6278397	9.9568623	9.6709774	10.3290226	53
8	9.6281090	9.9568030	9.6713060	10.3286940	52
9	9.6283782	9.9567437	9.6716345	10.3283655	51
10	9.6286472	9.9566844	9.6719628	10.3280372	50
11	9.6289160	9.9566250	9.6722910	10.3277090	49
12	9.6291845	9.9565656	9.6726190	10.3273810	48
13	9.6294529	9.9565061	9.6729468	10.3270532	47
14	9.6297211	9.9564466	9.6732745	10.3267255	46
15	9.6299890	9.9563870	9.6736020	10.3263980	45
16	9.6302568	9.9563274	9.6739294	10.3260706	44
17	9.6305243	9.9562678	9.6742566	10.3257434	43
18	9.6307917	9.9562081	9.6745836	10.3254164	42
19	9.6310589	9.9561483	9.6749105	10.3250895	41
20	9.6313258	9.9560886	9.6752372	10.3247628	40
21	9.6315926	9.9560287	9.6755638	10.3244362	39
22	9.6318591	9.9559689	9.6758903	10.3241097	38
23	9.6321255	9.9559089	9.6762165	10.3237835	37
24	9.6323916	9.9558490	9.6765426	10.3234574	36
25	9.6326576	9.9557890	9.6768686	10.3231314	35
26	9.6329233	9.9557289	9.6771944	10.3228056	34
27	9.6331889	9.9556688	9.6775201	10.3224799	33
28	9.6334542	9.9556087	9.6778456	10.3221544	32
29	9.6337194	9.9555485	9.6781709	10.3218291	31
30	9.6339844	9.9554882	9.6784961	10.3215039	30
31	9.6342491	9.9554280	9.6788211	10.3211789	29
32	9.6345137	9.9553676	9.6791460	10.3208540	28
33	9.6347780	9.9553073	9.6794708	10.3205292	27
34	9.6350422	9.9552469	9.6797953	10.3202047	26
35	9.6353062	9.9551864	9.6801198	10.3198802	25
36	9.6355699	9.9551259	9.6804440	10.3195560	24
37	9.6358335	9.9550653	9.6807682	10.3192318	23
38	9.6360969	9.9550047	9.6810921	10.3189079	22
39	9.6363601	9.9549441	9.6814160	10.3185840	21
40	9.6366231	9.9548834	9.6817396	10.3182604	20
41	9.6368859	9.9548227	9.6820632	10.3179368	19
42	9.6371484	9.9547619	9.6823865	10.3176135	18
43	9.6374108	9.9547011	9.6827098	10.3172902	17
44	9.6376731	9.9546402	9.6830328	10.3169672	16
45	9.6379351	9.9545793	9.6833557	10.3166443	15
46	9.6381969	9.9545184	9.6836785	10.3163215	14
47	9.6384585	9.9544574	9.6840011	10.3159989	13
48	9.6387199	9.9543963	9.6843236	10.3156764	12
49	9.6389812	9.9543352	9.6846459	10.3153541	11
50	9.6392422	9.9542741	9.6849681	10.3150319	10
51	9.6395030	9.9542129	9.6852901	10.3147099	9
52	9.6397637	9.9541517	9.6856120	10.3143880	8
53	9.6400241	9.9540904	9.6859338	10.3140662	7
54	9.6402844	9.9540291	9.6862553	10.3137447	6
55	9.6405445	9.9539677	9.6865768	10.3134232	5
56	9.6408044	9.9539063	9.6868981	10.3131019	4
57	9.6410640	9.9538448	9.6872192	10.3127808	3
58	9.6413235	9.9537833	9.6875402	10.3124598	2
59	9.6415828	9.9537218	9.6878611	10.3121389	1
60	9.6418420	9.9536602	9.6881818	10.3118182	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	64 Degrees.				

Min.	26 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6418420	9.9536602	9.6881818	10.3118182	60
1	9.6421009	9.9535985	9.6885023	10.3114977	59
2	9.6423596	9.9535369	9.6888227	10.3111773	58
3	9.6426182	9.9534751	9.6891430	10.3108570	57
4	9.6428765	9.9534134	9.6894631	10.3105369	56
5	9.6431347	9.9533515	9.6897831	10.3102169	55
6	9.6433926	9.9532897	9.6901030	10.3098970	54
7	9.6436504	9.9532278	9.6904226	10.3095774	53
8	9.6439080	9.9531658	9.6907422	10.3092578	52
9	9.6441654	9.9531038	9.6910616	10.3089384	51
10	9.6444226	9.9530418	9.6913809	10.3086191	50
11	9.6446796	9.9529797	9.6917000	10.3083000	49
12	9.6449365	9.9529175	9.6920189	10.3079811	48
13	9.6451931	9.9528553	9.6923378	10.3076622	47
14	9.6454496	9.9527931	9.6926565	10.3073435	46
15	9.6457058	9.9527308	9.6929750	10.3070250	45
16	9.6459619	9.9526685	9.6932934	10.3067066	44
17	9.6462178	9.9526061	9.6936117	10.3063883	43
18	9.6464735	9.9525437	9.6939298	10.3060702	42
19	9.6467290	9.9524813	9.6942478	10.3057522	41
20	9.6469844	9.9524188	9.6945656	10.3054344	40
21	9.6472395	9.9523562	9.6948833	10.3051167	39
22	9.6474945	9.9522936	9.6952009	10.3047991	38
23	9.6477492	9.9522310	9.6955183	10.3044817	37
24	9.6480038	9.9521683	9.6958355	10.3041645	36
25	9.6482582	9.9521055	9.6961527	10.3038473	35
26	9.6485124	9.9520428	9.6964697	10.3035303	34
27	9.6487665	9.9519799	9.6967865	10.3032135	33
28	9.6490203	9.9519171	9.6971032	10.3028968	32
29	9.6492740	9.9518541	9.6974198	10.3025802	31
30	9.6495274	9.9517912	9.6977363	10.3022637	30
31	9.6497807	9.9517282	9.6980526	10.3019474	29
32	9.6500338	9.9516651	9.6983687	10.3016313	28
33	9.6502868	9.9516020	9.6986847	10.3013153	27
34	9.6505395	9.9515389	9.6990006	10.3009994	26
35	9.6507920	9.2514757	9.6993164	10.3006836	25
36	9.6510444	9.9514124	9.6996320	10.3003680	24
37	9.6512966	9.9513492	9.6999474	10.3000526	23
38	9.6515486	9.9512858	9.7002628	10.2997372	22
39	9.6518004	9.9512224	9.7005780	10.2994220	21
40	9.6520521	9.9511590	9.7008930	10.2991070	20
41	9.6523035	9.9510956	9.7012080	10.2987920	19
42	9.6525548	9.9510320	9.7015227	10.2984773	18
43	9.6528059	9.9509685	9.7018374	10.2981626	17
44	9.6530568	9.9509049	9.7021519	10.2978481	16
45	9.6533075	9.9508412	9.7024663	10.2975337	15
46	9.6535581	9.9507775	9.7027805	10.2972195	14
47	9.6538084	9.9507138	9.7030946	10.2969054	13
48	9.6540586	9.9506500	9.7034086	10.2965914	12
49	9.6543086	9.9505861	9.7037225	10.2962775	11
50	9.6545584	9.9505223	9.7040362	10.2959638	10
51	9.6548081	9.9504583	9.7043497	10.2956503	9
52	9.6550575	9.9503944	9.7046632	10.2953368	8
53	9.6553068	9.9503303	9.7049765	10.2950235	7
54	9.6555559	9.9502663	9.7052897	10.2947103	6
55	9.6558048	9.9502022	9.7056027	10.2943973	5
56	9.6560536	9.9501380	9.7059156	10.2940844	4
57	9.6563021	9.9500738	9.7062284	10.2937716	3
58	9.6565505	9.9500095	9.7065410	10.2934590	2
59	9.6567987	9.9499452	9.7068535	10.2931465	1
60	9.6570468	9.9498809	9.7071659	10.2928341	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	63 Degrees.				

Min.	27 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6570468	9.9498809	9.7071659	10.2928341	60
1	9.6572946	9.9498165	9.7074781	10.2925219	59
2	9.6575423	9.9497521	9.7077902	10.2922098	58
3	9.6577898	9.9496876	9.7081022	10.2918978	57
4	9.6580371	9.9496230	9.7084141	10.2915859	56
5	9.6582842	9.9495585	9.7087258	10.2912742	55
6	9.6585312	9.9494938	9.7090374	10.2909626	54
7	9.6587780	9.9494292	9.7093488	10.2906512	53
8	9.6590246	9.9493645	9.7096601	10.2903399	52
9	9.6592710	9.9492997	9.7099713	10.2900287	51
10	9.6595173	9.9492349	9.7102824	10.2897176	50
11	9.6597633	9.9491700	9.7105933	10.2894067	49
12	9.6600093	9.9491051	9.7109041	10.2890959	48
13	9.6602550	9.9490402	9.7112148	10.2887852	47
14	9.6605005	9.9489752	9.7115254	10.2884746	46
15	9.6607459	9.9489101	9.7118358	10.2881642	45
16	9.6609911	9.9488450	9.7121461	10.2878539	44
17	9.6612361	9.9487799	9.7124562	10.2875438	43
18	9.6614810	9.9487147	9.7127662	10.2872338	42
19	9.6617257	9.9486495	9.7130761	10.2869239	41
20	9.6619702	9.9485842	9.7133859	10.2866141	40
21	9.6622145	9.9485189	9.7136956	10.2863044	39
22	9.6624586	9.9484535	9.7140051	10.2859949	38
23	9.6627026	9.9483881	9.7143145	10.2856855	37
24	9.6629464	9.9483227	9.7146237	10.2853763	36
25	9.6631900	9.9482572	9.7149329	10.2850671	35
26	9.6634335	9.9481916	9.7152419	10.2847581	34
27	9.6636768	9.9481260	9.7155508	10.2844492	33
28	9.6639199	9.9480604	9.7158595	10.2841405	32
29	9.6641628	9.9479947	9.7161682	10.2838318	31
30	9.6644056	9.9479289	9.7164767	10.2835233	30
31	9.6646482	9.9478631	9.7167851	10.2832149	29
32	9.6648906	9.9477973	9.7170933	10.2829067	28
33	9.6651329	9.9477314	9.7174014	10.2825986	27
34	9.6653749	9.9476655	9.7177094	10.2822906	26
35	9.6656168	9.9475995	9.7180173	10.2819827	25
36	9.6658586	9.9475335	9.7183251	10.2816749	24
37	9.6661001	9.9474674	9.7186327	10.2813673	23
38	9.6663415	9.9474013	9.7189402	10.2810598	22
39	9.6665828	9.9473352	9.7192476	10.2807524	21
40	9.6668238	9.9472689	9.7195549	10.2804451	20
41	9.6670647	9.9472027	9.7198620	10.2801380	19
42	9.6673054	9.9471364	9.7201690	10.2798310	18
43	9.6675459	9.9470700	9.7204759	10.2795241	17
44	9.6677863	9.9470036	9.7207827	10.2792173	16
45	9.6680265	9.9469372	9.7210893	10.2789107	15
46	9.6682665	9.9468707	9.7213958	10.2786042	14
47	9.6685064	9.9468042	9.7217022	10.2782978	13
48	9.6687461	9.9467376	9.7220085	10.2779915	12
49	9.6689856	9.9466710	9.7223147	10.2776853	11
50	9.6692250	9.9466043	9.7226207	10.2773793	10
51	9.6694642	9.9465376	9.7229266	10.2770734	9
52	9.6697032	9.9464708	9.7232324	10.2767676	8
53	9.6699420	9.9464040	9.7235381	10.2764619	7
54	9.6701807	9.9463371	9.7238436	10.2761564	6
55	9.6704192	9.9462702	9.7241490	10.2758510	5
56	9.6706576	9.9462032	9.7244543	10.2755457	4
57	9.6708958	9.9461362	9.7247595	10.2752405	3
58	9.6711338	9.9460692	9.7250646	10.2749354	2
59	9.6713716	9.9460021	9.7253695	10.2746305	1
60	9.6716093	9.9459349	9.7256744	10.2743256	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	62 Degrees.				

SINES.

Min.	28 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6716093	9.9459349	9.7256744	10.2743256	60
1	9.6718468	9.9458677	9.7259791	10.2740209	59
2	9.6720841	9.9458005	9.7262837	10.2737163	58
3	9.6723213	9.9457332	9.7265881	10.2734119	57
4	9.6725583	9.9456659	9.7268925	10.2731075	56
5	9.6727952	9.9455985	9.7271967	10.2728033	55
6	9.6730319	9.9455310	9.7275008	10.2724992	54
7	9.6732684	9.9454636	9.7278048	10.2721952	53
8	9.6735047	9.9453960	9.7281087	10.2718913	52
9	9.6737409	9.9453285	9.7284124	10.2715876	51
10	9.6739769	9.9452609	9.7287161	10.2712839	50
11	9.6742128	9.9451932	9.7290196	10.2709804	49
12	9.6744485	9.9451255	9.7293230	10.2706770	48
13	9.6746840	9.9450577	9.7296263	10.2703737	47
14	9.6749194	9.9449899	9.7299295	10.2700705	46
15	9.6751546	9.9449220	9.7302325	10.2697675	45
16	9.6753896	9.9448541	9.7305354	10.2694646	44
17	9.6756245	9.9447862	9.7308383	10.2691617	43
18	9.6758592	9.9447182	9.7311410	10.2688590	42
19	9.6760937	9.9446501	9.7314436	10.2685564	41
20	9.6763281	9.9445821	9.7317460	10.2682540	40
21	9.6765623	9.9445139	9.7320484	10.2679516	39
22	9.6767963	9.9444457	9.7323506	10.2676494	38
23	9.6770302	9.9443775	9.7326527	10.2673473	37
24	9.6772640	9.9443092	9.7329547	10.2670453	36
25	9.6774975	9.9442409	9.7332566	10.2667434	35
26	9.6777309	9.9441725	9.7335584	10.2664416	34
27	9.6779642	9.9441041	9.7338601	10.2661399	33
28	9.6781972	9.9440356	9.7341616	10.2658384	32
29	9.6784301	9.9439671	9.7344631	10.2655369	31
30	9.6786629	9.9438985	9.7347644	10.2652356	30
31	9.6788955	9.9438299	9.7350656	10.2649344	29
32	9.6791279	9.9437612	9.7353667	10.2646333	28
33	9.6793602	9.9436925	9.7356677	10.2643323	27
34	9.6795923	9.9436238	9.7359685	10.2640315	26
35	9.6798243	9.9435549	9.7362693	10.2637307	25
36	9.6800560	9.9434861	9.7365699	10.2634301	24
37	9.6802877	9.9434172	9.7368705	10.2631295	23
38	9.6805191	9.9433482	9.7371709	10.2628291	22
39	9.6807504	9.9432792	9.7374712	10.2625288	21
40	9.6809816	9.9432102	9.7377714	10.2622286	20
41	9.6812126	9.9431411	9.7380715	10.2619285	19
42	9.6814434	9.9430720	9.7383714	10.2616286	18
43	9.6816741	9.9430028	9.7386713	10.2613287	17
44	9.6819046	9.9429335	9.7389710	10.2610290	16
45	9.6821349	9.9428643	9.7392707	10.2607293	15
46	9.6823651	9.9427949	9.7395702	10.2604298	14
47	9.6825952	9.9427255	9.7398696	10.2601304	13
48	9.6828250	9.9426561	9.7401689	10.2598311	12
49	9.6830548	9.9425866	9.7404681	10.2595319	11
50	9.6832843	9.9425171	9.7407672	10.2592328	10
51	9.6835137	9.9424476	9.7410662	10.2589338	9
52	9.6837430	9.9423779	9.7413650	10.2586350	8
53	9.6839720	9.9423083	9.7416638	10.2583362	7
54	9.6842010	9.9422386	9.7419624	10.2580376	6
55	9.6844297	9.9421688	9.7422609	10.2577391	5
56	9.6846583	9.9420990	9.7425594	10.2574406	4
57	9.6848868	9.9420291	9.7428577	10.2571423	3
58	9.6851151	9.9419592	9.7431559	10.2568441	2
59	9.6853432	9.9418893	9.7434540	10.2565460	1
60	9.6855712	9.9418193	9.7437520	10.2562480	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	61 Degrees.				

Min.	29 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6855712	9.9418193	9.7437520	10.2562480	60
1	9.6857991	9.9417492	9.7440499	10.2559501	59
2	9.6860267	9.9416791	9.7443476	10.2556524	58
3	9.6862542	9.9416090	9.7446453	10.2553547	57
4	9.6864816	9.9415388	9.7449428	10.2550572	56
5	9.6867088	9.9414685	9.7452403	10.2547597	55
6	9.6869359	9.9413982	9.7455376	10.2544624	54
7	9.6871628	9.9413279	9.7458349	10.2541651	53
8	9.6873895	9.9412575	9.7461320	10.2538680	52
9	9.6876161	9.9411871	9.7464290	10.2535710	51
10	9.6878425	9.9411166	9.7467259	10.2532741	50
11	9.6880688	9.9410461	9.7470227	10.2529773	49
12	9.6882949	9.9409755	9.7473194	10.2526806	48
13	9.6885209	9.9409048	9.7476160	10.2523840	47
14	9.6887467	9.9408342	9.7479125	10.2520875	46
15	9.6889723	9.9407634	9.7482089	10.2517911	45
16	9.6891978	9.9406927	9.7485052	10.2514948	44
17	9.6894232	9.9406219	9.7488013	10.2511987	43
18	9.6896484	9.9405510	9.7490974	10.2509026	42
19	9.6898734	9.9404801	9.7493934	10.2506066	41
20	9.6900983	9.9404091	9.7496892	10.2503108	40
21	9.6903231	9.9403381	9.7499850	10.2500150	39
22	9.6905476	9.9402670	9.7502806	10.2497194	38
23	9.6907721	9.9401959	9.7505762	10.2494238	37
24	9.6909964	9.9401248	9.7508716	10.2491284	36
25	9.6912205	9.9400535	9.7511669	10.2488331	35
26	9.6914445	9.9399823	9.7514622	10.2485378	34
27	9.6916683	9.9399110	9.7517573	10.2482427	33
28	9.6918919	9.9398396	9.7520523	10.2479477	32
29	9.6921155	9.9397682	9.7523472	10.2476528	31
30	9.6923388	9.9396968	9.7526420	10.2473580	30
31	9.6925620	9.9396253	9.7529368	10.2470632	29
32	9.6927851	9.9395537	9.7532314	10.2467686	28
33	9.6930080	9.9394821	9.7535259	10.2464741	27
34	9.6932308	9.9394105	9.7538203	10.2461797	26
35	9.6934534	9.9393388	9.7541146	10.2458854	25
36	9.6936758	9.9392671	9.7544088	10.2455912	24
37	9.6938981	9.9391953	9.7547029	10.2452971	23
38	9.6941203	9.9391234	9.7549969	10.2450031	22
39	9.6943423	9.9390515	9.7552908	10.2447092	21
40	9.6945642	9.9389796	9.7555846	10.2444154	20
41	9.6947859	9.9389076	9.7558783	10.2441217	19
42	9.6950074	9.9388356	9.7561718	10.2438282	18
43	9.6952288	9.9387635	9.7564653	10.2435347	17
44	9.6954501	9.9386914	9.7567587	10.2432413	16
45	9.6956712	9.9386192	9.7570520	10.2429480	15
46	9.6958922	9.9385470	9.7573452	10.2426548	14
47	9.6961130	9.9384747	9.7576383	10.2423617	13
48	9.6963336	9.9384024	9.7579313	10.2420687	12
49	9.6965541	9.9383300	9.7582242	10.2417758	11
50	9.6967745	9.9382576	9.7585170	10.2414830	10
51	9.6969947	9.9381851	9.7588096	10.2411904	9
52	9.6972148	9.9381126	9.7591022	10.2408978	8
53	9.6974347	9.9380400	9.7593947	10.2406053	7
54	9.6976545	9.9379674	9.7596871	10.2403129	6
55	9.6978741	9.9378947	9.7599794	10.2400206	5
56	9.6980936	9.9378220	9.7602716	10.2397284	4
57	9.6983129	9.9377492	9.7605637	10.2394363	3
58	9.6985321	9.9376764	9.7608557	10.2391443	2
59	9.6987511	9.9376035	9.7611476	10.2388524	1
60	9.6989700	9.9375306	9.7614394	10.2385606	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	60 Degrees.				

Min.	30 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.6989700	9.9375306	9.7614394	10.2385606	60
1	9.6991887	9.9374577	9.7617311	10.2382689	59
2	9.6994073	9.9373847	9.7620227	10.2379773	58
3	9.6996258	9.9374116	9.7623142	10.2376858	57
4	9.6998441	9.9372385	9.7626056	10.2373944	56
5	9.7000622	9.9371653	9.7628969	10.2371031	55
6	9.7002802	9.9370921	9.7631881	10.2368119	54
7	9.7004981	9.9370189	9.7634792	10.2365208	53
8	9.7007158	9.9369456	9.7637702	10.2362298	52
9	9.7009334	9.9368722	9.7640612	10.2359388	51
10	9.7011508	9.9367988	9.7643520	10.2356480	50
11	9.7013681	9.9367254	9.7646427	10.2353573	49
12	9.7015852	9.9366519	9.7649334	10.2350666	48
13	9.7018022	9.9365783	9.7652239	10.2347761	47
14	9.7020190	9.9365047	9.7655143	10.2344857	46
15	9.7022357	9.9364311	9.7658047	10.2341953	45
16	9.7024523	9.9363574	9.7660949	10.2339051	44
17	9.7026687	9.9362836	9.7663851	10.2336149	43
18	9.7028849	9.9362098	9.7666751	10.2333249	42
19	9.7031011	9.9361360	9.7669651	10.2330349	41
20	9.7033170	9.9360621	9.7672550	10.2327450	40
21	9.7035329	9.9359881	9.7675448	10.2324552	39
22	9.7037486	9.9359141	9.7678344	10.2321656	38
23	9.7039641	9.9358401	9.7681240	10.2318760	37
24	9.7041795	9.9357660	9.7684135	10.2315865	36
25	9.7043947	9.9356918	9.7687029	10.2312971	35
26	9.7046099	9.9356177	9.7689922	10.2310078	34
27	9.7048248	9.9355434	9.7692814	10.2307186	33
28	9.7050397	9.9354691	9.7695705	10.2304295	32
29	9.7052543	9.9353948	9.7698596	10.2301404	31
30	9.7054689	9.9353204	9.7701485	10.2298515	30
31	9.7056833	9.9352459	9.7704373	10.2295627	29
32	9.7058975	9.9351715	9.7707261	10.2292739	28
33	9.7061116	9.9350969	9.7710147	10.2289853	27
34	9.7063256	9.9350223	9.7713033	10.2286967	26
35	9.7065394	9.9349477	9.7715917	10.2284083	25
36	9.7067531	9.9348730	9.7518801	10.2281199	24
37	9.7069667	9.9347983	9.7721684	10.2278316	23
38	9.7071801	9.9347235	9.7724566	10.2275434	22
39	9.7073933	9.9346486	9.7727447	10.2272553	21
40	9.7076064	9.9345738	9.7730327	10.2269673	20
41	9.7078194	9.9344988	9.7733206	10.2266794	19
42	9.7080323	9.9344238	9.7736084	10.2263916	18
43	9.7082450	9.9343488	9.7738961	10.2261039	17
44	9.7084575	9.9342737	9.7741838	10.2258162	16
45	9.7086699	9.9341986	9.7744713	10.2255287	15
46	9.7088822	9.9341234	9.7747588	10.2252412	14
47	9.7090943	9.9340482	9.7750462	10.2249538	13
48	9.7093063	9.9339729	9.7753334	10.2246666	12
49	9.7005182	9.9338976	9.7756206	10.2243794	11
50	9.7007299	9.9338222	9.5759077	10.2240923	10
51	9.7009415	9.9337467	9.7761947	10.2238053	9
52	9.7101529	9.9336713	9.7764816	10.2235184	8
53	9.7103642	9.9335957	9.7767685	10.2232315	7
54	9.7105753	9.9335201	9.7770552	10.2229448	6
55	9.7107863	9.9334445	9.7773418	10.2226582	5
56	9.7109972	9.9333688	9.7776284	10.2223716	4
57	9.7112080	9.9332931	9.7779149	10.2220851	3
58	9.7114186	9.9332173	9.7782012	10.2217988	2
59	9.7116290	9.9331415	9.7784875	10.2215125	1
60	9.7118393	9.9330656	9.7787737	10.2212263	0
	Co ſine.	Sine.	Cotangent.	Tang.	Min.
	59 Degrees.				

Min.	31 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7118393	9.9330656	9.7787737	10.2212263	60
1	9.7120495	9.9329897	9.7790599	10.2209401	59
2	9.7122596	9.9329137	9.7793459	10.2206541	58
3	9.7124695	9.9328376	9.7796318	10.2203682	57
4	9.7126792	9.9327616	9.7799177	10.2200823	56
5	9.7128889	9.9326854	9.7802034	10.2197966	55
6	9.7130983	9.9326092	9.7804891	10.2195109	54
7	9.7133077	9.9325330	9.7807747	10.2192253	53
8	9.7135169	9.9324567	9.7810602	10.2189398	52
9	9.7137260	9.9323804	9.7813456	10.2186544	51
10	9.7139349	9.9323040	9.7816309	10.2183691	50
11	9.7141437	9.9322276	9.7819162	10.2180838	49
12	9.7143524	9.9321511	9.7822013	10.2177987	48
13	9.7145609	9.9320746	9.7824864	10.2175136	47
14	9.7147693	9.9319980	9.7827713	10.2172287	46
15	9.7149776	9.9319213	9.7830562	10.2169438	45
16	9.7151857	9.9318447	9.7833410	10.2166590	44
17	9.7153937	9.9317679	9.7836258	10.2163742	43
18	9.7156015	9.9316911	9.7839104	10.2160896	42
19	9.7158092	9.9316143	9.7841949	10.2158051	41
20	9.7160168	9.9315374	9.7844794	10.2155206	40
21	9.7162243	9.9314605	9.7847638	10.2152362	39
22	9.7164316	9.9313835	9.7850481	10.2149519	38
23	9.7166387	9.9313065	9.7853323	10.2146677	37
24	9.7168458	9.9312294	9.7856164	10.2143836	36
25	9.7170526	9.9311522	9.7859004	10.2140996	35
26	9.7172594	9.9310750	9.7861844	10.2138156	34
27	9.7174660	9.9309978	9.7864682	10.2135318	33
28	9.7176725	9.9309205	9.7867520	10.2132480	32
29	9.7178789	9.9308432	9.7870357	10.2129643	31
30	9.7180851	9.9307658	9.7873193	10.2126807	30
31	9.7182912	9.9306883	9.7876028	10.2123972	29
32	9.7184971	9.9306109	9.7878863	10.2121137	28
33	9.7187030	9.9305333	9.7881696	10.2118304	27
34	9.7189086	9.9304557	9.7884529	10.2115471	26
35	9.7191142	9.9303781	9.7887361	10.2112639	25
36	9.7193196	9.9303004	9.7890192	10.2109808	24
37	9.7195249	9.9302226	9.7893023	10.2106977	23
38	9.7197300	9.9301448	9.7895852	10.2104148	22
39	9.7199350	9.9300670	9.7898681	10.2101319	21
40	9.7201399	9.9299891	9.7901508	10.2098492	20
41	9.7203447	9.9299112	9.7904335	10.2095665	19
42	9.7205493	9.9298332	9.7907161	10.2092839	18
43	9.7207538	9.9297551	9.7909987	10.2090013	17
44	9.7209581	9.9296770	9.7912811	10.2087189	16
45	9.7211623	9.9295989	9.7915635	10.2084365	15
46	9.7213664	9.9295207	9.7918458	10.2081542	14
47	9.7915704	9.9294424	9.7921280	10.2078720	13
48	9.7217742	9.9293641	9.7924101	10.2075899	12
49	9.7219779	9.9292857	9.7926921	10.2073079	11
50	9.7221814	9.9292073	9.7929741	10.2070259	10
51	9.7223848	9.9291289	9.7932560	10.2067440	9
52	9.7225881	9.9290504	9.7935378	10.2064622	8
53	9.7227913	9.9289718	9.7938195	10.2061805	7
54	9.7229943	9.9288932	9.7941011	10.2058989	6
55	9.7231972	9.9288145	9.7943827	10.2056173	5
56	9.7234000	9.9287358	9.7946641	10.2053359	4
57	9.7236026	9.9286571	9.7949455	10.2050545	3
58	9.7238051	9.9285783	9.7952268	10.2047732	2
59	9.7240075	9.9284994	9.7955081	10.2044919	1
60	9.7242097	9.9284205	9.7957892	10.2042108	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	58 Degrees.				

Min.	32 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7242097	9.9284205	9.7957892	10.2042108	60
1	9.7244118	9.9283415	9.7960703	10.2039297	59
2	9.7246138	9.9282625	9.7963513	10.2036487	58
3	9.7248156	9.9281834	9.7966322	10.2033678	57
4	9.7250174	9.9281043	9.7969130	10.2030870	56
5	9.7252189	9.9280251	9.7971938	10.2028062	55
6	9.7254204	9.9279459	9.7974745	10.2025255	54
7	9.7256217	9.9278666	9.7977551	10.2022449	53
8	9.7258229	9.9277873	9.7980356	10.2019644	52
9	9.7260240	9.9277079	9.7983160	10.2016840	51
10	9.7262249	9.9276285	9.7985964	10.2014036	50
11	9.7264257	9.9275490	9.7988767	10.2011233	49
12	9.7266264	9.9274695	9.7991569	10.2008431	48
13	9.7268269	9.9273899	9.7994370	10.2005630	47
14	9.7270273	9.9273103	9.7997170	10.2002830	46
15	9.7272276	9.9272306	9.7999970	10.2000030	45
16	9.7274278	9.9271509	9.8002769	10.1997231	44
17	9.7276278	9.9270711	9.8005567	10.1994433	43
18	9.7278277	9.9269913	9.8008365	10.1991635	42
19	9.7280275	9.9269114	9.8011161	10.1988839	41
20	9.7282271	9.9268314	9.8013957	10.1986043	40
21	9.7284267	9.9267514	9.8016752	10.1983248	39
22	9.7286260	9.9266714	9.8019546	10.1980454	38
23	9.7288253	9.9265913	9.8022340	10.1977660	37
24	9.7290244	9.9265112	9.8025133	10.1974867	36
25	9.7292234	9.9264310	9.8027925	10.1972075	35
26	9.7294223	9.9263507	9.8030716	10.1969284	34
27	9.7296211	9.9262704	9.8033506	10.1966494	33
28	9.7298197	9.9261901	9.8036296	10.1963704	32
29	9.7300182	9.9261096	9.8039085	10.1960915	31
30	9.7302165	9.9260292	9.8041873	10.1958127	30
31	9.7304148	9.9259487	9.8044661	10.1955339	29
32	9.7306129	9.9258681	9.8047447	10.1952553	28
33	9.7308109	9.9257875	9.8050233	10.1949767	27
34	9.7310087	9.9257069	9.8053019	10.1946981	26
35	9.7312064	9.9256261	9.8055803	10.1944197	25
36	9.7314040	9.9255454	9.8058587	10.1941413	24
37	9.7316015	9.9254646	9.8061370	10.1938630	23
38	9.7317989	9.9253837	9.8064152	10.1935848	22
39	9.7319961	9.9253028	9.8066933	10.1933067	21
40	9.7321932	9.9252218	9.8069714	10.1930286	20
41	9.7323902	9.9251408	9.8072494	10.1927506	19
42	9.7325870	9.9250597	9.8075273	10.1924727	18
43	9.7327837	9.9249786	9.8078052	10.1921948	17
44	9.7329803	9.9248974	9.8080829	10.1919171	16
45	9.7331768	9.9248161	9.8083606	10.1916394	15
46	9.7333731	9.9247349	9.8086383	10.1913617	14
47	9.7335693	9.9246535	9.8089158	10.1910842	13
48	9.7337654	9.9245721	9.8091933	10.1908067	12
49	9.7339614	9.9244907	9.8094707	10.1905293	11
50	9.7341572	9.9244092	9.8097480	10.1902520	10
51	9.7343529	9.9243277	9.8100253	10.1899747	9
52	9.7345485	9.9242461	9.8103025	10.1896975	8
53	9.7347440	9.9241644	9.8105796	10.1894204	7
54	9.7349393	9.9240827	9.8108566	10.1891434	6
55	9.7351345	9.9240010	9.8111336	10.1888664	5
56	9.7353296	9.9239191	9.8114105	10.1885895	4
57	9.7355246	9.9238373	9.8116873	10.1883127	3
58	9.7357195	9.9237554	9.8119641	10.1880359	2
59	9.7359142	9.9236734	9.8122408	10.1877592	1
60	9.7361088	9.9235914	9.8125174	10.1874826	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	57 Degrees.				

Min.	33 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7361088	9.9235914	9.8125174	10.1874826	60
1	9.7363032	9.9235093	9.8127939	10.1872061	59
2	9.7364976	9.9234272	9.8130704	10.1869296	58
3	9.7366918	9.9233450	9.8133468	10.1866532	57
4	9.7368859	9.9232628	9.8136231	10.1863769	56
5	9.7370799	9.9231805	9.8138993	10.1861007	55
6	9.7372737	9.9230982	9.8141755	10.1858245	54
7	9.7374675	9.9230158	9.8144516	10.1855484	53
8	9.7376611	9.9229334	9.8147277	10.1852723	52
9	9.7378546	9.9228509	9.8150036	10.1849964	51
10	9.7380479	9.9227684	9.8152795	10.1847205	50
11	9.7382412	9.9226858	9.8155554	10.1844446	49
12	9.7384343	9.9226032	9.8158311	10.1841689	48
13	9.7386273	9.9225205	9.8161068	10.1838932	47
14	9.7388201	9.9224377	9.8163824	10.1836176	46
15	9.7390129	9.9223549	9.8166580	10.1833420	45
16	9.7392055	9.9222721	9.8169335	10.1830665	44
17	9.7393980	9.9221891	9.8172089	10.1827911	43
18	9.7395904	9.9221062	9.8174842	10.1825158	42
19	9.7397827	9.9220232	9.8177595	10.1822405	41
20	9.7399748	9.9219401	9.8180347	10.1819653	40
21	9.7401668	9.9218570	9.8183098	10.1816902	39
22	9.7403587	9.9217738	9.8185849	10.1814151	38
23	9.7405505	9.9216906	9.8188599	10.1811401	37
24	9.7407421	9.9216073	9.8191348	10.1808652	36
25	9.7409337	9.9215240	9.8194096	10.1805904	35
26	9.7411251	9.9214406	9.8196844	10.1803156	34
27	9.7413164	9.9213572	9.8199592	10.1800408	33
28	9.7415075	9.9212737	9.8202338	10.1797662	32
29	9.7416986	9.9211902	9.8205084	10.1794916	31
30	9.7418895	9.9211066	9.8207829	10.1792171	30
31	9.7420803	9.9210229	9.8210574	10.1789426	29
32	9.7422710	9.9209393	9.8213317	10.1786683	28
33	9.7424616	9.9208555	9.8216060	10.1783940	27
34	9.7426520	9.9207717	9.8218803	10.1781197	26
35	9.7428423	9.9206878	9.8221545	10.1778455	25
36	9.7430325	9.9206039	9.8224286	10.1775714	24
37	9.7432226	9.9205200	9.8227026	10.1772974	23
38	9.7434126	9.9204360	9.8229766	10.1770234	22
39	9.7436024	9.9203519	9.8232505	10.1767495	21
40	9.7437921	9.9202678	9.8235244	10.1764756	20
41	9.7439817	9.9201836	9.8237981	10.1762019	19
42	9.7441712	9.9200994	9.8240719	10.1759281	18
43	9.7443606	9.9200151	9.8243455	10.1756545	17
44	9.7445498	9.9199308	9.8246191	10.1753809	16
45	9.7447390	9.9198464	9.8248926	10.1751074	15
46	9.7449280	9.9197619	9.8251660	10.1748340	14
47	9.7451169	9.9196775	9.8254394	10.1745606	13
48	9.7453056	9.9195929	9.8257127	10.1742873	12
49	9.7454943	9.9195083	9.8259860	10.1740140	11
50	9.7456828	9.9194237	9.8262592	10.1737408	10
51	9.7458712	9.9193390	9.8265323	10.1734677	9
52	9.7460595	9.9192542	9.8268053	10.1731947	8
53	9.7462477	9.9191694	9.8270783	10.1729217	7
54	9.7464358	9.9190845	9.8273513	10.1726487	6
55	9.7466237	9.9189996	9.8276241	10.1723759	5
56	9.7468115	9.9189146	9.8278969	10.1721031	4
57	9.7469992	9.9188296	9.8281696	10.1718304	3
58	9.7471868	9.9187445	9.8284423	10.1715577	2
59	9.7473743	9.9186594	9.8287149	10.1712851	1
60	9.7475617	9.9185742	9.8289874	10.1710126	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	56 Degrees.				

SINES.

Min.	34 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7475617	9.9185742	9.8289874	10.1710126	60
1	9.7477489	9.9184890	9.8292599	10.1707401	59
2	9.7479360	9.9184037	9.8295323	10.1704677	58
3	9.7481230	9.9183183	9.8298047	10.1701953	57
4	9.7483099	9.9182329	9.8300769	10.1699231	56
5	9.7484967	9.9181475	9.8303492	10.1696508	55
6	9.7486833	9.9180620	9.8306213	10.1693787	54
7	9.7488698	9.9179764	9.8308934	10.1691066	53
8	9.7490562	9.9178908	9.8311654	10.1688346	52
9	9.7492425	9.9178051	9.8314374	10.1685626	51
10	9.7494287	9.9177194	9.8317093	10.1682907	50
11	9.7496148	9.9176336	9.8319811	10.1680189	40
12	9.7498007	9.9175478	9.8322529	10.1677471	48
13	9.7499866	9.9174619	9.8325246	10.1674754	47
14	9.7501723	9.9173760	9.8327963	10.1672037	46
15	9.7503579	9.9172900	9.8330679	10.1669321	45
16	9.7505434	9.9172040	9.8333394	10.1666606	44
17	9.7507287	9.9171179	9.8336109	10.1663891	43
18	9.7509140	9.9170317	9.8338823	10.1661177	42
19	9.7510991	9.9169455	9.8341536	10.1658464	41
20	9.7512842	9.9168593	9.8344249	10.1655751	40
21	9.7514691	9.9167730	9.8346961	10.1653039	39
22	9.7516538	9.9166866	9.8349673	10.1650327	38
23	9.7518385	9.9166002	9.8352384	10.1647616	37
24	9.7520231	9.9165137	9.8355094	10.1644906	36
25	9.7522075	9.9164272	9.8357804	10.1642196	35
26	9.7523919	9.9163406	9.8360513	10.1639487	34
27	9.7525761	9.9162539	9.8363221	10.1636779	33
28	9.7527602	9.9161673	9.8365929	10.1634071	32
29	9.7529442	9.9160805	9.8368636	10.1631364	31
30	9.7531280	9.9159937	9.8371343	10.1628657	30
31	9.7533118	9.9159069	9.8374049	10.1625951	29
32	9.7534954	9.9158200	9.8376755	10.1623245	28
33	9.7536790	9.9157330	9.8379460	10.1620540	27
34	9.7538624	9.9156460	9.8382164	10.1617836	26
35	9.7540457	9.9155589	9.8384867	10.1615133	25
36	9.7542288	9.9154718	9.8387571	10.1612429	24
37	9.7544119	9.9153846	9.8390273	10.1609727	23
38	9.7545949	9.9152974	9.8392975	10.1607025	22
39	9.7547777	9.9152101	9.8395676	10.1604324	21
40	9.7549604	9.9151228	9.8398377	10.1601623	20
41	9.7551431	9.9150354	9.8401077	10.1598923	19
42	9.7553256	9.9149479	9.8403776	10.1596224	18
43	9.7555080	9.9148604	9.8406475	10.1593525	17
44	9.7556902	9.9147729	9.8409174	10.1590826	16
45	9.7558724	9.9146852	9.8411871	10.1588129	15
46	9.7560544	9.9145976	9.8414569	10.1585431	14
47	9.7562364	9.9145099	9.8417265	10.1582735	13
48	9.7564182	9.9144221	9.8419961	10.1580039	12
49	9.7565999	9.9143342	9.8422657	10.1577343	11
50	9.7567815	9.9142464	9.8425351	10.1574649	10
51	9.7569630	9.9141584	9.8428046	10.1571954	9
52	9.7571444	9.9140704	9.8430739	10.1569261	8
53	9.7573256	9.9139824	9.8433432	10.1566568	7
54	9.7575068	9.9138943	9.8436125	10.1563875	6
55	9.7576878	9.9138061	9.8438817	10.1561183	5
56	9.7578687	9.9137179	9.8441508	10.1558492	4
57	9.7580495	9.9136296	9.8444199	10.1555801	3
58	9.7582302	9.9135413	9.8446889	10.1553111	2
59	9.7584108	9.9134530	9.8449579	10.1550421	1
60	9.7585913	9.9133645	9.8452268	10.1547732	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	55 Degrees.				

Min.	35 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7585913	9.9133645	9.8452268	10.1547732	60
1	9.7587717	9.9132760	9.8454956	10.1545044	59
2	9.7589519	9.9131875	9.8457644	10.1542356	58
3	9.7591321	9.9130989	9.8460332	10.1539668	57
4	9.7593121	9.9130102	9.8463018	10.1536982	56
5	9.7594920	9.9129215	9.8465705	10.1534295	55
6	9.7596718	9.9128328	9.8468390	10.1531610	54
7	9.7598515	9.9127440	9.8471075	10.1528925	53
8	9.7600311	9.9126551	9.8473760	10.1526240	52
9	9.7602106	9.9125662	9.8476444	10.1523556	51
10	9.7603899	9.9124772	9.8479127	10.1520873	50
11	9.7605692	9.9123882	9.8481810	10.1518190	49
12	9.7607483	9.9122991	9.8484492	10.1515508	48
13	9.7609274	9.9122099	9.8487174	10.1512826	47
14	9.7611063	9.9121207	9.8489855	10.1510145	46
15	9.7612851	9.9120315	9.8492536	10.1507464	45
16	9.7614638	9.9119422	9.8495216	10.1504784	44
17	9.7616424	9.9118528	9.8497896	10.1502104	43
18	9.7618208	9.9117634	9.8500575	10.1499425	42
19	9.7619992	9.9116739	9.8503253	10.1496747	41
20	9.7621775	9.9115844	9.8505931	10.1494069	40
21	9.7623556	9.9114948	9.8508608	10.1491392	39
22	9.7625337	9.9114051	9.8511285	10.1488715	38
23	9.7627116	9.9113155	9.8513961	10.1486039	37
24	9.7628894	9.9112257	9.8516637	10.1483363	36
25	9.7630671	9.9111359	9.8519312	10.1480688	35
26	9.7632447	9.9110460	9.8521987	10.1478013	34
27	9.7634222	9.9109561	9.8524661	10.1475339	33
28	9.7635996	9.9108661	9.8527335	10.1472665	32
29	9.7637769	9.9107761	9.8530008	10.1469992	31
30	9.7639540	9.9106860	9.8532680	10.1467320	30
31	9.7641311	9.9105959	9.8535352	10.1464648	29
32	9.7643080	9.9105057	9.8538023	10.1461977	28
33	9.7644849	9.9104155	9.8540694	10.1459306	27
34	9.7646616	9.9103251	9.8543365	10.1456635	26
35	9.7648382	9.9102348	9.8546034	10.1453966	25
36	9.7650147	9.9101444	9.8548704	10.1451296	24
37	9.7651911	9.9100539	9.8551372	10.1448628	23
38	9.7653674	9.9099634	9.8554041	10.1445959	22
39	9.7655436	9.9098728	9.8556708	10.1443292	21
40	9.7657197	9.9097821	9.8559376	10.1440624	20
41	9.7658957	9.9096915	9.8562042	10.1437958	19
42	9.7660715	9.9096007	9.8564708	10.1435292	18
43	9.7662473	9.9095099	9.8567374	10.1432626	17
44	9.7664229	9.9094190	9.8570039	10.1429961	16
45	9.7665985	9.9093281	9.8572704	10.1427296	15
46	9.7667739	9.9092371	9.8575368	10.1424632	14
47	9.7669492	9.9091461	9.8578031	10.1421969	13
48	9.7671244	9.9090550	9.8580694	10.1419306	12
49	9.7672996	9.9089639	9.8583357	10.1416643	11
50	9.7674746	9.9088727	9.8586019	10.1413981	10
51	9.7676494	9.9087814	9.8588680	10.1411320	9
52	9.7678242	9.9086901	9.8591341	10.1408659	8
53	9.7679989	9.9085988	9.8594002	10.1405998	7
54	9.7681735	9.9085073	9.8596661	10.1403339	6
55	9.7683480	9.9084159	9.8599321	10.1400679	5
56	9.7685223	9.9083243	9.8601980	10.1398020	4
57	9.7686966	9.9082327	9.8604638	10.1395362	3
58	9.7688707	9.9081411	9.8607296	10.1392704	2
59	9.7690448	9.9080494	9.8609954	10.1390046	1
60	9.7692187	9.9079576	9.8612610	10.1387390	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	54 Degrees.				

SINES.

Min.	36 Degrees.				
	Sine.	Cofine.	Tang.	Cotangent.	
0	9.7692187	9.9079576	9.8612610	10.1387390	60
1	9.7693925	9.9078658	9.8615267	10.1384733	59
2	9.7695662	9.9077740	9.8617923	10.1382077	58
3	9.7697398	9.9076820	9.8620578	10.1379422	57
4	9.7699134	9.9075901	9.8623233	10.1376767	56
5	9.7700868	9.9074980	9.8625887	10.1374113	55
6	9.7702601	9.9074059	9.8628541	10.1371459	54
7	9.7704332	9.9073138	9.8631195	10.1368805	53
8	9.7706063	9.9072216	9.8633848	10.1366152	52
9	9.7707793	9.9071293	9.8636500	10.1363500	51
10	9.7709522	9.9070370	9.8639152	10.1360848	50
11	9.7711249	9.9069446	9.8641803	10.1358197	49
12	9.7712976	9.9068522	9.8644454	10.1355546	48
13	9.7714702	9.9067597	9.8647105	10.1352895	47
14	9.7716426	9.9066671	9.8649755	10.1350245	46
15	9.7718150	9.9065745	9.8652404	10.1347596	45
16	9.7719872	9.9064819	9.8655053	10.1344947	44
17	9.7721593	9.9063892	9.8657702	10.1342298	43
18	9.7723314	9.9062964	9.8660350	10.1339650	42
19	9.7725033	9.9062036	9.8662997	10.1337003	41
20	9.7726751	9.9061107	9.8665644	10.1334356	40
21	9.7728468	9.9060177	9.8668291	10.1331709	39
22	9.7730185	9.9059247	9.8670937	10.1329063	38
23	9.7731900	9.9058317	9.8673583	10.1326417	37
24	9.7733614	9.9057386	9.8676228	10.1323772	36
25	9.7735327	9.9056454	9.8678873	10.1321127	35
26	9.7737039	9.9055522	9.8681517	10.1318483	34
27	9.7738749	9.9054589	9.8684160	10.1315840	33
28	9.7740459	9.9053656	9.8686804	10.1313196	32
29	9.7742168	9.9052722	9.8689446	10.1310554	31
30	9.7743876	9.9051787	9.8692089	10.1307911	30
31	9.7745583	9.9050852	9.8694731	10.1305269	29
32	9.7747288	9.9049916	9.8697372	10.1302628	28
33	9.7748993	9.9048980	9.8700013	10.1299987	27
34	9.7750697	9.9048043	9.8702653	10.1297347	26
35	9.7752399	9.9047106	9.8705293	10.1294707	25
36	9.7754101	9.9046168	9.8707933	10.1292067	24
37	9.7755801	9.9045230	9.8710572	10.1289428	23
38	9.7757501	9.9044291	9.8713210	10.1286790	22
39	9.7759199	9.9043351	9.8715848	10.1284152	21
40	9.7760897	9.9042411	9.8718486	10.1281514	20
41	9.7762593	9.9041470	9.8721123	10.1278877	19
42	9.7764289	9.9040529	9.8723760	10.1276240	18
43	9.7765983	9.9039587	9.8726396	10.1273604	17
44	9.7767676	9.9038644	9.8729032	10.1270968	16
45	9.7769369	9.9037701	9.8731668	10.1268332	15
46	9.7771060	9.9036757	9.8734302	10.1265698	14
47	9.7772750	9.9035813	9.8736937	10.1263063	13
48	9.7774439	9.9034868	9.8739571	10.1260429	12
49	9.7776128	9.9033923	9.8742204	10.1257796	11
50	9.7777815	9.9032977	9.8744838	10.1255162	10
51	9.7779501	9.9032031	9.8747470	10.1252530	9
52	9.7781186	9.9031084	9.8750102	10.1249898	8
53	9.7782870	9.9030136	9.8752734	10.1247266	7
54	9.7784553	9.9029188	9.8755365	10.1244635	6
55	9.7786235	9.9028239	9.8757996	10.1242004	5
56	9.7787916	9.9027289	9.8760627	10.1239373	4
57	9.7789596	9.9026339	9.8763257	10.1236743	3
58	9.7791275	9.9025389	9.8765886	10.1234114	2
59	9.7792953	9.9024438	9.8768515	10.1231485	1
60	9.7794630	9.9023486	9.8771144	10.1228856	0
	Cofine.	Sine.	Cotangent.	Tang.	Min.
	53 Degrees.				

Min.	37 Degrees.				
	Sine.	Cofine.	Tang.	Cotangent.	
0	9.7794630	9.9023486	9.8771144	10.1228856	60
1	9.7796306	9.9022534	9.8773772	10.1226228	59
2	9.7797981	9.9021581	9.8776400	10.1223600	58
3	9.7799655	9.9020628	9.8779027	10.1220973	57
4	9.7801328	9.9019674	9.8781654	10.1218346	56
5	9.7803000	9.9018719	9.8784281	10.1215719	55
6	9.7804671	9.9017764	9.8786907	10.1213093	54
7	9.7806341	9.9016808	9.8789533	10.1210467	53
8	9.7808010	9.9015852	9.8792158	10.1207842	52
9	9.7809677	9.9014985	9.8794782	10.1205218	51
10	9.7811344	9.9013938	9.8797407	10.1202593	50
11	9.7813010	9.9012980	9.8800031	10.1199969	49
12	9.7814675	9.9012021	9.8802654	10.1197346	48
13	9.7816339	9.9011062	9.8805277	10.1194723	47
14	9.7818002	9.9010102	9.8807900	10.1192100	46
15	9.7819664	9.9009142	9.8810522	10.1189478	45
16	9.7821324	9.9008181	9.8813144	10.1186856	44
17	9.7822984	9.9007219	9.8815765	10.1184235	43
18	9.7824643	9.9006257	9.8818386	10.1181614	42
19	9.7826301	9.9005294	9.8821007	10.1178993	41
20	9.7827958	9.9004331	9.8823627	10.1176373	40
21	9.7829614	9.9003367	9.8826246	10.1173754	39
22	9.7831268	9.9002403	9.8828866	10.1171134	38
23	9.7832922	9.9001438	9.8831484	10.1168516	37
24	9.7834575	9.9000472	9.8834103	10.1165897	36
25	9.7836227	9.8999506	9.8836721	10.1163279	35
26	9.7837878	9.8998539	9.8839338	10.1160662	34
27	9.7839528	9.8997572	9.8841956	10.1158044	33
28	9.7841177	9.8996604	9.8844572	10.1155428	32
29	9.7842824	9.8995636	9.8847189	10.1152811	31
30	9.7844471	9.8994667	9.8849805	10.1150195	30
31	9.7846117	9.8993697	9.8852420	10.1147580	29
32	9.7847762	9.8992727	9.8855035	10.1144965	28
33	9.7849406	9.8991756	9.8857650	10.1142350	27
34	9.7851049	9.8990784	9.8860264	10.1139736	26
35	9.7852691	9.8989812	9.8862878	10.1137122	25
36	9.7854332	9.8988840	9.8865492	10.1134508	24
37	9.7855972	9.8987867	9.8868105	10.1131895	23
38	9.7857611	9.8986893	9.8870718	10.1129282	22
39	9.7859249	9.8985919	9.8873330	10.1126670	21
40	9.7860886	9.8984944	9.8875942	10.1124058	20
41	9.7862522	9.8983968	9.8878554	10.1121446	19
42	9.7864157	9.8982992	9.8881165	10.1118835	18
43	9.7865791	9.8982015	9.8883775	10.1116225	17
44	9.7867424	9.8981038	9.8886386	10.1113614	16
45	9.7869056	9.8980060	9.8888996	10.1111004	15
46	9.7870687	9.8979082	9.8891605	10.1108395	14
47	9.7872317	9.8978103	9.8894214	10.1105786	13
48	9.7873946	9.8977123	9.8896823	10.1103177	12
49	9.7875574	9.8976143	9.8899432	10.1100568	11
50	9.7877202	9.8975162	9.8902040	10.1097960	10
51	9.7878828	9.8974181	9.8904647	10.1095353	9
52	9.7880453	9.8973199	9.8907254	10.1092746	8
53	9.7882077	9.8972216	9.8909861	10.1090139	7
54	9.7883701	9.8971233	9.8912468	10.1087532	6
55	9.7885323	9.8970249	9.8915074	10.1084926	5
56	9.7886944	9.8969265	9.8917679	10.1082321	4
57	9.7888565	9.8968280	9.8920285	10.1079715	3
58	9.7890184	9.8967294	9.8922890	10.1077110	2
59	9.7891802	9.8966308	9.8925494	10.1074506	1
60	9.7893420	9.8965321	9.8928098	10.1071902	0
	Cofine.	Sine.	Cotangent.	Tang.	Min.
	52 Degrees.				

Min.	38 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7893420	9.8965321	9.8928098	10.1071902	60
1	9.7895036	9.8964334	9.8930702	10.1069298	59
2	9.7896652	9.8963346	9.8933306	10.1066694	58
3	9.7898266	9.8962358	9.8935909	10.1064091	57
4	9.7899880	9.8961369	9.8938511	10.1061489	56
5	9.7901493	9.8960379	9.8941114	10.1058886	55
6	9.7903104	9.8959389	9.8943715	10.1056285	54
7	9.7904715	9.8958398	9.8946317	10.1053683	53
8	9.7906325	9.8957406	9.8948918	10.1051082	52
9	9.7907933	9.8956414	9.8951519	10.1048481	51
10	9.7909541	9.8955422	9.8954119	10.1045881	50
11	9.7911148	9.8954429	9.8956719	10.1043281	49
12	9.7912754	9.8953435	9.8959319	10.1040681	48
13	9.7914359	9.8952440	9.8961918	10.1038082	47
14	9.7915963	9.8951445	9.8964517	10.1035483	46
15	9.7917566	9.8950450	9.8967116	10.1032884	45
16	9.7919168	9.8949453	9.8969714	10.1030286	44
17	9.7920769	9.8948457	9.8972312	10.1027688	43
18	9.7922369	9.8947459	9.8974910	10.1025090	42
19	9.7923968	9.8946461	9.8977507	10.1022493	41
20	9.7925566	9.8945463	9.8980104	10.1019896	40
21	9.7927163	9.8944463	9.8982700	10.1017300	39
22	9.7928760	9.8943464	9.8985296	10.1014704	38
23	9.7930355	9.8942463	9.8987892	10.1012108	37
24	9.7931949	9.8941462	9.8990487	10.1009513	36
25	9.7933543	9.8940461	9.8993082	10.1006918	35
26	9.7935135	9.8939458	9.8995677	10.1004323	34
27	9.7936727	9.8938456	9.8998271	10.1001729	33
28	9.7938317	9.8937452	9.9000865	10.0999135	32
29	9.7939907	9.8936448	9.9003459	10.0996541	31
30	9.7941496	9.8935444	9.9006052	10.0993948	30
31	9.7943083	9.8934439	9.9008645	10.0991355	29
32	9.7944670	9.8933433	9.9011237	10.0988763	28
33	9.7946256	9.8932426	9.9013830	10.0986170	27
34	9.7947841	9.8931419	9.9016422	10.0983578	26
35	9.7949425	9.8930412	9.9019013	10.0980987	25
36	9.7951008	9.8929404	9.9021604	10.0978396	24
37	9.7952590	9.8928395	9.9024195	10.0975805	23
38	9.7954171	9.8927385	9.9026786	10.0973214	22
39	9.7955751	9.8926375	9.9029376	10.0970624	21
40	9.7957330	9.8925365	9.9031966	10.0968034	20
41	9.7958909	9.8924354	9.9034555	10.0965445	19
42	9.7960486	9.8923342	9.9037144	10.0962856	18
43	9.7962062	9.8922329	9.9039733	10.0960267	17
44	9.7963638	9.8921316	9.9042321	10.0957679	16
45	9.7965212	9.8920303	9.9044910	10.0955090	15
46	9.7966786	9.8919289	9.9047497	10.0952503	14
47	9.7968359	9.8918274	9.9050085	10.0949915	13
48	9.7969930	9.8917258	9.9052672	10.0947328	12
49	9.7971501	9.8916242	9.9055259	10.0944741	11
50	9.7973071	9.8915226	9.9057845	10.0942155	10
51	9.7974640	9.8914208	9.9060431	10.0939569	9
52	9.7976208	9.8913191	9.9063017	10.0936983	8
53	9.7977775	9.8912172	9.9065603	10.0944397	7
54	9.7979341	9.8911153	9.9068188	10.0931812	6
55	9.7980906	9.8910133	9.9070773	10.0929227	5
56	9.7982470	9.8909113	9.9073357	10.0926643	4
57	9.7984034	9.8908092	9.9075941	10.0924059	3
58	9.7985596	9.8907071	9.9078525	10.0921475	2
59	9.7987158	9.8906049	9.9081109	10.0918891	1
60	9.7988718	9.8905026	9.9083692	10.0916308	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	51 Degrees.				

Min.	39 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.7988718	9.8905026	9.9083692	10.0916308	60
1	9.7990278	9.8904003	9.9086275	10.0913725	59
2	9.7991836	9.8902979	9.9088858	10.0911142	58
3	9.7993394	9.8901954	9.9091440	10.0908560	57
4	9.7994951	9.8900929	9.9094022	10.0905978	56
5	9.7996507	9.8899903	9.9096603	10.0903397	55
6	9.7998062	9.8898877	9.9099185	10.0900815	54
7	9.7999616	9.8897850	9.9101766	10.0898234	53
8	9.8001169	9.8896822	9.9104347	10.0895653	52
9	9.8002721	9.8895794	9.9106927	10.0893073	51
10	9.8004272	9.8894765	9.9109507	10.0890493	50
11	9.8005823	9.8893736	9.9112087	10.0887913	49
12	9.8007372	9.8892706	9.9114666	10.0885334	48
13	9.8008921	9.8891675	9.9117245	10.0882755	47
14	9.8010468	9.8890644	9.9119824	10.0880176	46
15	9.8012015	9.8889612	9.9122403	10.0877597	45
16	9.8013561	9.8888580	9.9124981	10.0875019	44
17	9.8015106	9.8887547	9.9127559	10.0872441	43
18	9.8016649	9.8886513	9.9130137	10.0869863	42
19	9.8018192	9.8885479	9.9132714	10.0867286	41
20	9.8019735	9.8884444	9.9135291	10.0864709	40
21	9.8021276	9.8883408	9.9137868	10.0862132	39
22	9.8022816	9.8882372	9.9140444	10.0859556	38
23	9.8024355	9.8881335	9.9143020	10.0856980	37
24	9.8025894	9.8880298	9.9145596	10.0854404	36
25	9.8027431	9.8879260	9.9148171	10.0851829	35
26	9.8028968	9.8878221	9.9150747	10.0849253	34
27	9.8030504	9.8877182	9.9153322	10.0846678	33
28	9.8032038	9.8876142	9.9155896	10.0844104	32
29	9.8033572	9.8875102	9.9158471	10.0841529	31
30	9.8035105	9.8874061	9.9161045	10.0838955	30
31	9.8036637	9.8873019	9.9163618	10.0836382	29
32	9.8038168	9.8871977	9.9166192	10.0833808	28
33	9.8039699	9.8870934	9.9168765	10.0831235	27
34	9.8041228	9.8869890	9.9171338	10.0828662	26
35	9.8042757	9.8868846	9.9173911	10.0826089	25
36	9.8044284	9.8867801	9.9176483	10.0823517	24
37	9.8045811	9.8866756	9.9179055	10.0820945	23
38	9.8047336	9.8865710	9.9181627	10.0818373	22
39	9.8048861	9.8864663	9.9184198	10.0815802	21
40	9.8050385	9.8863616	9.9186769	10.0813231	20
41	9.8051908	9.8862568	9.9189340	10.0810660	19
42	9.8053430	9.8861519	9.9191911	10.0808089	18
43	9.8054951	9.8860470	9.9194481	10.0805519	17
44	9.8056472	9.8859420	9.9197051	10.0802949	16
45	9.8057991	9.8858370	9.9199621	10.0800379	15
46	9.8059510	9.8857319	9.9202191	10.0797809	14
47	9.8061027	9.8856267	9.9204760	10.0795240	13
48	9.8062544	9.8855215	9.9207329	10.0792671	12
49	9.8064060	9.8854162	9.9209898	10.0790102	11
50	9.8065575	9.8853109	9.9212466	10.0787534	10
51	9.8067089	9.8852055	9.9215034	10.0784966	9
52	9.8068602	9.8851000	9.9217602	10.0782398	8
53	9.8070114	9.8849945	9.9220170	10.0779830	7
54	9.8071626	9.8848889	9.9222737	10.0777263	6
55	9.8073136	9.8847832	9.9225304	10.0774696	5
56	9.8074646	9.8846775	9.9227871	10.0772129	4
57	9.8076154	9.8845717	9.9230437	10.0769563	3
58	9.8077662	9.8844659	9.9233004	10.0766996	2
59	9.8079169	9.8843599	9.9235570	10.0764430	1
60	9.8080675	9.8842540	9.9238135	10.0761865	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	50 Degrees.				

Min.	40 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.8080675	9.8842540	9.9238135	10.0761845	60
1	9.8082180	9.8841479	9.9240701	10.0759299	59
2	9.8083684	9.8840418	9.9243266	10.0756734	58
3	9.8085188	9.8839357	9.9245831	10.0754169	57
4	9.8086690	9.8838294	9.9248396	10.0751604	56
5	9.8088192	9.8837232	9.9250960	10.0749040	55
6	9.8089692	9.8836168	9.9253524	10.0746476	54
7	9.8091192	9.8835104	9.9256088	10.0743912	53
8	9.8092691	9.8834039	9.9258652	10.0741348	52
9	9.8094189	9.8832974	9.9261215	10.0738785	51
10	9.8095686	9.8831908	9.9263778	10.0736222	50
11	9.8097182	9.8830841	9.9266341	10.0733659	49
12	9.8098678	9.8829774	9.9268904	10.0731096	48
13	9.8100172	9.8828706	9.9271466	10.0728534	47
14	9.8101666	9.8827638	9.9274028	10.0725972	46
15	9.8103159	9.8826568	9.9276590	10.0723410	45
16	9.8104650	9.8825499	9.9279152	10.0720848	44
17	9.8106141	9.8824428	9.9281713	10.0718287	43
18	9.8107631	9.8823357	9.9284274	10.0715726	42
19	9.8109121	9.8822285	9.9286835	10.0713165	41
20	9.8110609	9.8821213	9.9289396	10.0710604	40
21	9.8112096	9.8820140	9.9291956	10.0708044	39
22	9.8113583	9.8819067	9.9294516	10.0705484	38
23	9.8115069	9.8817992	9.9297076	10.0702924	37
24	9.8116554	9.8816918	9.9299636	10.0700364	36
25	9.8118038	9.8815842	9.9302195	10.0697805	35
26	9.8119521	9.8814766	9.9304755	10.0695245	34
27	9.8121003	9.8813689	9.9307314	10.0692686	33
28	9.8122484	9.8812612	9.9309872	10.0690128	32
29	9.8123965	9.8811534	9.9312431	10.0687569	31
30	9.8125444	9.8810455	9.9314989	10.0685011	30
31	9.8126923	9.8809376	9.9317547	10.0682453	29
32	9.8128401	9.8808296	9.9320105	10.0679895	28
33	9.8129878	9.8807215	9.9322662	10.0677338	27
34	9.8131354	9.8806134	9.9325220	10.0674780	26
35	9.8132829	9.8805052	9.9327777	10.0672223	25
36	9.8134303	9.8803970	9.9330334	10.0669666	24
37	9.8135777	9.8802887	9.9332890	10.0667110	23
38	9.8137250	9.8801803	9.9335446	10.0664554	22
39	9.8138721	9.8800719	9.9338003	10.0661997	21
40	9.8140192	9.8799634	9.9340559	10.0659441	20
41	9.8141662	9.8798548	9.9343114	10.0656886	19
42	9.8143131	9.8797462	9.9345670	10.0654330	18
43	9.8144600	9.8796375	9.9348225	10.0651775	17
44	9.8146067	9.8795287	9.9350780	10.0649220	16
45	9.8147534	9.8794199	9.9353335	10.0646665	15
46	9.8148999	9.8793110	9.9355889	10.0644111	14
47	9.8150464	9.8792021	9.9358444	10.0641556	13
48	9.8151928	9.8790930	9.9360998	10.0639002	12
49	9.8153391	9.8789840	9.9363552	10.0636448	11
50	9.8154854	9.8788748	9.9366105	10.0633895	10
51	9.8156315	9.8787656	9.9368659	10.0631341	9
52	9.8157776	9.8786563	9.9371212	10.0628788	8
53	9.8159235	9.8785470	9.9373765	10.0626235	7
54	9.8160694	9.8784376	9.9376318	10.0623682	6
55	9.8162152	9.8783281	9.9378871	10.0621129	5
56	9.8163609	9.8782186	9.9381423	10.0618577	4
57	9.8165066	9.8781090	9.9383975	10.0616025	3
58	9.8166521	9.8779994	9.9386527	10.0613473	2
59	9.8167975	9.8778896	9.9389079	10.0610921	1
60	9.8169429	9.8777799	9.9391631	10.0608369	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	49 Degrees.				

Min.	41 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.8169429	9.8777799	9.9391631	10.0608369	60
1	9.8170882	9.8776700	9.9394182	10.0605818	59
2	9.8172334	9.8775601	9.9396733	10.0603267	58
3	9.8173785	9.8774501	9.9399284	10.0600716	57
4	9.8175235	9.8773401	9.9401835	10.0598165	56
5	9.8176685	9.8772300	9.9404385	10.0595615	55
6	9.8178133	9.8771198	9.9406936	10.0593064	54
7	9.8179581	9.8770096	9.9409486	10.0590514	53
8	9.8181028	9.8768993	9.9412036	10.0587964	52
9	9.8182474	9.8767889	9.9414585	10.0585415	51
10	9.8183919	9.8766785	9.9417135	10.0582865	50
11	9.8185364	9.8765680	9.9419684	10.0580316	49
12	9.8186807	9.8764574	9.9422233	10.0577767	48
13	9.8188250	9.8763468	9.9424782	10.0575218	47
14	9.8189692	9.8762361	9.9427331	10.0572669	46
15	9.8191133	9.8761253	9.9429879	10.0570121	45
16	9.8192573	9.8760145	9.9432428	10.0567572	44
17	9.8194012	9.8759036	9.9434976	10.0565024	43
18	9.8195450	9.8757927	9.9437524	10.0562476	42
19	9.8196888	9.8756816	9.9440072	10.0559928	41
20	9.8198325	9.8755706	9.9442619	10.0557381	40
21	9.8199761	9.8754594	9.9445166	10.0554834	39
22	9.8201196	9.8753482	9.9447714	10.0552286	38
23	9.8202630	9.8752369	9.9450261	10.0549739	37
24	9.8204063	9.8751256	9.9452807	10.0547193	36
25	9.8205496	9.8750142	9.9455354	10.0544646	35
26	9.8206927	9.8749027	9.9457900	10.0542100	34
27	9.8208358	9.8747912	9.9460447	10.0539553	33
28	9.8209788	9.8746795	9.9462993	10.0537007	32
29	9.8211217	9.8745679	9.9465539	10.0534461	31
30	9.8212646	9.8744561	9.9468084	10.0531916	30
31	9.8214073	9.8743443	9.9470630	10.0529370	29
32	9.8215500	9.8742325	9.9473175	10.0526825	28
33	9.8216926	9.8741205	9.9475720	10.0524280	27
34	9.8218351	9.8740085	9.9478265	10.0521735	26
35	9.8219775	9.8738965	9.9480810	10.0519190	25
36	9.8221198	9.8737844	9.9483355	10.0516645	24
37	9.8222621	9.8736722	9.9485899	10.0514101	23
38	9.8224042	9.8735599	9.9488443	10.0511557	22
39	9.8225463	9.8734476	9.9490987	10.0509013	21
40	9.8226883	9.8733352	9.9493531	10.0506469	20
41	9.8228302	9.8732227	9.9496075	10.0503925	19
42	9.8229721	9.8731102	9.9498619	10.0501381	18
43	9.8231138	9.8729976	9.9501162	10.0498838	17
44	9.8232555	9.8728849	9.9503705	10.0496295	16
45	9.8233971	9.8727722	9.9506248	10.0493752	15
46	9.8235386	9.8726594	9.9508791	10.0491209	14
47	9.8236800	9.8725466	9.9511334	10.0488666	13
48	9.8238213	9.8724337	9.9513876	10.0486124	12
49	9.8239626	9.8723207	9.9516419	10.0483581	11
50	9.8241037	9.8722076	9.9518961	10.0481039	10
51	9.8242448	9.8720945	9.9521503	10.0478497	9
52	9.8243858	9.8719813	9.9524045	10.0475955	8
53	9.8245267	9.8718681	9.9526587	10.0473413	7
54	9.8246676	9.8717548	9.9529128	10.0470872	6
55	9.8248083	9.8716414	9.9531670	10.0468330	5
56	9.8249490	9.8715279	9.9534211	10.0465789	4
57	9.8250896	9.8714144	9.9536752	10.0463248	3
58	9.8252301	9.8713008	9.9539293	10.0460707	2
59	9.8253705	9.8711872	9.9541834	10.0458166	1
60	9.8255109	9.8710735	9.9544374	10.0455626	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	48 Degrees.				

Min.	42 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.8255109	9.8710735	9.9544374	10.0455626	60
1	9.8256512	9.8709597	9.9546915	10.0453085	59
2	9.8257913	9.8708458	9.9549455	10.0450545	58
3	9.8259314	9.8707319	9.9551995	10.0448005	57
4	9.8260715	9.8706179	9.9554535	10.0445465	56
5	9.8262114	9.8705039	9.9557075	10.0442925	55
6	9.8263512	9.8703898	9.9559615	10.0440385	54
7	9.8264910	9.8702756	9.9562154	10.0437846	53
8	9.8266307	9.8701613	9.9564694	10.0435306	52
9	9.8267703	9.8700470	9.9567233	10.0432767	51
10	9.8269098	9.8699326	9.9569772	10.0430238	50
11	9.8270493	9.8698182	9.9572311	10.0427689	49
12	9.8271887	9.8697037	9.9574850	10.0425150	48
13	9.8273279	9.8695891	9.9577389	10.0422611	47
14	9.8274671	9.8694744	9.9579927	10.0420073	46
15	9.8276063	9.8693597	9.9582465	10.0417535	45
16	9.8277453	9.8692449	9.9585004	10.0414996	44
17	9.8278843	9.8691301	9.9587542	10.0412458	43
18	9.8280231	9.8690152	9.9590080	10.0409920	42
19	9.8281619	9.8689002	9.9592618	10.0407382	41
20	9.8283006	9.8687851	9.9595155	10.0404845	40
21	9.8284393	9.8686700	9.9697693	10.0402307	39
22	9.8285778	9.8685548	9.9600230	10.0399770	38
23	9.8287163	9.8684396	9.9602767	10.0397233	37
24	9.8288547	9.8683242	9.9605305	10.0394695	36
25	9.8289930	9.8682088	9.9607842	10.0302158	35
26	9.8291312	9.8680934	9.9610378	10.0389622	34
27	9.8292694	9.8679779	9.9612915	10.0387085	33
28	9.8294075	9.8678623	9.9615452	10.0384548	32
29	9.8295454	9.8677466	9.9617988	10.0382012	31
30	9.8296833	9.8676309	9.9620525	10.0379475	30
31	9.8298212	9.8675151	9.9623061	10.0376939	29
32	9.8299589	9.8673992	9.9625597	10.0374403	28
33	9.8300966	9.8672833	9.9628133	10.0371867	27
34	9.8302342	9.8671673	9.9630669	10.0369331	26
35	9.8303717	9.8670512	9.9633204	10.0366796	25
36	9.8305091	9.8669351	9.9635740	10.0364260	24
37	9.8306464	9.8668189	9.9638275	10.0361725	23
38	9.8307837	9.8667026	9.9640811	10.0359189	22
39	9.8309209	9.8665863	9.9643346	10.0356654	21
40	9.8310580	9.8664699	9.9645881	10.0354119	20
41	9.8311950	9.8663534	9.9648416	10.0351584	19
42	9.8313320	9.8662369	9.9650951	10.0349049	18
43	9.8314688	9.8661203	9.9653486	10.0346514	17
44	9.8316056	9.8660036	9.9656020	10.0343980	16
45	9.8317423	9.8658868	9.9658555	10.0341445	15
46	9.8318789	9.8657700	9.9661089	10.0338911	14
47	9.8320155	9.8656531	9.9663623	10.0336377	13
48	9.8321519	9.8655362	9.9666157	10.0333843	12
49	9.8322883	9.8654192	9.9668692	10.0331308	11
50	9.8324246	9.8653021	9.9671225	10.0328775	10
51	9.8325609	9.8651849	9.9673759	10.0326241	9
52	9.8326970	9.8650677	9.9676293	10.0323707	8
53	9.8328331	9.8649504	9.9678827	10.0321173	7
54	9.8329691	9.8648331	9.9681360	10.0318640	6
55	9.8331050	9.8647156	9.9683893	10.0316107	5
56	9.8332408	9.8645981	9.9686427	10.0313573	4
57	9.8333766	9.8644806	9.9688960	10.0311040	3
58	9.8335122	9.8643629	9.9691493	10.0308507	2
59	9.8336478	9.8642452	9.9694026	10.0305974	1
60	9.8337833	9.8641275	9.9696559	10.0303441	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	47 Degrees.				

Min.	43 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.8337833	9.8641275	9.9696559	10.0303441	60
1	9.8339188	9.8640096	9.9699091	10.0300909	59
2	9.8340541	9.8638917	9.9701624	10.0298376	58
3	9.8341894	9.8637737	9.9704157	10.0295843	57
4	9.8343246	9.8636557	9.9706689	10.0293311	56
5	9.8344597	9.8635376	9.9709221	10.0290779	55
6	9.8345948	9.8634194	9.9711754	10.0288246	54
7	9.8347297	9.8633011	9.9714286	10.0285714	53
8	9.8348646	9.8631828	9.9716818	10.0283182	52
9	9.8349994	9.8630644	9.9719350	10.0280650	51
10	9.8351341	9.8629460	9.9721882	10.0278118	50
11	9.8352688	9.8628274	9.9724413	10.0275587	49
12	9.8354033	9.8627088	9.9726945	10.0273055	48
13	9.8355378	9.8625902	9.9729477	10.0270523	47
14	9.8356722	9.8624714	9.9732008	10.0267992	46
15	9.8358066	9.8623526	9.9734539	10.0265461	45
16	9.8359408	9.8622338	9.9737071	10.0262929	44
17	9.8360750	9.8621148	9.9739602	10.0260398	43
18	9.8362091	9.8619958	9.9742133	10.0257867	42
19	9.8363431	9.8618767	9.9744664	10.0255336	41
20	9.8364771	9.8617576	9.9747195	10.0252805	40
21	9.8366109	9.8616383	9.9749726	10.0250274	39
22	9.8367447	9.8615190	9.9752257	10.0247743	38
23	9.8368784	9.8613997	9.9754787	10.0245213	37
24	9.8370121	9.8612803	9.9757318	10.0242682	36
25	9.8371456	9.8611608	9.9759849	10.0240151	35
26	9.8372791	9.8610412	9.9762379	10.0237621	34
27	9.8374125	9.8609215	9.9764909	10.0235091	33
28	9.8375458	9.8608018	9.9767440	10.0232560	32
29	9.8376790	9.8606821	9.9769970	10.0230030	31
30	9.8378122	9.8605622	9.9772500	10.0227500	30
31	9.8379453	9.8604423	9.9775030	10.0224970	29
32	9.8380783	9.8603223	9.9777560	10.0222440	28
33	9.8382112	9.8602022	9.9780090	10.0219910	27
34	9.8383441	9.8600821	9.9782620	10.0217380	26
35	9.8384769	9.8699619	9.9785149	10.0214851	25
36	9.8386096	9.8598416	9.9787679	10.0212321	24
37	9.8387422	9.8597213	9.9790209	10.0209791	23
38	9.8388747	9.8596009	9.9792738	10.0207262	22
39	9.8390072	9.8594804	9.9795268	10.0204732	21
40	9.8391396	9.8593599	9.9797797	10.0202203	20
41	9.8392719	9.8592393	9.9800326	10.0199674	19
42	9.8394041	9.8591186	9.9802856	10.0197144	18
43	9.8395363	9.8589978	9.9805385	10.0194615	17
44	9.8396684	9.8588770	9.9807914	10.0192086	16
45	9.8398004	9.8587561	9.9810443	10.0189557	15
46	9.8399323	9.8586351	9.9812972	10.0187028	14
47	9.8400642	9.8585141	9.9815501	10.0184499	13
48	9.8401959	9.8583929	9.9818030	10.0181970	12
49	9.8403276	9.8582718	9.9820559	10.0179441	11
50	9.8404593	9.8581505	9.9823087	10.0176913	10
51	9.8405908	9.8580292	9.9825616	10.0174384	9
52	9.8407223	9.8579078	9.9828145	10.0171855	8
53	9.8408537	9.8577863	9.9830673	10.0169327	7
54	9.8409850	9.8576648	9.9833202	10.0166798	6
55	9.8411162	9.8575432	9.9835730	10.0164270	5
56	9.8412474	9.8574215	9.9838259	10.0161741	4
57	9.8413785	9.8572998	9.9840787	10.0159213	3
58	9.8415095	9.8571779	9.9843315	10.0156685	2
59	9.8416404	9.8570561	9.9845844	10.0154156	1
60	9.8417713	9.8569341	9.9848372	10.0151628	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	46 Degrees.				

Min.	44 Degrees.				
	Sine.	Coſine.	Tang.	Cotangent.	
0	9.8417713	9.8569349	9.9848372	10.0151628	60
1	9.8419021	9.8568121	9.9850900	10.0149100	59
2	9.8420328	9.8566900	9.9853428	10.0146752	58
3	9.8421634	9.8565678	9.9855956	10.0144044	57
4	9.8422939	9.8564455	9.9858484	10.0141516	56
5	9.8424244	9.8563232	9.9861012	10.0138988	55
6	9.8425548	9.8562008	9.9863540	10.0136460	54
7	9.8426851	9.8560784	9.9866068	10.0133932	53
8	9.8428154	9.8559558	9.9868596	10.0131404	52
9	9.8429456	9.8558332	9.9871123	10.0128877	51
10	9.8430757	9.8557106	9.9873651	10.0126349	50
11	9.8432057	9.8555878	9.9876179	10.0123821	49
12	9.8433356	9.8554650	9.9878706	10.0121294	48
13	9.8434655	9.8553421	9.9881234	10.0118766	47
14	9.8435953	9.8552192	9.9883761	10.0116239	46
15	9.8437250	9.8550961	9.9886289	10.0113711	45
16	9.8438547	9.8549730	9.9888816	10.0111184	44
17	9.8439842	9.8548499	9.9891344	10.0108656	43
18	9.8441137	9.8547266	9.9893871	10.0106129	42
19	9.8442432	9.8546033	9.9896399	10.0103601	41
20	9.8443725	9.8544799	9.9898926	10.0101074	40
21	9.8445018	9.8543564	9.9901453	10.0098547	39
22	9.8446310	9.8542329	9.9903981	10.0096019	38
23	9.8447601	9.8541093	9.9906508	10.0093492	37
24	9.8448891	9.8539856	9.9909035	10.0090965	36
25	9.8450181	9.8538619	9.9911562	10.0088438	35
26	9.8451470	9.8537381	9.9914089	10.0085911	34
27	9.8452758	9.8536142	9.9916616	10.0083384	33
28	9.8454045	9.8534902	9.9919143	10.0080857	32
29	9.8455332	9.8533662	9.9921670	10.0078330	31
30	9.8456618	9.8532421	9.9924197	10.0075803	30
31	9.8457903	9.8531179	9.9926724	10.0073276	29
32	9.8459188	9.8529936	9.9929251	10.0070749	28
33	9.8460471	9.8528693	9.9931778	10.0068222	27
34	9.8461754	9.8527449	9.9934305	10.0065695	26
35	9.8463036	9.8526204	9.9936832	10.0063168	25
36	9.8464318	9.8524959	9.9939359	10.0060641	24
37	9.8465599	9.8523713	9.9941886	10.0058114	23
38	9.8466879	9.8522466	9.9944413	10.0055587	22
39	9.8468158	9.8521218	9.9946940	10.0053060	21
40	9.8469436	9.8519970	9.9949466	10.0050534	20
41	9.8470714	9.8518721	9.9951993	10.0048007	19
42	9.8471991	9.8517471	9.9954520	10.0045480	18
43	9.8473267	9.8516220	9.9957047	10.0042953	17
44	9.8474543	9.8514969	9.9959573	10.0040427	16
45	9.8475817	9.8513717	9.9962100	10.0037900	15
46	9.8477091	9.8512465	9.9964627	10.0035373	14
47	9.8478365	9.8511211	9.9967154	10.0032846	13
48	9.8479637	9.8509957	9.9969680	10.0030320	12
49	9.8480909	9.8508702	9.9972207	10.0027793	11
50	9.8482180	9.8507446	9.9974734	10.0025266	10
51	9.8483450	9.8506190	9.9977260	10.0022740	9
52	9.8484720	9.8504933	9.9979787	10.0020213	8
53	9.8485989	9.8503675	9.9982314	10.0017686	7
54	9.8487257	9.8502417	9.9984840	10.0015160	6
55	9.8488524	9.8501157	9.9987367	10.0012633	5
56	9.8489791	9.8499897	9.9989893	10.0010107	4
57	9.8491057	9.8498637	9.9992420	10.0007580	3
58	9.8492322	9.8497375	9.9994947	10.0005053	2
59	9.8493586	9.8496113	9.9997473	10.0002527	1
60	9.8494850	9.8494850	10.0000000	10.0000000	0
	Coſine.	Sine.	Cotangent.	Tang.	Min.
	45 Degrees.				

Sine *of Incidence*, in *Catoptrics* and *Dioptrics*, is uſed for the ſine of the angle of incidence.

Sine *of Reflection*, in *Catoptrics*, is uſed for the ſine of the angle of reflection.

Sine *of Refraction*, in *Dioptrics*, is uſed for the ſine of the angle of refraction.

Sine *aſſenſu capituli*, in *Law*, a writ that lies where a biſhop, dean, prebendary, or maſter of an hoſpital, aliens the lands holden in right of his biſhopric, deanery, houſe, &c. without the aſſent of the chapter or fraternity; in which caſe his ſucceſſor ſhall have this writ.

SINE-CURES, are eccleſiaſtical benefices, without cure of ſouls. Their original was as follows: The rector (with proper conſent) had a power to intitle a vicar in his church to officiate under him; and this was often done: and by this means, two perſons were inſtituted to the ſame church and both to the cure of ſouls, and both did actually officiate. So that however the rectors of ſine-cures, by having been long excuſed from reſidence, are in common opinion diſcharged from the cure of ſouls, (which is the reaſon of the name,) and however the cure is ſaid in the law-books to be in them *habitualiter* only; yet in ſtrictneſs, and with regard to their original inſtitution, the cure is in them *actualiter*, as much as it is in the vicar. Gibſ. 719. Johnſ. 85.

That is to ſay, where they come in by inſtitution; but if the rectory is a donative, the caſe is otherwiſe: for then coming in by donation, they have not the cure of ſouls committed to them. And theſe are moſt properly ſine-cures, according to the genuine ſignification of the word. Johnſ. 85.

No church where there is but one incumbent can properly be a ſine-cure: and though the church being down, or the pariſh being become deſtitute of pariſhioners, the incumbent may be thereby neceſſarily acquitted from the actual performance of public duty, yet he is ſtill under an obligation to do it, whenever a church ſhall be built, and there is a competent number of inhabitants; and, in the mean while, if the church be preſentative, as moſt of ſuch churches are, the incumbent is inſtituted into the cure of ſouls. Such benefices are rather depopulations than ſine-cures; and it will be proper for the new incumbent to read the thirty-nine articles, and the liturgy, in the church-yard, &c. and to do whatever other incumbents uſually do.

But a rectory, or portion of it, may properly be a ſine-cure, if there be a vicar under the rector, endowed and charged with the cure; in which caſe it does not come within the ſtatute of pluralities, 21 Hen. VIII. c. 13.

Here, therefore, no diſpenſation is neceſſary to hold the ſine-cure with a former living; nor need the incumbent read the articles, or divine ſervice, as required by 13 Eliz. c. 12. which extends only to a benefice with cure.

A ſine-cure donative wants no inſtitution and induction, but one preſentative muſt have both, eſpecially if it conſiſt in glebe and tithes, and not in a portion of money; but the inſtitution muſt not run *in curam animarum*, but *in rectoriam, ſive portionem rectoriæ de* A. B. &c.

By the above-mentioned ſtatute (21 Hen. VIII.) not only prebends, and rectories with vicarages endowed, but deaneries and archdeaconries are declared to be benefices *without cure.*

SINE DIE, in *Law*. When judgment is given againſt the plaintiff, he is ſaid to be *in miſericordia pro falſo clamore ſuo*; and for the defendant, it is ſaid, *eat inde ſine die*; i. e. he is diſmiſſed the court.

The phraſe is alſo uſed in parliament, for the adjournment of any debate, without fixing the day when it ſhall come on again; which is looked upon as a genteeler diſmiſſion of the thing in queſtion.

SINEER, in *Geography*, a town of Hindooſtan, in Baglana; 3 miles W. of Junere.

SINEGAR CREEK, a river of Maryland, which runs into the Potomack, N. lat. 39° 8′. W. long. 77° 33′.

SINEMAHONING, a north-weſt branch of the river Suſquehanna.

SINE PARI, in *Anatomy*, an epithet applied to the vena azygos, which latter is an equivalent expreſſion derived from the Greek. It means the *ſingle* vein; as there is only one in the body, and not a pair, as in general, conſiſting of a right and left veſſel. See VEIN.

SINEPUXENT INLET, in *Geography*, a bay on the S.E. coaſt of Maryland. N. lat. 38° 20′.

SINERVAS, in *Ancient Geography*, a town of the Leſſer Armenia, on the route from Satala to Melitene, between Carſagis and Analiba. It. of Anton.

SINES, in *Geography*, a ſea-port town of Portugal, in Eſtremadura, containing about 1400 inhabitants; 39 miles S. of Setuval. N. lat. 37° 46′. W. long. 8° 51′.

SINESCLA, a town of Aſiatic Turkey, in the province of Diarbekir; 80 miles E. of Rabba.

SINEU, a town of the iſland of Majorca; 20 miles E. of Parma.

SINEW properly denotes what we call a *nerve;* though, in common ſpeech, it is rather uſed for a *tendon*.

The Hebrews do not eat the ſinew of the thighs of animals, in memory of the ſinew of Jacob's thigh, which the angel touched. This abſtinence is not commanded by the law, and ſome interpreters think that it is an act of voluntary devotion.

SINEW, in the *Manege*. To unſinew a horſe, called in French *enerver*, is to cut the two tendons on the ſide of the head, about five inches under the eyes; which two join in one at the tip, or the end of the noſe, in order to perform its motion. This tendon at the tip of the noſe is likewiſe cut. We unſinew, in order to dry the head, and make it ſmaller.

SINEW-*Shrunk*, is ſaid of a horſe that is over-rid, and ſo worn down with fatigue, that he becomes gaunt-bellied, through a ſtiffneſs and contraction of the two ſinews that are under his belly.

SINEW-*Sprung*, is a violent attaint, or over-reach, in which a horſe ſtrikes the toe of his hinder feet againſt the ſinew of the fore-legs.

SINF, in the *Materia Medica of the Ancients*, a word uſed to expreſs the ſame as *agallochum*, or lignum aloes.

SIN-FONG, in *Geography*, a town of China, of the third rank, in Kiang-ſi; 27 miles S. of Kan-cheou.

SING, a town of Dalmatia, built by the Turks, in oppoſition to Cliſſa. It was ſtrongly fortified; and the Venetians, after taking this place in the year 1686, ſtrengthened its fortifications, in order to ſecure it to themſelves; 16 miles N. of Spalatro.—Alſo, a town of Corea; 153 miles S.S.E. of King-ki-tao. N. lat. 35° 27′. E. long. 127° 49′.—Alſo, a town of Corea; 25 miles S.E. of Long-Kouang.

SINGA, in *Ancient Geography*, a town of Syria, in the Comagene. Ptolemy.

SIN-GAN, in *Geography*, a city of China, of the firſt rank, and capital of the province of Chen-ſi; next to Peking, one of the largeſt and moſt beautiful cities in the kingdom. Its walls are thick, very high, and four leagues in circumference; they are flanked with a great number of towers, and ſurrounded by a deep ditch. Some of its gates are magnificent and remarkably lofty. In this city is ſtill ſeen a palace where the ancient kings of Chen-ſi reſided, the extent of whoſe country, and the bravery of their people, once rendered them formidable to their neighbours. The houſes are, according to the Chineſe faſhion, low and ill-conſtructed; and the furniture, on account of the ſcarcity of good artiſts, inferior to that in the ſouthern provinces; porcelain being very rare, and the varniſh coarſe. The inhabitants are generally more robuſt, and brave, and better formed for enduring fatigue, and alſo of greater ſtature, than thoſe of the other provinces. The principal Tartar forces deſtined for the defence of the northern part of the empire are garriſoned in this city, under a general of their own nation, who, with his ſoldiers, occupies a quarter of the city, ſeparated from the reſt by a wall. Bats of a ſingular ſpecies are found in the territories of Sin-gan; they are as large as domeſtic fowls, and the Chineſe prefer their fleſh to that of the moſt delicate chickens. This country alſo furniſhes the ladies with a white paint, which they uſe for embelliſhing their complexions. It appears, by an inſcription on a marble monument dug up here in 1625, that the Chriſtian religion flouriſhed in China from the year 636 to 782. This capital has 37 cities under its juriſdiction; ſix of the ſecond claſs and 31 of the third. The Mandarins, who are numerous in this city, are moſtly Tartars. N. lat. 35° 14′. E. long. 108° 29′. Groſier.—Alſo, a town of China, of the third rank, in Pe-tche-li; 22 miles E.N.E. of Pao-ting.

SINGANA, in *Botany*, Aubl. Guian. 574. Juſſ. 257, altered by Aublet from the name *Singan Singa*, given by the blacks in Guiana to the fruit of this ſhrub. See STERBECKIA.

SINGANELLORE, in *Geography*, a town of Hindooſtan, in Coimbetore; 5 miles E. of Coimbetore.

SINGAPETTY, a town of Hindooſtan; 17 miles S.S.W. of Tinevelly.

SINGARA, SINJER, in *Ancient Geography*, an important town of Aſia, in Meſopotamia, on the banks of the river Mygdonius. Dion Caſſius ſays that it was taken by Trajan; and that it afterwards became a Roman colony, under the appellations of Aurelia and Septimia, which it bears on medals.

SINGARPETTY, in *Geography*, a town of Hindooſtan, in Barramaul; 25 miles E.N.E. of Darempoury.

SINGARPILLY, a town of Hindooſtan, in Myſore; 23 miles E.S.E. of Chinna Balabaram.

SINGAS, SINSJA, in *Ancient Geography*, a river of Aſia, which, according to Ptolemy, flowed from Pieria, the moſt northerly canton of Syria, and diſcharged itſelf into the Euphrates S.E. of Samoſata, between Arudis and Porſica.

SINGBOON, in *Geography*, a circar of Hindooſtan, of ſmall extent, bounded N.E. and E. by Bengal, S. by Mohurbunge, W. and N.W. by Bahar.

SINGEAH, a town of Hindooſtan, in Bahar; 10 miles N. of Hajypour. N. lat. 25° 52′. E. long. 85° 24′.

SINGECOLLAM, a town of Hindooſtan; 10 miles S. of Tinevelly.

SINGECONDA, a town of Hindooſtan, in the Carnatic; 25 miles N. of Ongole.

SINGEE, a town of Hindooſtan, in Bahar; 24 miles S.S.E. of Durbungah. N. lat. 25° 45′. E. long. 86° 21′.

SINGERAM, a town of Hindooſtan, in Golconda; 15 miles S.E. of Hydrabad.

SINGERBILL, a town of Hindooſtan, in Bengal; 30 miles N. of Cormillah.

SINGERS, in the *Jewiſh Antiquities*. See CHANTOR.

SINGERS in Lulli's operas. See LULLI.

SINGESECKEN, in *Geography*, a town of Norway, in the province of Drontheim; 46 miles S.S.W. of Drontheim.

SINGFING, a town of America, in New York, on the river Hudſon; 27 miles N. of New York. N. lat. 41° 8'. W. long. 73° 53'.

SINGHOLE, a town of Hindooſtan, in Gurry Mundella; 36 miles N.N.W. of Gurrah.

SINGHORE, a town of Hindooſtan, in Oude; 16 miles S.E. of Manickpour.

SINGHYA, a town of Hindooſtan, in Bahar; 10 miles N. of Hajypour.

SINGILIEV, a town of Ruſſia, in the government of Simbirſk, on the Volga; 24 miles S. of Simbirſk. N. lat. 54° 1'. E. long. 48° 34'.

SINGING, the act of making divers inflexions of the voice, agreeable to the ear, and correſponding to the notes of a ſong, or piece of melody.

The Greek muſicians, ſays Dr. Smith in his Harmonics, p. 3. note *c*, rightly deſcribe the difference between the manner of ſinging and that of talking. They conſidered two motions in the voice; the one continued, and uſed in talking; the other diſcrete, and uſed in ſinging. In the continued motion, the voice never reſts at any certain pitch, but waves up and down by inſenſible degrees; and in the diſcrete motion it does the contrary, frequently reſting or ſtaying at certain places, and leaping from one to another by ſenſible intervals. Euclid's Introductio Harmonica, p. 2. In the former caſe, the vibrations of the air are continually accelerated and retarded by turns, and by very ſmall degrees, and in the latter by large ones.

The firſt thing done, in learning to ſing, is to raiſe a ſcale of notes, by tones and ſemitones, to an octave; and deſcend again by the ſame notes; and then to riſe and fall by greater intervals, as a 3d, 4th, and 5th, and to do all this by notes of different pitch.

Then theſe notes are repreſented by lines and ſpaces, to which the ſyllables *fa, ſol, la, mi,* are applied, and the pupil is taught to name each line and ſpace by them; whence this practice is uſually called *ſol-fa-ing*. The nature, reaſon, defects, &c. of which, ſee under the article SOL-FA-ING.

For the hiſtory of ſinging, as a part of religious worſhip, ſee *Choral* SERVICE.

SINGING, *Proceſſional*. It was about the year 386, during the perſecution of the orthodox Chriſtians by the empreſs Juſtina, mother to the then young emperor Valentinian II. that eccleſiaſtical muſic was introduced in favour of the Arians. "At this time," ſays St. Auguſtine, "it was firſt ordered that hymns and pſalms ſhould be ſung after the manner of eaſtern nations, that the people might not languiſh and pine away with a tedious ſorrow, and from that time to the preſent it is retained at Milan, and imitated by almoſt all the other congregations of the world."

Muſic is ſaid by ſome of the fathers to have drawn the Gentiles frequently into the church through mere curioſity; who liked its ceremonies ſo well, that they were baptized before their departure. The generality of our parochial muſic is not likely to produce ſimilar effects; being ſuch as would ſooner drive Chriſtians with good ears *out* of the church, than draw Pagans *into it*.

About this time, during the contention between the orthodox Chriſtians and the Arians, we find by Socrates the hiſtorian, (l. vi. c. 8.) that the heretics uſed to ſing hymns, marching through the ſtreets of Conſtantinople in proceſſion, with which the vulgar were ſo much captivated, that the orthodox, under the direction of St. Chryſoſtom, thought it neceſſary to follow the example which had been ſet them by their greateſt enemies. Proceſſional ſinging had been long practiſed by the Pagans, but no mention is made of it among Chriſtians before this period.

SINGING *in the Church by the primitive Chriſtians*. With reſpect to the muſic that was firſt uſed by the Chriſtians, or eſtabliſhed in the church by the firſt emperors that were converted, as no ſpecimens remain, it is difficult to determine of what kind it was. That ſome part of the ſacred muſic of the apoſtles and their immediate ſucceſſors, in Paleſtine and the adjacent countries, may have been ſuch as was uſed by the Hebrews, particularly in chanting the pſalms, is probable; but it is no leſs probable that the muſic of the hymns which were firſt received in the church, wherever Paganiſm had prevailed, reſembled that which had been many ages uſed in the temple-worſhip of the Greeks and Romans. Of this, the verſification of thoſe hymns affords an indiſputable proof, as it by no means reſembles that of the pſalms, or of any other Hebrew poetry. And examples may be found in all the breviaries, miſſals, and antiphonaries, ancient and modern, of every ſpecies of verſification which has been practiſed by the Greek and Roman poets, particularly the lyric; ſuch as the Alcmanian, Alcaic, Sapphic, &c.

St. Hilary, biſhop of Poictiers, and St. Ambroſe, are ſaid to have been the firſt that compoſed hymns to be ſung in the weſtern churches. Both theſe fathers flouriſhed about the middle of the fourth century; but Prudentius, a Chriſtian poet, contemporary with Theodoſius, who died in 395, was author of moſt of the hymns in the Roman breviary.

SINGING, *Celeſtial*. It ſeems as if the primitive Chriſtians had had no conceptions more ſublime of the employment of the bleſt in the celeſtial abode, than that they were eternally ſinging. The ancient hymn, "Te Deum laudamus," ſtill retained in the church, appears to have furniſhed the poet Dante with a model of the 28th canto of his "Paradiſo," where, under three different hierarchies, conſiſting each of three choirs or choruſes, the heavenly hoſt of cherubim and ſeraphim are ſinging perpetual hoſannahs. Milton has aſſigned them the ſame employment:

> ——— Their golden harps they took:
> Harps ever tun'd, that glittering by their ſide
> Like quivers hung, and with preamble ſweet
> Of charming ſymphony they introduce
> Their ſacred ſong, and waken raptures high;
> No voice exempt, no voice but well could join
> Melodious part, ſuch concord is in heaven.
>
> Parad. Loſt, book iii.

Orazio Benivoli compoſed, in the laſt century, a maſs for the ceſſation of the plague at Rome, upon the ſame idea, for ſix choirs, of four parts each, the ſcore conſiſting of twenty-four different parts: it was performed in St. Peter's church, of which he was maeſtro di capella, and the ſingers, amounting to more than two hundred, were arranged in different circles of the dome; the ſixth choir occupying the ſummit of the cupola.

SINGING *in England by Madrigaliſts*. Choral compoſitions, madrigals, and ſongs in that ſtyle, always of many parts, being the only vocal muſic that was in favour with maſters and their moſt powerful patrons, precluded all refinement in the performance: as fugues, canons, and full choruſes, of which they chiefly conſiſted, are founded upon democratic principles, which admit of no ſovereignty; and whatever good they contain, is equally diſtributed to all ranks in the muſical ſtate; the art of ſinging, therefore, in theſe times, further than was neceſſary to keep a performer in tune and time, muſt have been unknown: the poſſeſſor of the moſt exquiſite voice had no more frequent opportunities allowed of diſplaying it, than the moſt diſagreeable; ſolo ſongs, anthems, and cantatas, being productions of later times. The penalty for the crime of playing a ſolo at the concert of ancient muſic was five guineas; but at this time, if inſtead of that ſum being forfeited, five hundred had been offered to the individual who could perform ſuch a feat, fewer candidates would have entered the liſts than if the like premium had been offered for flying from Saliſbury ſteeple over Old Sarum, without a balloon.

Singing, *Parochial*. See Psalmody. See alſo Sternhold and Hopkins.

Singing *in Italy*, during the 16th century. Zacconi, one of the beſt Italian writers on muſic of that period, in his "Prattica di Muſica," publiſhed 1596, chiefly dwells, in the firſt book, on the ſuperiority of the ſinging and ſingers of his own time, over all that preceded them; and has a long chapter upon the manner of gracing and embelliſhing a melody, where he tells us, "Che ſtile ſi tenghi nel far di *gorgia;* dell' uſo de i moderni *paſſagi*, come ſi *fioriſchino* le cantilene;" and ſpeaks of *acconciature*, as the modern Italians do of *riffioramenti*, or graces. The diviſions, however, into which he breaks paſſages, in order to *embelliſh* them, if adopted by an opera-ſinger of the preſent times, would be like a modern fine lady appearing at court in the furbelows and flounces of queen Elizabeth, or a fine gentleman in the peruke of ſir Cloudeſley Shovel.

Singing *in France*, during the 17th century. See Merſennus, and St. Evremond.

Singing *in England*, previous to the reign of queen Anne.

Muſic at all times has been called in to the aſſiſtance of weak plays and unattractive actors in our national theatres; and incidental ſongs, and ſinging between the acts, have been found ſo alluring, that when there was no plan formed for exhibiting muſical dramas, ſingers have been engaged at conſiderable ſalaries, expreſsly for that purpoſe.

Before the laſt century, the art of ſinging, indeed, ſeems to have been little cultivated among us, by either ſex, beyond what concerned time and tune. The honourable Roger North, in his manuſcript "Memoirs of Muſic," ſpeaks of the younger Baniſter as an excellent ſinging-maſter; but the players, who ſung Purcell's ſongs on the ſtage, ſeem to have had nothing but voice and action to recommend them: ſuch as Bowen, Harris, Freeman, and Pate, among the men; and among the women, Mrs. Davies, Miſs Shore, afterwards wife to Colley Cibber, Mrs. Croſs, Miſs Champion, and Mrs. Bracegirdle. It was, however, a powerful recommendation to a ſong, during the 17th century, to ſay that it had been performed at the playhouſe. How different from modern times! Church muſic, by the gay and faſtidious frequenters of the opera, before, as well as after it had been heard, is pronounced to be *old-faſhioned*, and playhouſe muſic *vulgar*. Till the reign of queen Anne, indeed, the gentlemen of the chapel royal were occaſionally allowed to ſing on the ſtage; but that princeſs thinking the practice indecent, prohibited its continuance. There are few inſtances of vocal performers, eſpecially female, being brought on our ſtage, but by accident. The fear of ſeduction, profligacy, and the world's opinion, deters parents from educating their children with a view to a profeſſion, which nothing but uncommon ſucceſs and prudence can render honourable in the eyes of the moſt ſerious part of the nation. The generality of female ſingers, therefore, having every thing to learn after leiſure for ſtudy is no longer in their power, uſually remain ignorant of the principles of their art, and ſo totally dependent on a maſter, as to be obliged to perpetuate that apprenticeſhip, which ought to have been ſerved before they ſet up for themſelves.

In 1763, the paſticcio burletta of "Love in a Village," and in 1765 "The Summer's Tale," and "The Maid of the Mill," betrayed us into a taſte for Italian melody, which has been the model of moſt of our vocal compoſers in and out of the theatre ever ſince. The "Duenna," another favourite Engliſh paſticcio, in 1775, helped us on, and Dr. Arnold, Mr. Dibdin, and Mr. Shield, have very judiciouſly complied with the reigning taſte, and imitated or adopted the opera ſtyle in all its viciſſitudes. Linley of Bath, and Jackſon of Exeter, in their elegies at leaſt, have ſtedfaſtly adhered to a ſtyle of their own, which ſeems to have been formed upon the melodies of our beſt old Engliſh maſters, and thoſe of the laſt age, that were moſt worthy of being preſerved.

Till the Italian opera was eſtabliſhed in this country, little was expected of a ſinger beſides voice and an ear. Indeed, long after that period, good taſte in ſinging was ſo little diffuſed throughout the iſland, that the great and exquiſite performers who came hither from the continent ſeem to have made but a ſmall impreſſion on their aſtoniſhed hearers. Nicolini, Seneſino, Bernacchi, Fauſtina, Cuzzoni, Farinelli, Caſſarelli, Careſtini, Conti, Monticelli, Mingotti, Elizi, Manzoli, Guarducci, and Guadagni, had no effect upon our national taſte; and though a few individuals among the people of faſhion, by private inſtructions from them, and by the beſt of all leſſons, hearing them frequently perform in public, diminiſhed the original ſin of our native *brogue* and vulgar expreſſion; yet as theſe pupils could be heard but by few, their power was local, and no more likely to have any general effect upon our national cantilena, than their learning French and Italian upon our general language. It is not difficult, however, to fix the era of a change in our vocal muſic, which ſeems to have remained ſtationary for near half a century. It was begun by the compoſitions and inſtructions of Dr. Arne, who endeavoured to refine our melody and ſinging, more from Italian than Engliſh models; and was greatly accelerated by the paſticcio Engliſh operas above mentioned, as well as by the inſtructions of Tedeſchini, Cocchi, Vento, and Giardini, who were employed about this time to teach ſeveral of our playhouſe ſingers. Tenducci's performance in Artaxerxes had a rapid effect upon the public taſte, and ſtimulated to imitation all that were poſſeſſed of good ears and flexible voices. In later times, the ſcholars of Sacchini, Piozzi, Parſons, and others, with the public concerts, where the beſt compoſitions and moſt exquiſite performances of all kinds were conſtantly heard, completed the revolution; and it may be with truth and certainty affirmed, that our taſte and judgment in both, even at the playhouſes, differ as much from thoſe of twenty or thirty years ago, as the manners of a civilized people from thoſe of ſavages.

Singing *of Birds*. See Song *of Birds*.

SINGINGING, in *Geography*, a ſmall iſland in the Eaſt Indian ſea, near the E. coaſt of the iſland of Naſſau. S. lat. 3° 50′. E. long. 100° 2′.

SINGITICUS Sinus, in *Ancient Geography*, a gulf of Macedonia, in the Ægean ſea.

SINGIVENDA, in *Geography*, a town of Hindooſtan, in the Carnatic; 28 miles N.N.W. of Ongole.

SINGLE, among *Sportſmen*, the tail of any of the deer kind.

Single *Bond* or *Obligation*, *ſimplex obligatio*, in *Law*, is a deed, by which the obligor obliges himſelf, his heirs, executors, and adminiſtrators, to pay a certain ſum of money to another at a day appointed. See Obligation.

Single *Caſt*, in *Huſbandry*, a term uſed by farmers for that ſort of ſowing, that diſperſes the neceſſary quantity of corn at one bout.

SINGLE *Echo, Fine, Poſition, Propoſition, Rafters, Tenaille,* and *Voucher.* See the ſubſtantives.

SINGLE-*Horſe Carts,* in *Agriculture.* See CART.

SINGLES. See PETTY *Singles.*

SINGO, in *Geography,* a town of European Turkey, in the province of Macedonia, near mount Athos.

SINGON, an iſland near the coaſt of Sweden, at the entrance into the gulf of Finland. N. lat. 60° 11′. E. long. 18° 20′.

SINGOONMAW, a town of the Birman empire; 16 miles S. of Pegongmew.

SINGOR, a ſea-port town of Aſia, in the kingdom of Siam, on the coaſt of Malacca. N. lat. 6° 40′. E. long. 101° 14′.

SINGPINE, a town of Bengal; 25 miles S.E. of Nattore.

SINGPOUR, a town of Bengal; 22 miles E.S.E. of Ramgur.—Alſo, a town of Bengal; 8 miles S.E. of Koonda.—Alſo, a town of Hindooſtan, in the circar of Sohajepour; 8 miles S. of Sohajepour.

SINGRAMOW, a town of Hindooſtan, in Oude; 24 miles S.S.E. of Sultanpour.

SINGRECOTTA, a town of Hindooſtan, in the circar of Cicacole; 23 miles W. of Vizianagram.

SINGREMON, a town of Hindooſtan, in Allahabad; 23 miles N.N.E. of Gazypour.

SINGREPETTA, a town of Hindooſtan, in the Carnatic; 15 miles S.E. of Tritchinopoly.

SINGROWLA, a town of Hindooſtan, in Allahabad, S.W. of Bahar.

SING-SING, a town of America, in the ſtate of New York; 35 miles N. of New York.

SINGUAR, a town of Hindooſtan, in Bahar; 14 miles E.N.E. of Hajypour.

SINGUE, a town of Hindooſtan, in Bahar; 38 miles S. of Bahar.

SINGULAR NUMBER, in *Grammar,* the firſt manner of declining nouns, and conjugating verbs; uſed when we only ſpeak of a ſingle perſon or thing. See NUMBER.

SINGULAR *Hiſtory.* See HISTORY.

SINGULAR *Propoſition.* See PROPOSITION.

SINGULARIS, or SINGLE, in the *Manege,* a name given by the Romans to a horſe, upon which a man rode, in their races, without a ſaddle, uſing only a cloth, like the Greeks, faſtened with a ſurcingle, or elſe ſitting upon the bare back.

SINGULATOR, among the Romans, a horſeman who rode with one horſe only.

SINGULTUS, in *Medicine,* a ſpaſmodic affection of the diaphragm, which, from the ſound which accompanies it, is commonly called *hickup;* under which head ſee an ample account of this affection.

SINGUM, in *Geography,* a town of Hindooſtan, in the Carnatic; 23 miles S.S.W. of Tritchinopoly.

SINGUR, a town of Hindooſtan, in Bahar; 35 miles S.E. of Gayhah.—Alſo, a town of Hindooſtan, in Viſiapour; 12 miles S. of Poonah.

SINGUS, in *Ancient Geography,* a town of Macedonia, in Chalcidis, on the Singitic gulf. Ptol.

SING-Y, in *Geography,* a town of China, of the third rank, in Quang-tong; 17 miles N. of Kao-tcheou.

SINHALA, in *Ancient Geography,* a name formerly given to the iſland of Ceylon, formed from the Sanſcrit Sinha, a lion, and given to it on account of its being inhabited by Sinhalas, or the offspring of a lion. See Aſiatic Reſearches, vol. i. p. 48.

SIN-HIANG, in *Geography,* a town of China, of the third rank, in Ho-nan, on the river Ki; 12 miles S.W. of Oue-kiun.

SIN-HING, a ſmall iſland near the coaſt of China, in the Eaſtern ſea; 3 miles S. of Tſong-ming. N. lat. 31° 32′. E. long. 121°.—Alſo, a town of China, of the third rank, in Quang-tong; 27 miles S. of Tchao-king.—Alſo, a city of China, of the ſecond rank, in Yun-nan. N. lat. 24° 30′. E. long. 102° 23′.

SIN-HO, a town of China, of the third rank, in Petche-li; 15 miles S.W. of Khi.

SIN-HOA, a ſea-port town of Cochinchina. N. lat. 17°. E. long. 88° 14′.—Alſo, a town of China, of the third rank, in Hou-quang, on the river Lo; 32 miles N.N.W. of Pao-king.

SIN-HOEI, a town of China, of the third rank, in Quang-tong; 40 miles N.W. of Macao.—Alſo, a town of China, of the third rank, in Quang-tong; 45 miles S.S.E. of Tchao-king.

SINIA, a river of Ruſſia, which runs into the Oby, 52 miles N. of Berezov, N. lat. 65°. E. long. 66° 14′.

SINJAR, a town of Aſiatic Turkey, in the province of Diarbekir; 140 miles S.E. of Diarbekir. N. lat. 36° 17′. E. long. 41° 35′.—Alſo, a range of mountains, in the province of Diarbekir; 70 miles S.E. of Diarbekir. On this range ſtood the fortreſs of Sangara, which was ſurrendered to the Perſians by the puſillanimous ſucceſſor of Julian, about eight or ten miles from Niſibis. This mountain is at preſent peopled by ſeveral tribes of that ſect called Yezedi, who worſhip, or rather deprecate, the devil, from a notion that he poſſeſſes an unlimited power over mankind. They are the deſcendants of thoſe Arabs who followed the banners of Yezid, and fought againſt Haſſein, in the battle of Kerbela; and Sheikh Ade, the founder of the ſect, is interred near Moſul. They are ſaid to adore the Supreme Being as the creator and benefactor of the human race, drink wine and other ſtrong liquors, and circumciſe like the Mahometans. They are the mortal enemies of the Turks, and have never been completely ſubdued. They lie in ambuſh behind the riſing grounds, which ſkirt the road between Moſul and Merdin; and as travellers are obliged to paſs a lonely wild, 20 furſungs in length, they are liable, if not numerouſly attended, to be murdered by theſe miſcreants. Sinjar affords abundance of paſturage, and alſo a ſufficient quantity of grain for the conſumption of its ſavage inhabitants. In the year 341 a bloody battle was fought near this place, between the emperor Conſtantius and Sapor II., in which the former ſuſtained a total defeat, and was driven by his victorious rival acroſs the Euphrates.

SINIA STANITZ, a town of Ruſſia, in the government of Irkutſk, on the Lena. N. lat. 61° 15′. E. long. 125° 34′.

SINICA, a town of America, in South Carolina, belonging to the Cherokee Indians, on the Keowe; 43 miles N.W. of Peterſburg.

SINICAL QUADRANT. See QUADRANT.

SINIGAGLIA, in *Geography,* a ſea-port town of Italy, in the duchy of Urbino, the ſee of a biſhop, ſuffragan of Urbino, on the Adriatic, at the mouth of the river Nivola (anciently Senon), which ſeparates the duchy of Urbino from the marquiſate of Ancona. It was anciently called "Sena Gallorum," denoting that it was built by the Gallic Senones, and became a Roman colony in the year of Rome 462. It has been ſeveral times deſtroyed, eſpecially by the Goths. It contains four churches and ſix convents, with about 6000 inhabitants. It is an unhealthy place, and water fit for drinking is ſcarce ; 28 miles E.S.E. of Urbino.

SINJIAR. See SINJAR.

SIN-ING, a town of Corea ; 25 miles E.S.E. of Long-Kouang.

SI-NING, a town of Corea ; 8 miles N.E. of Sing-tcheou.—Alſo, a city of China, of the ſecond rank, in Chen-ſi. N. lat. 36° 40′. E. long. 101° 24′.—Alſo, a town of China, of the third rank, in Pe-tche-li ; 25 miles N.W. of Yu-tcheou.—Alſo, a town of China, of the third rank, in Quang-tong ; 15 miles S.W. of Te-king.

SINION, a river of China, which runs into the Kialing, 15 miles S. of Oei-tcheou.

SINIS COLONIA, in *Ancient Geography,* a town of Aſia, in Leſſer Armenia, near the Euphrates, according to Ammianus Marcellinus.

SINISCOLA, in *Geography,* a town of Sardinia, on the eaſt coaſt. N. lat. 40° 30′. E. long. 10° 1′.

SINISI, a town of Naples, in Baſilicata ; 11 miles S.W. of Turſi.

SINISTER, ſomething on, or towards the left hand.

Hence ſome derive the word ſiniſter, *a ſinendo,* becauſe the gods, by ſuch auguries, permit us to proceed in our deſigns.

SINISTER is alſo uſed among us for unlucky ; though, in the ſacred rites of divination, the Romans uſed it in an oppoſite ſenſe. Thus, *avis ſiniſtra,* or a bird on the left hand, was eſteemed a happy omen ; whence, in the law of the Twelve Tables, *Ave ſiniſtra populi magiſter eſto.*

SINISTER, in *Heraldry.* The ſiniſter ſide of an eſcutcheon is the ſide anſwering to the right hand of the perſon who looks at it.

SINISTER *Chief* and *Baſe.* See ESCUTCHEON.

SINISTER *Bend.* See BEND.

SINISTER *Aſpect,* among *Aſtrologers,* is an appearance of two planets, happening according to the ſucceſſion of the ſigns ; as Saturn in Aries, and Mars in the ſame degree of Gemini.

SINISTRI, a ſect of ancient heretics, thus called, becauſe they held the left hand in abhorrence, and made it a point of religion not to receive any thing with it.

What in us is a piece of civility, in them was a ſuperſtition. Balſamon obſerves, that they were likewiſe called Sabbatians and Novatians.

SINKBAZAR, in *Geography,* a town of Bengal ; 15 miles S.S.W. of Rogonatpour.

SINKEL, a ſea-port town of the iſland of Sumatra, near the weſt coaſt, on a river which runs into the ſea. This town is a good mart for ſalt, iron, ſteel, and ſometimes opium. N. lat. 2° 8′. E. long. 97°.

SINKING *of the Earth.* See ABSORPTIONS *of the Earth.*

SINKING *Fund.* See FUND.

SINKOO, in the *Materia Medica,* a name given by ſome authors to the lignum aloes, or agallochum, uſed in medicine.

SINKOUANG, in *Geography,* a town on the weſt coaſt of Sumatra. N. lat. 1° 12′. E. long. 98° 13′.

SIN-LO, a town of China, of the third rank, in Petche-li, on the Chao river ; 42 miles S.W. of Pao-ting.

SINN, a river of Germany, which runs into the Maine, with the Saal, near Gemunden, in the duchy of Wurzburg. —Alſo, a town of Aſiatic Turkey, in the province of Diarbekir ; 40 miles S.E. of Diarbekir.

SINNEMAHONING CREEK, a river of America, in Pennſylvania, which runs into the weſt branch of the Suſquehanna, N. lat. 41° 17′. W. long. 78°.

SINNERSHAUSEN, a town of Germany, in the county of Henneberg ; 8 miles N.W. of Meinungen.

SINNET, aboard a *Ship.* See SENNIT.

SIN-NGHAN, in *Geography,* a town of China, of the third rank, in Ho-nan ; 17 miles W. of Ho-nan.

SIN-NHING, a town of China, of the third rank, in Hou-quang ; 20 miles S.S.W. of Oukang.

SIN-NING, a town of China, of the third rank, in Quang-tong ; 52 miles S. of Tchao-king.—Alſo, a town of China, of the third rank, in Se-tchuen ; 17 miles E.S.E. of Ta.—Alſo, a city of China, of the ſecond rank, in Quang-ſi. N. lat. 22° 34′. E. long. 107° 17′.

SINNO, a river of Naples, which runs into the Adriatic, N. lat. 40°. E. long. 16° 40′. Near the mouth of the Sinno was Siris, probably the port of Heraclea ; but at preſent there is nothing but an open road, where ſhips may lie to take in a cargo of corn, and other commodities, of which one is liquorice, a root that grows wild in great quantities along theſe ſwamps, and the ſale of which is ſaid to have produced 700*l.* a year to the duke of Corigliano. The banks of the Sinno are famous in Roman hiſtory for the victory gained by Pyrrhus over the conſul Levinus, in the year of Rome 473. This is ſaid to have been the firſt encounter of the Epirots with the Romans. The honour of the day was purchaſed by Pyrrhus at the expence of the flower of his army.

SINO, a town of Africa, on the Grain Coaſt ; 30 miles S.E. of Sanguin.

SINOB, or SINOPE, a ſea-port town of Aſiatic Turkey, in the ſangiacat of Kiutaja, near the coaſt of the Black ſea, on the iſthmus of a peninſula, ſix miles in circumference, which terminates in a conſiderable cape, which has not above twelve feet of water. The antiquity of this town is traced to the time of the Argonauts, or at leaſt to the time when the Cimmerians eſtabliſhed themſelves here ; for being driven from their country by the Scythians, they came into Aſia, overagainſt the mouth of the Iſter. Its firſt commencement, however, was feeble ; but when it received a colony of Mileſians, it roſe to ſuch a degree of power, that it founded other colonies on the coaſts of the Euxine ſea, whilſt it poſſeſſed all the advantages of liberty. It was taken by Pharnaces, father of Mithridates, and made the capital of Pontus ; and it became the birth-place of Mithridates. In the year B.C. 70, it was taken by the Romans under Lucullus, who reſtored its liberty. After experiencing a variety of calamities under the tyranny of Pharnaces, Julius Cæſar, having vanquiſhed this prince, re-eſtabliſhed Sinope, and ſent hither a Roman colony. It eſtabliſhed a new era in commemoration of this happy event, and inſcribed on its monuments the title of "Colonia Julia Felix Sinope." This colony was ſent to Sinope in the year of Rome 709. The town ſubſiſted in a flouriſhing ſtate under the Roman emperors. Its commerce, which was conſiderable, and the convenience of its ports, contributed alike to its opulence and its ſplendour. Strabo ſays that it was one of the moſt conſiderable towns of Aſia. A particular worſhip was paid to Serapis at Sinope, and it alſo honoured Mercury as the god of commerce. Strabo and Pliny ſay, that Sinope, under the Roman emperors, compriſed in Paphlagonia, formed a part of the government of Bithynia. Paphlagonia, however, was detached from Bithynia, and formed a particular province, about the reign of Conſtantine ; but the town of Sinope was united with ſome other towns of Pontus, to form the province of Helleſpont, in honour of Helena, the mother of Conſtantine. When the emperor Heraclius divided the Eaſt into ſeveral departments, the town of Sinope was included in that of Armenia. Chriſtianity was received in this city towards the end of the third century. This place has two good harbours, and a dock-yard for building ſhips. Turks only reſide within the walls; one of the fauxbourgs is inhabited by Greeks, with a metropolitan dependant on the patriarch of Conſtantinople. In the environs are ſome copper-mines. Diogenes, the cynic, was a native of Sinope, but he was buried at Corinth; 380 miles E. of Conſtantinople. N. lat. 41° 6′. E. long. 35°.

SINON, a river of Perſia, in the province of Mazanderan, which runs into the Caſpian ſea, 5 miles E. of Fehrabad.

SINONGI, a town of Japan, in the iſland of Ximo; 20 miles S.W. of Sanga.

SI NON OMNES, in *Law*, a writ on aſſociation of juſtices, by which, if all in commiſſion cannot meet at the day aſſigned, it is permitted that two or more of them may finiſh the buſineſs.

SINOOTS, in *Geography*, a town of Japan, in the iſland of Ximo; 20 miles E. of Taiſero.

SINOPE, in *Ancient Geography*. See Sinob.

Sinope, a river of Aſia, in Paphlagonia, which runs near the town of Sinope.

SINOPER, or Sinopis, in *Natural Hiſtory*. See Sinopica *Terra*.

SINOPICA Terra, the name of a red earth, of the ochre-kind, called alſo *rubrica ſinopica*, and by ſome authors *ſinopis*.

It is a very cloſe, compact, and weighty earth, of a fine glowing purple colour, but in ſome ſpecimens much deeper than in others, and in ſome degenerates into paleneſs; but, even in its worſt condition, the colour is very fine. It is of a pure texture, but not very hard, and of an even but duſty ſurface. It adheres firmly to the tongue, is perfectly fine and ſmooth to the touch, does not crumble eaſily between the fingers, and ſtains the hands. It melts very ſlowly in the mouth, and is perfectly pure and fine, and of a very auſtere aſtringent taſte, and ferments very violently with aqua fortis. In the fire it acquires a great hardneſs, but does not change colour.

It was dug in Cappadocia, and carried for ſale to the city Sinope, whence it had its name. It is now found in plenty in the New Jerſeys, in America, and is called by the people there *blood-ſtone*, from its ſtaining the hands to a blood-colour, and may probably be had in many other places; and this deſerves thoroughly inquiring into, ſince there ſeems not one among the earths more worthy of notice. Its fine texture and body, with its high florid colour, muſt make it very valuable to painters, and its powerfully aſtringency equally ſo in medicine.

The ancients were well acquainted with it in fluxes and hæmorrhages, and experience ſhews it poſſeſſes the ſame virtues at this time. The deepeſt coloured is ever the moſt aſtringent. Hill's Hiſt. of Foſſ. p. 60.

SINOPLE, or Senople, in *Heraldry*, denotes *vert*, or the green colour in armories; thus called by the ancient heralds: though Pliny and Iſidore, by *color ſinopicus*, or *ſinople*, mean a browniſh-red, ſuch as that of our ruddle.

F. Meneſtrier derives the word from the Greek *praſina hopla*, *green armories*; by corruptedly retrenching the firſt ſyllable *pra*; which is no new thing among Oriental words, witneſs Salonica for Theſſalonica.

Sinople is ſuppoſed to ſignify love, youth, beauty, rejoicing, and liberty: whence it is, that letters of grace, abolition, legitimation, &c. are always to be ſealed with green wax.

SINOPOLI, in *Geography*, a town of Naples, in Calabria Ultra; 5 miles S.W. of Oppido.

SINOTIUM, in *Ancient Geography*, a town of Illyria, in Dalmatia, and one of the fifty poſſeſſed by the Dalmatians. Strabo ſays, that it was reduced to aſhes by Auguſtus.

SINOVIA. See Synovia.

SIN-PING, in *Geography*, a town of China, of the third rank, in Yun-nan; 35 miles N. of Yuen-kiang.

SINSACATA, a town of South America, in the province of Cordova; 36 miles N. of Cordova.

SIN-SI, a town of Corea; 30 miles N.N.E. of King-ki-tao.

SINSJA, a river of Aſia, which runs into the Euphrates, 33 miles S.E. of Semiſat.

SINSILIN, a town of Perſia, in the province of Ghilan; 23 miles W.N.W. of Reſhd.

SINSIN, a town of Perſia, in the province of Irak; 120 miles N. of Iſpahan. See Zinjan.

SINSO, a province of Africa, in the kingdom of Angola, north of Loanda.

SIN-TAI, a town of China, of the third rank, in Chantong; 37 miles S.E. of Tai-nghan.

SIN-TAI-TOUKA, a town of Chineſe Tartary. N. lat. 41° 16′. E. long. 120° 14′.

SIN-TAN, a town of China, of the third rank, in Se-tchuen; 10 miles S.S.E. of Han.

SIN-TCHANG, a town of Corea; 45 miles E. of Haimen.—Alſo, a town of China, of the third rank, in Kiang-ſi; 37 miles W.S.W. of Choui-tcheou.—Alſo, a town of China, of the third rank, in Tche-kiang; 42 miles N.N.W. of Tai-tcheou.—Alſo, a city of China, of the ſecond rank, in Yun-nan. N. lat. 29°. E. long. 103° 29′.

SIN-TCHEOU, a city of China, of the firſt rank, in Quang-ſi. N. lat. 33° 26′. E. long. 109° 29′.

SIN-TCHIM HOTUN, a city of Corea. N. lat. 42° 57′. E. long. 130° 18′.

SIN-TCHIN, a town of China, of the third rank, in Pe-tche-li; 32 miles N.E. of Pao-ting.—Alſo, a town of China, of the third rank, in Chan-tong; 30 miles N.W. of Tcin-tcheou.

SIN-TCHING, a town of China, of the third rank, in Kiang-ſi; 22 miles S.S.E. of Kien-tchang.—Alſo, a town of China, of the third rank, in Tche-kiang; 30 miles N.N.E. of Yen-tcheou.—Alſo, a town of China, of the third rank, in Se-tchuen; 17 miles E. of Xun.—Alſo, a town of China, of the third rank, in Ho-nan; 20 miles N. of Hiu-tcheou.

SIN-TCHU-AM, a town of Chineſe Tartary. N. lat. 41° 5′. E. long. 120° 54′.

SIN-TCHUEN, a town of Corea; 48 miles S.W. of Hoang-tcheou.

SIN-TCIN, a town of China, of the third rank, in Houquang; 20 miles W.S.W. of Koue-yang.

SINTHUS, in *Ancient Geography*, a town of Macedonia, in the Amphaxitide, near the gulf Thermæus, according to Herodotus.—Alſo, one of the largeſt rivers which diſcharged themſelves into the Erythræan ſea. Arrian.—Alſo, one of the mouths of the Indus, according to Ptolemy.

SIN-TIEN, in *Geography*, a city of China, of the ſecond rank, in Yun-nan. N. lat. 25° 36′. E. long. 102° 54′.

SIN-TIENTSE, a town of Chineſe Tartary. N. lat. 41° 16′. E. long. 121° 19′.

SINTII, in *Ancient Geography*, the name of a people who inhabited the iſle of Lemnos, according to Homer. This name, however, probably belongs to the inhabitants of the town of Sindus, or Sinthus, near the Thermaic gulf.

SINTIQUIPAQUE, in *Geography*, a town of Mexico, in the province of Guadalajara, on the Barania; 110 miles N.W. of Guadalajara.

SIN-TOU, a town of China, of the third rank, in Kiang-ſi, on the river Kan; 13 miles S. of Lin-kiang.—Alſo, a town of China, of the third rank, in Se-tchuen; 10 miles S. of Han.

SINTRA. See CINTRA.

SIN-TSAI, a town of China, of the third rank, in Ho-nan, on the river Yu; 32 miles E.S.E. of Yun-hing.

SINTZHEIM, a town of the duchy of Baden; 13 miles S.S.E. of Heidelberg.

SINU. See ZINU.

SINUATUM FOLIUM, in *Botany*, a Sinuated Leaf, ſo called from *ſinus*, a bay or creek, in alluſion to its winding outline, or the broad, deep, rounded inciſions of its margin. See LEAF.

SINUESSA, in *Ancient Geography*, a town of Italy, on the frontiers of Latium and Campania, near the marſh of Miſturnes. It derived its name, according to Strabo, from the ſinuoſity of the coaſt, which at this place formed a ſmall gulf. Some remains of it, as well as of its baths, the water of which was reputed to be excellent againſt ſterility, ſtill ſubſiſt. Sinueſſa was a Roman colony, according to Livy.

SINUNIA, a town of Aſia, in Parthia, according to Ptolemy.

SINUOSITY, a ſeries of bends and turns in arches, or other irregular figures; ſometimes jetting out, and ſometimes falling in: ſuch as deſcribed by the motion of a ſerpent, &c.

It is the ſinuoſity of the ſea-coaſts that forms bays, ports, capes, &c. Du Loir obſerves, that the courſe of the river Meander, creeping in a thouſand agreeable ſinuoſities, ſerved Dædalus as a model by which to form his labyrinth.

SINUOUS ULCERS. See ULCER.

SINUS, in *Anatomy*, a term applied to various cavities of the body. In the head we have the ſinuſes of the frontal, ſphenoid, ethmoid, and maxillary bones; which are cavities of theſe bones communicating with the noſe. (See CRANIUM and NOSE.) The ſinuſes of the dura mater are the large veins of the brain. (See BRAIN, NERVOUS *Syſtem*, and VEIN.) The ſinuſes of the venæ and cavæ and pulmonary veins are the principal parts of the two auricles. (See HEART.) The ſinus of the vena portarum is its trunk, juſt before it divides into the right and left branches. See VEIN.

SINUS, in *Surgery*, a ſmall orifice leading down to an abſceſs.

SINUS *Hipponenſis*, in *Ancient Geography*, the gulf of Bizerta, a gulf of Africa, formed by the promontory "Candidum" to the north-weſt, and the promontory "Apollinis" to the eaſt.

SINUS *Numidicus*, the gulf of Stora, a gulf of Africa, formed to the weſt by the promontory "Tritum," and to the eaſt by the promontory "Tapſus."

SIN-YAN, in *Geography*, a river of China, which runs into the Eaſtern ſea, 17 miles E.N.E. of Yen-te-hing.

SIN-YANG, a town of Corea; 45 miles S. of Koang-tcheou.—Alſo, a city of China, of the ſecond rank, in Ho-nan. N. lat. 32° 12′. E. long. 113° 38′.

SIN-YE, a town of China, of the third rank, in Ho-nan; 27 miles S.S.W. of Nan-yang.

SIN-YU, a town of China, of the third rank, in Kiang-ſi; 25 miles W.S.W. of Lin-kiang.

SINZIG. See ZINZIG.

SINZITA, in *Ancient Geography*, a town of Leſſer Armenia, in the prefecture of Muriana. Ptolemy.

SIO, in *Geography*, a river of Hungary, which runs into the Sarand, near Simontornya.—Alſo, a river of Spain, which runs into the Segra, a little above Balaguer.—Alſo, a decayed town of Africa, on the coaſt of Zanguebar; 10 miles N.W. of Ampaça.

SIOCON, a town on the weſt coaſt of the iſland of Mindanao. N. lat. 7° 25′. E. long. 122° 12′.

SIOCOTTICLAY, a town of the iſland of Ceylon; 25 miles N.N.W. of Trincomaly.

SIODA, in *Ancient Geography*, a town of Albania, being one of thoſe which Ptolemy places between the Cyrrhus and Albanus.

SIOE, in *Geography*, a ſmall iſland of Denmark, near the W. coaſt of Langeland. N. lat. 54° 58′. E. long. 10° 42′.

SION, or ZION, in *Ancient Geography*, a mountain of Paleſtine, or of the land of Canaan, for an account of which, ſee JERUSALEM.

SION was alſo one of the names of mount Hermon, or rather of a chain of mountains, called mountains of Hermon, from mount Hermon, the principal of them. Of this mountain the Pſalmiſt probably ſpeaks in Pſ. cxxviii. 3.—Alſo, a town of Paleſtine, in the tribe of Iſſachar, according to the book of Joſhua.

SION, in *Geography*, a town of France, in the department of the Lower Loire; 9 miles W. of Chateaubriant.

SION, or *Sitten*, a town of Switzerland, and capital of the Vallais, ſituated on a river of the ſame name, which ſoon after runs into the Rhone. This is the ſee of a biſhop, the moſt ancient in Switzerland, and ſaid to have been originally founded at Martinach. The biſhop, who ſtyles himſelf count and vogt-governor of the Vallais, is elected by the chapter of the cathedral and the repreſentatives of the tythings, and is a ſuffragan of the archbiſhop of Mouſtiers, in Savoy. It contains ſix churches, with ſome convents, a college, and three palaces of the biſhop, ſtanding one above another; 48 miles E. of Geneva. Sion is ſituated at the foot of three inſulated rocks, that riſe immediately from the plain. The higheſt, called Tourbillon, ſupports the ruins of the old epiſcopal palace, containing two or three untenanted apartments, in one of which are the portraits of the ſeveral biſhops. On the ſecond rock, denominated Valeria, are obſerved the remains of the old cathedral, and a few houſes belonging to the canons. On Mayoria, the third rock, ſtands the epiſcopal palace, an ancient edifice of ſtone, built in 1547. Two apartments in this palace deſerve attention. The firſt is that in which the diet aſſembles; and the other is the hall, in which the biſhop holds his court, like the feudal lords of ancient times; at the further extremity is a raiſed ſeat, called a throne, ſurrounded by a wooden baluſtrade, and as an incitement to wiſdom and impartiality, the figures of Juſtice and Solomon's judgment are coarſely painted upon the walls. Sion is an ancient town, and was formerly the capital of the Seduni, who inhabited this part of the country in the time of Julius Cæſar. Among ſeveral obliterated inſcriptions, one is legible, in honour of the emperor Auguſtus, during his eleventh conſulſhip. In this inſcription the town is called "Civitas Sedunorum." N. lat. 46° 11′. E. long. 7° 9′. See VALLAIS.

SION *College*. See COLLEGE.

SIONDELAR, in *Geography*, a town of Hindooſtan, in the Carnatic; 25 miles N.W. of Ongole.

SIONDY, a town of Hindooſtan, in the Carnatic; 20 miles S. of Ongole.

SIONE, a river of America, which runs into lake Erie, N. lat. 42° 22′. W. long. 82° 52′.

SIONI, a town of Georgia, in the province of Carduel; 90 miles N.N.W. of Teflis.

SIOPE, a river of Brazil, which runs into the Atlantic, S. lat. 3° 20′. W. long. 40′.

SIORING, a town of North Jutland; 4 miles N.W. of Tiſted.

SIOTO. See Scioto.

SIOTOSTA, a town of Sweden, in Weſt Gothland; 49 miles E.S.E. of Gotheborg.

SIOUEN, a town of China, of the third rank, in Quang-tong; 32 miles S. of Louy.

SIOULE, a river of France, which runs into the Allier, two miles N. of St. Pourçain, in the department of the Allier.

SIOU-OUEN, a town of China, of the third rank, in Koei-tcheou; 15 miles N.N.W. of Koei-yang.

SIOUX, a river of Louiſiana, which runs into the Miſſouri, N. lat. 38° 42′. W. long. 93° 17′.

Sioux, a denomination that diſtinguiſhes Indians of North America, who inhabit the territories about the rivers Miſſiſippi and Miſſouri. The dread of this powerful nation is extended over all the other ſavage nations, from the confluence of the Miſſiſippi and Miſſouri, to the Raven river on the former, and to the Snake Indians on the latter. Among theſe nations, however, the Sioux have many allies; but the Chippeways are an exception, as they have maintained with them a long conteſt; and, indeed, by means of their ſmall lakes, water-courſes, and impenetrable moraſſes and ſwamps, they bid defiance to the attacks of their neighbours. Of the Sioux nation there are different bands, that are diſtinguiſhed among themſelves. The firſt of theſe comprehends the Minowa Kantong, or Gens de Lac, who extend from the Prairie des Chiens to Le Prairie du François, 35 miles up the St. Peters. This band is again ſubdivided into four claſſes, under different chiefs. The firſt ſubdiviſion hunts on both ſides of the Miſſiſippi and its confluent ſtreams, from the Prairie des Chiens to the river Du Bœuf. The ſecond ſubdiviſion reſides near the head of the lake Pepin, and hunts from the Rivière du Bœuf near to the river St. Croix. The third ſubdiviſion reſides between the Rivière au Canon and the entrance of the St. Peters. Its principal hunting ground is on the St. Croix. The fourth ſubdiviſion is ſituated from the entrance of St. Peters to the Prairie des François; they have a village nine miles up the St. Peters, on the N. ſide. The band Minowa Kantong is reputed the braveſt of all the Sioux. The ſecond band of Sioux includes the Waſhpetong, or Gens des Fieulles, who inhabit the country from the Prairie des François near to Roche Blanche, on the St. Peters. They hunt on the St. Peters, and alſo in the Miſſiſippi up Rum river, and ſometimes follow the buffalo over the plains. The third band compriſes the Suſſitongs, who extend from the Roche Blanche to Lac de Groſs Roche, on the river St. Peters. They are ſubdivided into the Cawrees and Suſſitongs proper, both of whom hunt E. of the Miſſiſippi, and up that river, as far as the Rivière de Corbeau. The fourth great band comprehends the Yanctongs, who are diſperſed from the Montaignes de la Prairie, which extend from St. Peters to the Miſſouri, to the river De Moyen. Theſe are ſubdivided into the Yanctongs of the north and thoſe of the ſouth. Theſe are the moſt unſettled and erratic of all the Sioux; ſo that they are ſometimes found on the borders of the Lower Red river, ſometimes on the Miſſouri, and on thoſe immenſe plains that lie between the two rivers. The fifth band includes the Titongs, who are diſperſed on both ſides of the Miſſouri. The ſixth and ſmalleſt band of the Sioux includes the Waſhpecoute, who reſide generally on the lands weſt of the Miſſiſippi, between that river and the Miſſouri. They generally hunt on the head of the river De Moyen. Theſe are repreſented as the moſt ſtupid and inactive of all the Sioux.

The Minowa Kantongs are the only Sioux who uſe canoes, and they are by far the moſt civilized; being the only Sioux who have ever built log huts, or cultivated any ſpecies of vegetables. This band is entirely armed with fire-arms. The Waſhpetong are a roving band; they leave the river St. Peters in April, and do not return from the plains until the middle of Auguſt. The Suſſitongs of Roche Blanche bear the character of being the moſt evil-diſpoſed Indians on the river St. Peters. They likewiſe follow the buffalo in the ſpring and ſummer months. The Suſſitongs of the Lac de Groſs Roche bear the character of good hunters and brave warriors. The Yanctongs and Titongs are the moſt independent Indians; as they follow the buffalo where chance directs; clothing themſelves with the ſkin, and making their lodges, bridles, and ſaddles of the ſame materials, the fleſh of the animal furniſhing them with food.

The claims of limits of the Sioux nation are allowed by all their neighbours to commence at the Prairie des Chiens, and to aſcend the Miſſiſippi, on both ſides, to the Rivière de Corbeau, up the river to its ſource; from thence to the ſource of St. Peters; from thence to the Montaigne de la Prairie; from thence to the Miſſouri, down that river to the Mahas, bearing thence N.E. to the ſource of the river De Moyen; and from thence to the place of commencement. They alſo claim a large territory S. of the Miſſouri. The country E. of the Miſſiſippi, from Rum river to the Rivière de Corbeau, is likewiſe in diſpute between them and the Chippeways, and has been the ſcene of many ſharp encounters for near 150 years paſt.

The Sioux are repreſented as the moſt warlike and independent nation of Indians within the boundaries of the United States, every paſſion being ſubſervient to that of war; and their leaders feel themſelves perfectly ſecure from any combination that can be made againſt them. Their guttural pronunciation, high cheek-bones, thin viſages, and diſtinct manners, together with their own traditions, ſupported by the teſtimony of neighbouring nations, leave little room for doubt, that they have emigrated from the N.W. point of America, to which they had come from the narrow ſtrait which in that quarter divides the two continents, and that they are deſcendants of a Tartarian tribe. Pike's Account of Expeditions to the Sources of the Miſſiſippi, &c. Appendix to part 1.

SIPA, a town of Napaul; 98 miles N.E. of Catmandu.

SIPALAY, a town on the W. coaſt of the iſland of Negroes. N. lat. 9° 43′. E. long. 122° 28′.

SIPANEA, in *Botany*, Aubl. Guian. 147. t. 56, a name of Aublet's, whoſe origin or meaning does not appear. The plant is ſuppoſed by Juſſieu to be a congener of *Muſſænda*; but Schreber more juſtly refers it to Virecta, Linn. Suppl. 17. See that article hereafter.

SIPARUNA, Aubl. Guian. 864. t. 333. Juſſ. 443, an unexplained name for a ſhrub of Guiana, whoſe generic characters are not ſufficiently made out to allow of its being reduced by Juſſieu to any of his natural orders; nor has Schreber admitted it into his *Genera Plantarum*. Aublet refers it to the *Monoecia Decandria* of the Linnæan ſyſtem.

Gen. Ch. Male, *Cal.* Perianth of one leaf, in four deep roundiſh ſegments. *Cor.* none. *Stam.* Filaments four, ſix, eight, or ten, inſerted into a hairy receptacle; anthers of two cells. *Piſt.* none.

Female, *Cal.* and *Cor.* as in the male. *Stam.* none. *Piſt.* Germen ſuperior, roundiſh; ſtyle oblong, ſtriated; ſtigmas five, capillary. *Fruit* unknown.

1. S. *guianenſis.*—Found on the borders of rivulets, in the quarter of Oyac, flowering in Auguſt. The *ſtem* is eight or ten feet high, ſlender, with long, ſlender, ſmooth, oppoſite branches; its wood white and brittle. *Leaves* elliptic-oblong, ſmooth, pointed, entire, about five inches in length, oppoſite, on ſhort ſtalks. The *flowers* are axillary, green, very ſmall, on ſhort, ſomewhat racemoſe, ſtalks.

SIPAVEND, in *Geography*, a town of Perſia, in the province of Mekran; 212 miles N.N.W. of Kidge.

SIPELER, a town of Hindooſtan, in the circar of Condapilly; 24 miles S. of Maſulipatam.

SIPGICON-COUTEN, a town of Chineſe Tartary, in the country of Hami. N. lat. 40° 10′. E. long. 95° 42′.

SIPHAC, a name uſed by ſome authors for the peritoneum.

SIPHANTO, in *Geography*, an iſland of the Archipelago, N. of Argentiera, and very cloſe to it. In former times this iſland was flouriſhing under the name of "Siphnos," and it was even reckoned the richeſt of the Archipelago, on account of the gold and ſilver-mines which had there been diſcovered, and of which the tenth alone furniſhed the temple of Apollo at Delphos with the richeſt treaſure that had been ſeen. Theſe mines reflect diſhonour on the memory of the Siphnians, whilſt they enriched them; for their opulence produced ſuch a corruption of morals and duplicity of character, which became ſo common and ſo characteriſtic of them, that they ſerved, throughout all Greece, as a term of compariſon, when it was required to paint diſcredited morals or perfidy of conduct. At this day, the treaſures concealed within the boſom of the earth are unknown; and the diſcovery of them remains to become a ſource of riches to an iſland, which, though leſs impoveriſhed than ſome others, exhibits in a degree the picture of miſery common to all theſe countries. Beſides the mines of gold and ſilver which Siphanto afforded, it has ſome that are very abundant in lead, iron, and load-ſtone. Its mountains alſo contain quarries of very beautiful marble, and the reſidents ſpeak of a ſpecies of very ſoft ſtone, with which they made vaſes that were conveyed throughout all Greece, but are not known in our days; ſo that the iſland of Siphanto would ſtill be the richeſt of the Archipelago, if it ceaſed to be ſubject to a government which cruſhes it with an iron hand. It is alſo one of the moſt agreeable and moſt chearful; the air is pure and wholeſome; the plains are adorned with a variety of dreſs, which it owes to eaſy labour; and the excellent quality of their productions is another precious favour of nature. Salt, cotton, figs, oil, wax, and a few other commodities of leſs importance, compoſe the crops and the trade of the iſland: but both might be much augmented by induſtry, if it were encouraged. Fine cotton-cloths, ſtraw-hats, &c. are manufactured here. The inhabitants are mild and hoſpitable; the women are beautiful; but their dreſs diſguiſes their charms. This iſland has no harbour, except for ſmall veſſels. The moſt conſiderable place, which is called Serai, is built on ſteep rocks, which leave below the town only a ſmall cave, where boats can anchor, becauſe if they were ſurpriſed here by a northerly wind, they would ſoon be daſhed to pieces on the coaſt; thoſe of the country are haſtily drawn on ſhore as ſoon as they are unloaded. Siphanto contains five villages, and about 5000 inhabitants. N. lat. 36° 59′. E. long. 24° 56′.

SIPHILIS, from σιφλος, *filthy*, in *Surgery*, the venereal diſeaſe. See Lues *Venerea*.

SIPHITA, a word uſed by Paracelſus, and his followers, with the addition of *parva* and *magna*, for two diſorders. The *ſiphita parva* ſignifies the *chorea ſancti Viti*, or *St. Vitus's dance*; and the *ſiphita magna*, walking in time of ſleep.

SIPHNIUS Lapis, in the *Natural Hiſtory* of the ancients, a ſubſtance found in great plenty in the iſland Siphnos, (*Siphanto*,) in the Ægean ſea. It was dug up in large maſſes in the neighbourhood of the ſea; and when freſh, might be cut or worked into any ſorts of veſſels, by reaſon of its ſoftneſs; but when afterwards burnt and oiled over, became black and ſolid, and fit for any ſervice: and the veſſels made of it bore the fire very well. The ſame ſubſtance is ſtill found in many parts of Europe, and called *lapis lebitum*, and applied to the ſame uſe. It is no other than the ſteatites, or our ſoap-rock.

SIPHON, or Syphon, in *Hydraulics*, a crooked tube, one leg or branch of which is longer than the other; uſed in the raiſing of fluids, emptying of veſſels, and in various hydroſtatical experiments.

The word in the original Greek, σιφων, ſignifies ſimply *tube*, whence ſome apply it to common tubes or pipes. Wolfius particularly deſcribes two veſſels under the name of ſiphons: the one cylindrical in the middle, and conical at the two extremes; the other globular in the middle, with two narrow tubes fitted to it axis-wiſe: both ſerving to take up a quantity of water, &c. and to retain it when up.

But the moſt uſeful and celebrated ſiphon is that which follows: a crooked tube A B C (*Plate* XV. *Hydraulics*, *fig.* 1.) is provided of ſuch a length, and with ſuch an angle, or ſo bent at the vertex, as that when the orifice A is placed on an horizontal plane, the height of A B may not exceed thirty-two or thirty-three feet. For common uſes, a foot or half a foot high ſuffices. If, now, the leſs arm, A B, be immerged in water, or any other liquid, and the air be ſucked out of it by the aperture C, till the liquor follow; the liquor will continue to flow out of the veſſel, through the tube B C, as long as the aperture A is under the ſurface of the liquor.

Note, inſtead of ſucking out the air, the event will be the ſame, if the ſiphon be at firſt filled with the fluid, and the aperture C ſtopped with the finger, till the aperture A be immerged.

The truth of the phenomenon is known by abundance of experiments; nor is the reaſon of part of it far to ſeek. In ſucking, the air in the tube is rarefied, and the equilibrium deſtroyed; conſequently the water muſt be raiſed into the leſſer leg A B, by the preponderating preſſure of the atmoſphere.

The ſiphon being thus filled, the atmoſphere preſſes equally on each extremity, ſo as to ſuſtain an equal quantity of water in each leg; but the air not being able to ſuſtain all the water in the longer leg, and being more than able to ſuſtain that in the ſhorter leg; with the exceſs of force, therefore, it will raiſe new water into the ſhorter leg; and this new water cannot make its way, but by protruding the firſt before it: by this means is the water continually driven out at the longer leg, as it is continually raiſed by the ſhorter.

The cauſe of the ſiphon's running may be otherwiſe explained in the following manner: the air which paſſes into the veſſel A B C D (*fig.* 2.), repreſented by the column K L, K L, ſuſtains the column of water, L D, in the ſhort leg of the ſiphon, preſſing againſt that air with its perpendicular height D F; whilſt the column of air M S, preſſing upwards againſt the whole of the long or iſſuing leg D S, which acts according to the height D C, muſt yield and ſuffer the water to run out, as long as the leg D S is longer, or rather perpendicularly higher, than D G. For ſince K and M are ſuppoſed to be at the top of the atmoſphere, the columns K L and M S are equal in height and preſſure, (for the height of L above S is of no account with reſpect to the whole height of the atmoſphere,) as long as M S is acted upon by the deſcending water D S, whoſe height is from D to S, (*e. g.* fifteen inches,) an height ſuperior to that of the column D G, (*e. g.* ſeven inches,) ſupported by the column of air K L, the column M S muſt yield to the water iſſuing out at S; and however the ſurface of the water, E F, deſcends, the column K L, by its preſſure, will always overcome the reſiſtance of the column M S, becauſe it has a leſs height of water to ſuſtain than M S has. If the mouth of the iſſuing leg had been at T, the water would hang *in equilibrio*, filling both legs of the ſiphon, when the water is come down in the upper veſſel to I H T; becauſe then the two columns of air, K L and M S, will be acted againſt by an equal height of water in the legs of the ſiphon; but if you raiſe the iſſuing end of the ſiphon (now ſuppoſed at T) up to the level of *u* V above I H, the water will run back up from V to D, and ſo out at H in the upper veſſel: becauſe then the column M S, having only the height V D to ſuſtain, will be acted againſt with leſs force than the column K L, which is preſſed againſt by the whole height, D H, ſuperior to V D. Since, therefore, the preſſure of the air is the cauſe of the water being puſhed up into the ſiphon, and the difference of its preſſure (as one column is acted againſt by the water in the ſhort leg more weakly than another column of air is acted upon by the water in the long leg) is the cauſe of its running continually from one veſſel into another, when once ſet a-going; it follows, that the bend, D, of the upper part of the ſiphon muſt not be above thirty-two feet higher than the water in the upper veſſel, becauſe the air cannot ſuſtain a column of water, whoſe height exceeds thirty-two feet.

Mercury will run in a ſiphon in the ſame manner as water; but in this caſe, the bend of the ſiphon muſt not be more than $30\frac{8}{10}$ inches above the ſtagnant mercury in the upper veſſel; becauſe, as it is about fourteen times ſpecifically heavier than water, it will be lifted up by the preſſure of air but the fourteenth part of the height to which the water is lifted. Deſag. Exp. Phil. vol. ii. ſect. 8.

But ſome authors aſſert, that the water continues to flow through the ſiphon, even when placed under a receiver, and the air exhauſted from it.

Some will have it, that there is ſtill air enough left in the evacuated receiver, to raiſe the water to an inch or two. But as both mercury and water are found to fall entirely out of the Toricellian tube, *in vacuo;* the preſſure of the thin remaining air there can never be the cauſe of the aſcent, both of mercury and water, in the ſhorter leg of the ſiphon. Hence, as the height of the ſiphon is limited to thirty-two feet; for this only reaſon, that air cannot raiſe water higher; ſome have queſtioned whether or not we are in the right in rejecting Hero's method of carrying water, by means of a ſiphon, over the tops of mountains, into an oppoſite valley. For Hero only orders the apertures of the ſiphon to be ſtopped, and water to be poured through a funnel into the angle or meeting of the legs, till the ſiphon be full; when, ſhutting the aperture in the angle, and opening the other two, the water, he ſays, will continue to flow. Now, if there only need air for the firſt riſe of the water into the leſs leg, not for the continuation of the motion, it were poſſible to raiſe the water much higher than the height of the atmoſphere would carry it.

Wolfius (Elem. Matheſ. tom. ii. p. 348. ed. 1733.) expreſsly ſays, that this propoſed artifice of Hero is very juſtly rejected; becauſe air is neceſſary not only for the elevation of the water in the ſhorter leg, but for the continuance of its motion; and he adds, that this method was unſucceſsfully tried, where the height was greater than thirty-two feet.

Deſaguliers alſo obſerves, that in a crane or ſiphon, ſuch as that propoſed by Hero, of about forty feet high, the water, inſtead of running from the upper veſſel into the lower, as it would do if the height of the ſhort leg were much under thirty-two feet, will in the two legs fall back to the height of thirty-two feet, above the reſpective veſſels, where it will hang; the air not being able to ſuſtain the water above theſe heights, and conſequently drive it up over the bend.

In an experiment of this kind, the water in the legs of the ſiphon, unleſs it be purged of its air, will not reſt at a height of quite thirty feet above the water in the veſſels, becauſe air will extricate itſelf out of the water, and getting above the water in the legs, preſs it downwards, ſo that its height will be leſs to balance the preſſure of the atmoſphere. However, this is certain, that a ſiphon of a particular kind, once ſet a running, will perſiſt in its motion, though removed into the moſt perfect vacuum our air-pumps will make: or, if the lower orifice of a full ſiphon be ſhut, and the whole be thus placed in a receiver, with a contrivance for opening the orifice when the air is exhauſted; the water will be all emptied out of the veſſel, as if it had been in the open air.

This fact has been ſufficiently aſcertained by many approved hydroſtatical writers.

Deſaguliers informs us, that he made the experiment, both with water and mercury; for having filled a ſiphon, recurved at the extremities of its legs, ſucceſſively with thoſe liquors, and ſuſpended it by a ſlip-wire in the receiver of an air-pump, over two ſmall jars containing mercury to unequal heights, (and water, when water was uſed in the ſiphon,) he exhauſted the air out of the receiver, and then letting down the ſiphon, ſo that its two ends went into the liquor in the jars, the liquor ran from the higher into the lower veſſel. He alſo made an experiment in the open air, where the mercury ran through a ſiphon, whoſe bend was more than thirty-one inches above the lower orifice of the ſhort leg of the ſiphon. But neither of theſe experiments affords a juſt objection againſt the doctrine advanced in the preceding part of this article, *viz.* that the air is the cauſe of the diſcharge of liquors from one veſſel into another by means of ſiphons; for its running *in vacuo* was only owing to the attraction of coheſion, which acts for a ſmall height; becauſe the experiment will not ſucceed *in vacuo*, if the ſiphon uſed for mercury has its bend ſix inches higher than the orifice of the ſhort leg, and if the bend of the ſiphon for water be two or three feet high; neither will the laſt-mentioned experiment with mercury in the open air anſwer, if the bend of the ſiphon be forty inches high: and in all the experiments, the bores of the ſiphons muſt be very ſmall. Exp. Phil. ubi ſupra, p. 168.

The figure of the ſiphon may be varied at pleaſure (ſee *figs.* 3, 4, 5.), provided only the orifice C be below the level of the ſurface of the water to be drawn up; but ſtill the farther it is diſtant from it, the faſter will the fluid be carried off. And if, in the courſe of the flux, the orifice A be drawn out of the fluid, all the liquor in the ſiphon will go out at the lower orifice C; that in the leg C B dragging, as it were, that in the ſhorter leg A B after it.

If a filled ſiphon be ſo diſpoſed, as that both orifices, A and C, be in the ſame horizontal line, the fluid will remain pendant in each leg, how unequal ſoever the length of the legs may be. Fluids, therefore, in ſiphons, ſeem, as it were, to form one continued body; ſo that the heavier part, deſcending like a chain, pulls the lighter after it.

Laſtly, it muſt be obſerved, that the water will flow out, even through a ſiphon that is interrupted, by having the legs A D and F C joined (*fig.* 5.) together, by a much bigger tube full of air.

The ſipho Wirtembergicus is a very extraordinary machine of this kind, performing divers things which the common ſiphon will not reach. *E. gr.* In this, though the legs be in the ſame level, yet the water riſes up the one, and deſcends through the other; the water riſes, even though the aperture of the leſs leg be only half immerged in water; the ſiphon has its effect after continuing dry a long time; either of the apertures being open, the other remaining ſhut for a whole day, and then opened, the waters flow out as uſual. Laſtly, the water riſes and falls indifferently through either leg.

Muſchenbroeck, in accounting for the operation of this ſiphon, obſerves, no diſcharge could be made by it, unleſs the water applied to either leg cauſe the one to be ſhorter, and the other longer by its own weight. Introd. ad Phil. Nat. tom. ii. p. 853. ed. 4to. 1762.

The project of this ſiphon was laid by Jordanus Pelletier, and executed at the expence of prince Frederic Charles, adminiſtrator of Wirtemberg, by his mathematician Shahackard, who made each branch twenty feet long, and ſet them eighteen feet apart; the deſcription of it was publiſhed by Reiſelius, the duke's phyſician.

This gave occaſion to M. Papin to invent another, that did the ſame things, deſcribed in the Philoſophical Tranſactions; and which Reiſelius, in another paper in the Tranſactions, ingenuouſly owns to be the very ſame with that of Wirtemberg. Its ſtructure will appear from its figure, which is repreſented *Plate* XV. *Hydraulics*, *fig.* 6.

SIPHONANTHUS, in *Botany*, from σιφων, *a tube*, and ανθος, *a flower*, becauſe of the long tube of the corolla. Ammann, the author of the genus, in the Peterſburgh Tranſactions, for 1736, called it *Siphonanthemum*.—Linn. Gen. 53. Schreb. 70. Willd. Sp. Pl. v. 1. 606. Mart. Mill. Dict. v. 4. Juſſ. 132. Lamarck Illuſtr. t. 79.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Borragineis affine*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, large, in five deep permanent ſegments. *Cor.* of one petal, funnel-ſhaped; tube thread-ſhaped, very ſlender, many times longer than the calyx; limb in four deep ſpreading ſegments, ſmaller than the calyx. *Stam.* Filaments four, longer than the limb of the corolla; anthers oblong, triangular. *Piſt.* Germen ſuperior, four-cleft, very ſhort; ſtyle thread-ſhaped, the length of the ſtamens, recurved at the extremity; ſtigma ſimple. *Peric.* Berries four, roundiſh, within the ſpreading calyx. *Seeds* ſolitary, roundiſh.

Eſſ. Ch. Corolla of one petal, funnel-ſhaped, very long, inferior. Berries four, with ſolitary ſeeds.

1. S. *indica*. Indian Pipe-flower. Linn. Sp. Pl. 159. Willd. n. 1. Poiret in Lam. Dict. v. 7. 200. ("Siphonanthemum ſalicis folio, flore flaveſcente; Amm. Act. Petrop. ann. 1736, 214. t. 15." Lyſimachii ſpecies; Piſ. et Bont. Ind. Or. 159?)—Native of the Eaſt Indies? We have ſeen no ſpecimen, but the figures and deſcriptions of this plant repreſent it as having an herbaceous, ſimple, leafy *ſtem*. *Leaves* alternate, or partly oppoſite; ſometimes three in a whorl, ſeſſile, lanceolate, acute, wavy, entire. *Flower-ſtalks* axillary and terminal, much ſhorter than the leaves, three-cleft. *Flowers* thrice as long as their ſtalks, yellowiſh.

Willdenow has ſeparated Lamarck's fig. 2. as a diſtinct ſpecies, by the name of *S. anguſtifolia*; but Lamarck himſelf in his Illuſtr. p. 318, gives that figure as perhaps only a better repreſentation of the original ſpecies. The difference indeed between the ſtigmas of the two figures is too great to be probable. We ſhould think, with this author, that the figure in Bontius might rather belong to ſome *Volkameria* or *Clerodendrum*, were it not ſpoken of as a pot-herb. After all, who can be certain, that the hiſtory of *Siphonanthus* is not altogether a blunder, and that the original plant itſelf is not a *Volkameria*, *Clerodendrum*, or *Ovieda*? *O. mitis*, a ſpecies very little known to botaniſts in general, bears a conſiderable reſemblance to it, though the infloreſcence differs materially from what is deſcribed in *Siphonanthus*.

SIPHONIA, from σιφων, *a pipe*, alluding to the uſes made of the reſinous exudation of this tree, ſo well known under the appellation of elaſtic gum, or *caoutchouc*.—Schreb. Gen. 656. Willd. Sp. Pl. v. 4. 567. Mart. Mill. Dict. v. 4. Lamarck Illuſtr. t. 790. (Hevea; Aubl. Guian. 871.)—Claſs and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of one leaf, bell-ſhaped, rather globoſe, cut half way down into five erect, acute teeth, reflexed at the margins. *Cor.* none. *Stam.* Filaments united into a column, ſhorter than the calyx; anthers five, nearly ovate, attached to the column below its ſummit.

Female, *Cal.* Perianth inferior, of one leaf, bell-ſhaped, ſomewhat turbinate, with five acute, ſpreading, recurved deciduous teeth, the circular baſe only being permanent. *Cor.* none. *Piſt.* Germen ſuperior, globoſe, ſomewhat conical, ſhorter than the calyx; ſtyle none; ſtigmas three, thickiſh, depreſſed, two-lobed. *Peric.* Capſule large, three-lobed, depreſſed, hollowed out at the baſe, woody, very hard, of three cells, inveſted with a fibrous bark; each cell with two elaſtic valves. *Seeds* one, two, or three, nearly ovate, with a brittle ſpotted ſhell.

Eſſ. Ch. Male, Calyx bell-ſhaped, five-cleft. Corolla none. Filament columnar, with five anthers.

Female, Calyx bell-ſhaped, five-cleft. Corolla none. Stigmas three, ſeſſile. Capſule of three lobes, with elaſtic valves.

1. S. *elaſtica*. Elaſtic-gum Tree. Martin n. 1. (S. Cahuchu; Richard. Willd. n. 1. Jatropha? elaſtica; Linn. Suppl. 422. Hevea guianenſis; Aubl. Guian. 871. t. 335. "Pao ſeringa; Mem. de l'Acad. des Sc. for 1751. t. 20, bad.")—Native of Braſil, and the foreſts of Guiana, bearing fruit in April and May. A *tree*, whoſe trunk riſes to the height of 50 or 60 feet, with a thin grey bark, and a ſoft white wood; the *branches* ſpreading widely in every direction. *Leaves* towards the ends of the branches, alternate, but crowded, and ſpreading in a circular order round the branch, on long ſtalks, ternate; leaflets elliptical, obtuſe, entire, or minutely undulated, ſmooth, reticulated with veins; paler beneath; each about three inches long, and one wide, on a partial ſtalk about half an inch in length. *Common footſtalks* rather longer than the leaflets, round, finely downy. The *flowers* we have not ſeen, but they are ſaid to be ſmall, downy, as well as their ſtalks; the male ones numerous, racemoſe; the female ſolitary, at

the end of each cluſter. *Fruit* the ſize of a cheſnut in its ſhell, green, ſmooth, of three large ovate lobes, the valves burſting elaſtically, like thoſe of a *Jatropha*. Aublet ſays the *nuts* are very good and wholeſome. The trunk of the tree, when wounded, diſcharges a milky fluid, which being collected, either in a maſs, or by ſmearing it over lumps of clay, ſticks, &c. dries into any ſhape that is wanted, and becomes the elaſtic gum, or Indian rubber, ſo uſeful to artiſts for effacing at pleaſure the marks of a black-lead pencil. (See Caoutchouc.) We beg leave to correct a ſlight botanical inaccuracy in that article; for the *Hevea* and the *Jatropha elaſtica* are preciſely the ſame plants. There is indeed, in the Linnæan herbarium, beſides the original ſpecimen, marked with this laſt name, another from Mutis, which that learned botaniſt judged to be a diſtinct ſpecies, though affording, as ſome other trees do, a ſimilar gum. The *leaflets* in this ſpecimen are larger, more acute at each end, and deſtitute of partial ſtalks. The *calyx* is nearly half an inch long. The younger Linnæus, in his *Supplementum*, 422, promiſed to publiſh ſomething at a future time reſpecting the various trees that yield an elaſtic gum, of the ſame utility as the *Caoutchouc;* but he did not live to execute his deſign. His reference to the Mem. de l'Academie for 1751, with a cenſure of the figure, appears to be copied from Aublet.

SIPIAS, in *Geography*, a town of Mingrelia, ſituated on a river which runs into the Black ſea; 100 miles W.N.W. of Teflis.

SI-PING, a town of China, of the third rank, in the province of Ho-nan; 30 miles N.N.W. of Yun-hing.

SIPONIMA, in *Botany*. See Ciponima, and Symplocos.

SIPSEY, in *Geography*, a river of the ſtate of Georgia, which runs into the Tombigh, N. lat. 32° 22′. W. long. 87° 51′.

SIPTACE, in *Natural Hiſtory*, the name given by the ancients to a beautiful bird, of which they were very fond, and which was often kept in their houſes. Some have conjectured this to be the goldfinch, from the fine yellow they deſcribe about it; but Pliny plainly makes it the parrot: he tells us, among other things, that it imitated the human voice the beſt of all birds.

SIPUCA, in *Geography*, a town of Peru, in the dioceſe of La Plata; 60 miles E. of Plata.

SIPUNCULUS, or Tube-worm, in *Vermiology*, a genus of the Vermes Inteſtina claſs and order, of which the generic character is as follows: Body round, elongated; mouth cylindrical at the end, and narrower than the body; the aperture at the ſide of the body, and veruciform. There are only two

Species.

* Nidus. The body of this ſpecies is covered with a cloſe ſkin, and globular at the lower end. It is deſcribed and figured by Pennant, Barbut, and Martin. It inhabits European ſeas, under ſtones; and is about eight inches long. The body is conic, and broader on the fore-part; the mouth is much ſlenderer than the body, and armed with fleſhy, three-pointed papillæ; the aperture is near the upper extremity.

Saccatus. Body covered with a looſe ſkin, and rounded at the lower end. It inhabits the American and Indian ſeas. It is ſhaped like the nidus, except in being encloſed as it were in a looſe bag, and in not having the lower end globular.

SIR, or Sirr, in *Geography*, a river which riſes in the mountains of Tartary, about 160 miles W. of Caſhgar, and runs into the lake of Aral, in N. lat. 45° 10′.

Sir *Biby's Iſland*, a ſmall iſland in Hudſon's bay. N. lat. 61° 55′. W. long. 93° 40′.

Sir *Charles Hardy's Iſland*, an iſland in the Southern Pacific ocean, diſcovered by captain Carteret in 1767. Its extent is conſiderable, and it appears to be flat, green, and pleaſant. S. lat. 4° 38′. E. long. 134° 6′.

Sir *Charles Hardy's Iſlands*, a cluſter of ſmall iſlands in the South Pacific ocean, diſcovered by captain Cook in 1770. S. lat. 11° 55′. W. long. 217°.

Sir *Thomas Hay's Point*, a cape on the N.W. coaſt of Portland, one of Queen Charlotte's iſlands, in the South Pacific ocean. S. lat. 10° 42′. E. long. 165° 14′.

Sir *William James's Iſland*. See St. *Suſanna*.

Sir *Henry Martin's Iſland*, an iſland in the Pacific ocean, about 16 leagues in circumference; diſcovered by lieutenant Hergeſt, commander of the Dædalus ſtore-ſhip, in the year 1792. The country ſeemed to be highly cultivated, and was fully inhabited by a civil and friendly race of people, readily inclined to ſupply whatever refreſhments their country afforded. Mr. Hergeſt's company were induced to entertain this opinion from the hoſpitable reception they experienced, on landing, from the chiefs, and upwards of 1500 of the natives, who were aſſembled on the ſhores of the harbour. On their return to the ſhip, they found the ſame harmony ſubſiſting there with the Indians, who had carried off and ſold a ſupply of vegetables and ſome figs. It is called by the natives Nooahēva. S. lat. 8° 51′. E. long. 220°.

Sir *Charles Saunders's Iſland*, or *Tapooamānoo*, an iſland in the Southern Pacific ocean, diſcovered by captain Wallis in the year 1767. The iſland is about ſix miles in length, and has a mountain of conſiderable height in the centre, which appeared to be fertile. The inhabitants did not appear to be numerous. S. lat. 17° 28′. W. long. 150° 40′.

Sir *Thomas Roe's Welcome*, a large bay in the north part of Hudſon's bay.

SIRA, a name by which ſome of the chemical writers have called orpiment.

SIRACAUSTUM, a name given by Meſue to a medicine he recommends in acute diſeaſes.

SIRACUSA, in *Geography*. See Syracusa.

SIRADIA, a town of the duchy of Warſaw, late capital of a palatinate of Poland, of the ſame name, ſituated on the Warta; 100 miles N.N.W. of Cracow. N. lat. 51° 31′. E. long. 18° 45′.

SIRÆUM, a word uſed by ſome to expreſs a ſweet decoction, whether given in that form, or firſt inſpiſſated into a ſort of rob by evaporation.

SIRAF, in *Geography*, a town of Perſia, in the province of Lariſtan, on the N. coaſt of the Perſian gulf, inhabited by Arabians from the oppoſite ſhores; 30 miles S.W. of Lar. N. lat. 26° 44′. E. long. 53° 50′.

SIRAGUAY, a town on the W. coaſt of the iſland of Mindanao. N. lat. 7° 15′. E. long. 112° 9′.

SIRAJEPOUR, a town of Hindooſtan, in Allahabad; 10 miles E. of Corah. N. lat. 26° 9′. E. long. 80° 58′.

SIRAITINA, a town of Ruſſia, in the country of the Coſſacks; 56 miles S. of Arkadinſkaia.

SIRAN, a town of France, in the department of the Herault; 15 miles S.W. of St. Pons.

SIRANCAPE, a river of Africa, which runs into the Indian ſea, S. lat. 13° 4′.—Alſo, a town of Africa, in the country of Mozambique, at the mouth of the river of the ſame name. S. lat. 13° 4′.

SIRANI, Giovanni Andrea, in *Biography*, a painter of the ſchool of Guido Rheni. He was born at Bologna in 1610, and was a favourite diſciple of his maſter, whoſe ſtyle he imitated with great ſucceſs. After the death of Guido, he was employed to finiſh many of his works, left incomplete in different churches, at Bologna; particularly the large picture of St. Brunone, in the Certoſini. He uſually painted upon a large ſcale, and with a free pencil, but in general his manner is too ſtrong and dark, like that of Caravaggio. He died in 1670, at the age of 60.

Sirani, Elizabetta, was the daughter of Giovanni Andrea Siraní, and born at Bologna in 1638. She learned the rudiments of the art from her father, but endeavoured to imitate the beſt ſtyle of Guido. At ſo early a period as her fifteenth year, ſhe had acquired conſiderable renown for her performances. Her firſt public work was painted when ſhe was only ſeventeen. In general ſhe wrought upon a large ſcale, and in a moſt finiſhed manner; with a rich and natural tone of colour. Her compoſitions are taſteful, and the airs of her heads graceful, and noble in character. Her portraits have greatly the air of nature, with an unaffected character of expreſſion and action.

Unhappily, whilſt in the enjoyment of the renown juſtly due to her ineſtimable talents and amiable qualities, and which had been acquired by unceaſing aſſiduity, her brilliant career was interrupted by poiſon; by whom adminiſtered is not exactly known, though it is ſuppoſed by her ſervant. This melancholy event happened in 1664, when ſhe had only attained her twenty-ſixth year; yet ſuch had been her induſtry, that ſhe had produced, according to Malvaſia, from a regiſter of her own keeping, 150 works: the moſt admired of which were painted for the churches and palaces at Bologna. They are elſewhere ſcarce.

SIRAN-LOSA, in *Geography*, a lake of Thibet, about 18 miles in circumference, which communicates with lake Tenckiri by means of a river called alſo "Siran-loſa;" 18 miles W. of lake Tenckiri.

SIRA-OULOSO, a town of Thibet; 15 miles E. of Hami.

SIRAT, Al, in the *Mahometan Theology*, the name of a bridge, which is ſituated in the midſt of hell, finer than a hair and ſharper than the edge of a ſword; over which thoſe who are admitted into paradiſe, and who take the right-hand way, and thoſe who are deſtined to hell-fire, and take the left, are ſuppoſed to paſs. On account of its form, it is conceived to be very difficult for any one to ſtand upon it; and therefore moſt of the Motazalites reject it as a fable, though the orthodox believe it on the authority of their prophet, by whom it is affirmed; and who has likewiſe declared, that in order to add to the difficulty of this paſſage, the bridge is beſet on each ſide with briars and hooked thorns, which will, however, be no impediment to the good, for they ſhall paſs with wonderful eaſe and ſwiftneſs, like lightning or the wind, Mohammed and his Moſlems leading the way; whereas the wicked, obſtructed by the ſlipppérineſs and extreme narrowneſs of the path, the entangling of the thorns, and the extinction of the light, which directed the former to paradiſe, will ſoon miſs their footing, and fall down headlong into hell, which is gaping beneath them. Koran, c. 18.

SIRATIK, in *Geography*, one of the Foulah ſtates in Africa, next in order to the principal, which lies within Sierra Leona, and of which Teambo is the capital. It borders on the ſouth of the Senegal river, and on the Jaloffs.

SIRAVAN, a town of Perſia, in the province of Chuſiſtan; 48 miles N.N.E. of Suſter.

SIRE, a title of honour in France, now given to the king only, as a mark of ſovereignty. In all placets and petitions, epiſtles, diſcourſes, &c. to the king, he is addreſſed under the title of *ſire*.

Some derive the word from the Latin *herus*, *maſter*: of which opinion ſeems Budæus, who, in ſpeaking to king Francis I., always called him *here*, q. d. *maſter*, or *ſire*; others derive it from the Greek κυριος, *lord*; of which opinion is Paſquier, who adds, that the ancient Franks gave the ſame title to God, calling him *beau ſire Dieu*: others fetch the word from the Syriac, and maintain it was firſt given to the merchants who traded in Syria: Menage will have it come from *ſenior*, *elder*; whence *ſeigneur*, then *ſeignor*, and *ſire*.

Sire was likewiſe anciently uſed in the ſame ſenſe with *ſieur* and *ſeigneur*, and applied to barons, gentlemen, and citizens.

Siré, in *Geography*, a province of Abyſſinia, about 25 miles broad, and not much more in length, reckoned as part of Tigré. It loſt the rank of a province, and was united to Tigré, on account of the miſbehaviour of its governor Kaſmeti Claudius, in an expedition againſt the Shangalla, in the reign of Yaſous the Great. It is ſeparated from Samen by the river Tacazzé, and reaches from Axum to this river.—Alſo, a town ſituated on the brink of a very ſteep, narrow valley, through which a road lies that is almoſt impaſſable. In the midſt of the valley runs a brook, bordered with palm-trees. The town of Siré is larger than that of Axum; it is in form of a half-crown fronting the plain, but its greateſt breadth is at the weſt end. All the houſes are of clay, and thatched; the roofs are in form of cones, as indeed are all in Abyſſinia. Siré is famous for a manufacture of coarſe cotton cloths, which paſs for current money through all the province of Tigré, and are valued at a drachm, the tenth part of a wakea of gold, or near the value of an imperial dollar each; their breadth is 1¼ yard. Beſides theſe, beads, needles, cohol, and incenſe, at times only, are conſidered as money. Although Siré is ſituated in one of the fineſt countries in the world, it is very ſubject to putrid fevers of the worſt kind, which ſweep away a number of people daily. N. lat. 14° 4′ 35″. E. long. 38° 0′ 15″. Bruce's Travels, vol. iii.

SIREN, σειρην, in *Antiquity*, *Mermaid*, a name given to a kind of fabulous beings, repreſented by the moderns as ſea-monſters, with women's faces and fiſhes' tails; but by the ancient poets, &c. as having the upper part human, and the lower like birds; and decked with a plumage of various colours. There are antique repreſentations of them ſtill ſubſiſting, under both theſe forms. They are ſaid to have been the daughters of Ocean and Amphitrite, and to form a beautiful part of Homer's machinery in the Odyſſey. Hyginus places their birth among the conſequences of the rape of Proſerpine. And Ovid makes them daughters of the river Achelous, and one of the Muſes.

The three ſirens are called *Parthenope*, *Lygea*, and *Leucoſia*. Homer only makes mention of two ſirens, and ſome others reckon five. Virgil places them on rocks, where veſſels are in danger of ſplitting. Pliny makes them inhabit the promontory of Minerva, near the iſland Capreæ. Others fix them in Sicily, near Cape Pelorus.

Claudian ſays, they inhabited harmonious rocks; that they were charming monſters; and that ſailors were wrecked on their rocks without regret, and even expired in raptures: *Dulce malum in pelago ſiren.*

Pauſanias tells us, that the ſirens, by the perſuaſion of Juno, challenged the Muſes to a trial of ſkill in ſinging; and theſe, having vanquiſhed them, plucked the golden feathers from the wings of the ſirens, and formed them into crowns, with which they adorned their own heads. This deſcription is, doubtleſs, founded on a literal explication of the fable, that the ſirens were women who inhabited the ſhores of Sicily; and who, by all the allurements of pleaſure, ſtopped paſſengers, and made them forget their courſe.

The name, according to Bochart, who derives it from the Phœnician language, implies a *ſongſtreſs:* and hence, it is probable, that in ancient times there might have been excellent ſingers, but of corrupt morals, on the coaſt of Sicily, who, by ſeducing voyagers, gave riſe to this fable. The Argonauts are ſaid to have been diverted from the inchantment of their ſongs, by the ſuperior ſtrains of Orpheus: Ulyſſes, however, had great difficulty in ſecuring himſelf from ſeduction. Circe prepares him for the conflict, by the picture and precepts deſcribed in the Odyſſ. lib. xii. ver. 51.

Some interpreters of the ancient fables will have the number and names of the three ſirens to have been taken from the triple pleaſure of the ſenſes, wine, love, and muſic, which are the three moſt powerful means of ſeducing men; and hence, ſo many exhortations to avoid the ſiren's fatal ſong.

Probably it was hence that the Greeks fetched their etymology of ſiren, *viz.* from σειρα, *a chain;* as if there was no getting free of their enticement.

Others, who do not look for ſo much myſtery in the fable, maintain that the ſirens were nothing but certain ſtraits in the ſea, where the waves whirling furiouſly around, ſeized and ſwallowed up veſſels that approached them too near.

Laſtly, others hold the ſirens to have been certain ſhores and promontories, where the winds, by the various reverberations and echoes, cauſe a kind of harmony that ſurpriſes and ſtops paſſengers. This, probably, might be the origin of the ſirens' ſong, and the occaſion of giving the name of ſirens to theſe rocks.

The learned Mr. Bryant ſays, that the ſirens were Cuthite and Canaanitiſh prieſts, who had founded temples in Sicily, which were rendered infamous on account of the women who officiated. They were much addicted to cruel rites, ſo that the ſhores upon which they reſided are deſcribed as covered with the bones of men, deſtroyed by their artifice. Virgil, Æneid, lib. i. v. 864.

The ancients repreſent their ſongs as ſo fatally winning, that nobody could withſtand their ſweetneſs: all were ſoothed with it; though their life was the purchaſe of the gratification. See Homer's Odyſſ. M. v. 39.

Mr. Bryant obſerves, that the ſtory of the ſirens relates to thoſe people, who with their muſic uſed to entice ſtrangers into the purlieus of their temples, and then put them to death. Nor was it muſic only with which perſons were ſeduced to follow them; the female part of their choirs were maintained for a twofold purpoſe, both on account of their voices and their beauty. They were accordingly very liberal of their favours, and by theſe means enticed ſea-faring perſons, who paid dear for their entertainment. Analyſis of Ancient Mythol. vol. ii. p. 17, &c.

SIREN, in *Ichthyology*, a name given by Artedi to the ſea-monſter often deſcribed by authors, but either not exiſting at all, or not ſo like man as their deſcription makes it. Artedi ſuppoſes it to conſtitute a peculiar genus of the plagiuri or cetaceous fiſhes. The characters he gives of it are theſe: it has no pinnated tail; the head, neck, and breaſt, down to the navel, repreſent thoſe of the human ſpecies; there are only two fins on the whole body, and thoſe ſtand on the breaſt.

Bartholine, in his Hiſtory of Curioſities, deſcribes ſuch a fiſh as this under the name of *ſyrene*, and Barchewitz under the name of *homo marinus*. See MERMAID, SEA-*Calf*, SEA-*Cow*, and SEA-*Man*.

SIREN, in *Natural Hiſtory*, a genus of the claſs and order Amphibia Reptilia, of which the generic character is, Body two-footed, tailed, naked; the feet are placed in the manner of arms, and furniſhed with claws. There is only a ſingle ſpecies mentioned by Gmelin, but Dr. Shaw notices three

Species.

LACERTINA. Body eel-ſhaped; branchiæ ramified. This ſpecies ſtands eminently diſtinguiſhed in the liſt of animals, by the ambiguity of its characters, which are ſuch as to have induced the great Linnæus to inſtitute it for a new order of Amphibia, under the title of MEANTES. The genus with which the ſiren has the neareſt affinity is the *lacerta*, or *lizard;* which ſee. It reſembles the larva, or firſt ſtate of a lacerta; and it is even ſtill doubtful whether it may not really be ſuch: yet it has never been obſerved in any other ſtate, having two feet only, without any appearance of a hind pair. The feet are alſo furniſhed with claws, whereas the larvæ of the lacertæ are obſerved to be without claws; the mouth has ſeveral rows of ſmall teeth; the body is eel-ſhaped, but ſlightly flattened beneath, marked on the ſides by ſeveral wrinkles, and ſlightly compreſſed towards the extremity of the tail, which is edged with a kind of ſoft ſkin, or adipoſe fin; on each ſide the neck are three ramified branchial proceſſes, reſembling, but on a larger ſcale, thoſe belonging to the larvæ of water-newts, and at the baſe are the openings into the gills; the eyes are very ſmall, and blue. The general colour of the animal is a deep or blackiſh-brown, ſcattered over, eſpecially on the ſides, with numerous minute whitiſh ſpecks. It is frequently found of the length of two feet, or even more. It is a native of North America, and more particularly of South Carolina, where it is not uncommon in muddy and ſwampy places, living generally under water, but ſometimes appearing on dry land. It has a kind of ſqueaking or ſinging voice; hence it was diſtinguiſhed by the name of ſiren. This curious animal was firſt diſcovered and deſcribed by Dr. Garden, who reſided many years in Carolina, and who gave the utmoſt attention to the ſcience of natural hiſtory, which he enriched by many highly intereſting obſervations, and by the diſcovery of many new facts. The doctor communicated ſpecimens of the ſiren to Linnæus, with particulars relative to its hiſtory and manners. The great Swediſh naturaliſt, in his letter to Dr. Garden on this ſubject, declares that nothing had ever exerciſed his thoughts ſo much, nor was there any thing he ſo much deſired to know, as the real nature of ſo extraordinary an animal. Mr. Hunter has given an anatomical deſcription of the ſiren in the 56th vol. of the Philoſophical Tranſactions, to which the reader is referred.

The ſiren, if thrown on the ground with any degree of violence, will ſometimes break in two or three pieces; and in this particular it reſembles the Anguis fragilis, or ſlow-worm. It may alſo be obſerved, that though in ſome reſpects it reſembles the larva of the lizard, yet no lizard, of which it may be ſuppoſed the larva, has ever yet been diſcovered in thoſe parts of Carolina where it is moſt frequent. The ſpecies to which it ſeems moſt allied is the Lacerta *teguixin* of Linnæus, which is a native of South America.

ANGUINE; Four-footed ſiren, with eel-ſhaped body, and ramified branchiæ. This has been denominated the Proteus anguinus by ſome naturaliſts, and by others the Auſtrian ſiren. This animal is found in a very ſingular ſituation, being an inhabitant of the celebrated romantic lake Zirknitz, in the duchy of Carniola, in Auſtria. From this lake the water regularly retires during the ſummer, by numerous ſubterraneous outlets at the bottom; leaving the ground dry, and fit for paſture, as well as for various kinds of hunting, and other amuſements: but in the month of October it again returns with great force, ſpringing out of the paſſages before mentioned, from a vaſt depth, till the lake is completely filled. It is ſituated in a valley, ſurrounded by rocky and woody mountains, in which are vaſt caverns, and it is principally ſupplied by eight rivulets running into it from the adjoining mountainous region. See Phil. Tranſ. vol. xvi.

This ſpecies of ſiren is extremely rare, and is found in the ſpring, and towards the decline of ſummer, in ſome particular parts of the above-mentioned lake, and meaſures from ten to twelve or thirteen inches in length, and about three quarters of an inch in diameter. It is entirely of a pale roſe-colour, or even nearly white, except the three pair of ramified branchial fins on each ſide the neck, which are of a bright red or carmine-colour. Its general ſhape is that of an eel; the body being cylindrical till towards the end of the tail, where it becomes flat, and is attenuated, both above and below, into a kind of fatty fin, ſcarcely diſtinguiſhable from the reſt of the tail; the ſkin is very ſmooth and even; the head is of a ſomewhat depreſſed form, with a lengthened, obtuſe, and widiſh ſnout, and it has no external eyes; the mouth is moderately wide, and furniſhed with a row of very minute teeth; the legs are three quarters of an inch long, and the feet of the fore-legs are furniſhed with three toes, without claws; the feet of the hind-legs have only two toes. The motions of this animal, when taken out of the water, are, in general, extremely ſlow and languid; as is alſo the caſe, when kept in a veſſel of water; but in its native lake, it is ſometimes obſerved to ſwim briſkly, waving its body in a ſerpentine direction, not unlike that of a leech. The Anguine ſiren is figured and very accurately deſcribed by Laurenti, in his work entitled "Specimen Medicum, exhibens Synopſin Reptilium." The real nature of the animal is not completely aſcertained; ſome imagining it to be the larva of ſome ſpecies of lizard, while others contend that it is a perfect animal *ſui generis.* It is evidently of a predacious nature, feeding on the ſmaller kind of aquatic animals; ſince one of them, which was kept alive in a veſſel of water, was obſerved to diſcharge from its ſtomach ſeveral ſmall ſhells of the genus Helix; and in the ſtomach of one, which was diſſected, were found the head and bones of a ſmall fiſh. Its voice is a ſtrong hiſs, much louder than might be expected from the ſize of the animal.

Dr. Schreibers, who has moſt diligently inveſtigated the nature and anatomy of this animal, ſays, "there can be no doubt that it bears a great affinity to the S. lacertina, having both gills and lungs; and therefore it leaves us in equal uncertainty as to its being a perfect animal in itſelf, or the larva of another animal. It is, however, remarkable, that notwithſtanding the moſt careful reſearches during many years, and the frequent fiſhing which takes place in the lakes and caverns of the neighbouring country, at all ſeaſons of the year, no animal has hitherto been found of which it can poſſibly be ſuppoſed the larva."

Pisciformis; Ferruginous-brown ſiren, ſpotted with black, with finely ramified branchiæ, tetradactylous fore and pentadactylous hind-feet. This animal, in the Naturaliſt's Miſcellany, is denominated Gyrinus Mexicanus, or Mexican tadpole. According to the deſcription given in that work, it is a native of Mexico, and, if only the larva of ſome large American lizard, is ſcarcely a leſs ſingular and curious animal than the ſiren. In its general appearance it bears ſome reſemblance to the larva of the Rana paradoxa, but is furniſhed with gills, opening externally in the manner of a fiſh; the openings are very large, and the external flap is continued from the ſides of the head acroſs the throat beneath, ſo as completely to inſulate the head from the breaſt; the gills themſelves conſiſt of four ſemicircular bony or cartilaginous arches, which are denticulated or ſerrated on their internal or concave part, like thoſe of fiſhes; on the opercula, or external flaps, are ſituated three very large and elegant branchial fins, or ramified parts, divided and ſubdivided into a vaſt number of ſlender or capillary proceſſes. In theſe particulars it reſembles the S. lacertina, except that in the latter animal the external opening to the gills is very ſmall; the mouth is furniſhed in front with a row of extremely minute teeth; the tongue is large, ſmooth, and rounded at the tip; the rictus, or gape, when the mouth is cloſed, appears conſiderably wider than it really is, owing to a lateral ſulcus proceeding from each corner to ſome diſtance; the feet are entirely deſtitute of webs, and they are furniſhed with rather weak claws; the front feet have four toes, and thoſe behind five. Independently of the general colour of the animal, the whole ſkin, when minutely examined, appears to be ſcattered over with very minute white ſpecks, reſembling thoſe on the ſurface of the S. lacertina. The ſides of the body are marked by ſeveral ſtrong rugæ or furrows, and an impreſſed lateral line or ſulcus is continued from the gills to the tail.

Siren is alſo a name given by Mouffet, and other authors, to a ſpecies of bee; of which they diſtinguiſh two kinds, a larger and a ſmaller. Theſe differ greatly from the common bee, in that they live ſolitary, and never unite into ſwarms, or build neſts, or make combs.

SIRET, in *Geography*, a town of the province of Bukovina; 85 miles N.W. of Jaſſi.—Alſo, a river of Moldavia, which runs into the Danube; 4 miles S. of Galacz.

SIREX, or *Tailed Waſp*, in *Entomology*, a genus of inſects of the order Hymenoptera, of which the generic character is, Mouth with a thick, horny, truncate, ſhort, denticulate mandible; four feelers, the hind ones longer, and thicker upwards; antennæ filiform, of more than twenty equal articulations; the ſting is exſerted, ſerrate and ſtiff; the abdomen is ſeſſile, terminating in a point; wings lanceolate, incumbent, the lower ones ſhorter.

The larvæ of this genus are ſix-footed, ſoft, cylindrical; the head rounded; they perforate wood, and frequently eat their way into the bowels of other inſects, and their larvæ, living upon them till they have utterly conſumed their entrails; the pupa is folliculate: the perfect inſect lives on the nectar of flowers. There are about twenty-ſix

Species.

* Gigas. The abdomen of this ſpecies is yellow at the baſe and tip; the body is black-blue. This is the largeſt ſpecies in the whole genus: it ſurpaſſes a hornet in ſize, and is principally obſerved in the neighbourhood of pines and other cone-bearing trees: it is of a black colour, with the eyes, the baſe, and lower half of the abdomen, of a bright orange-yellow; the thorax is villoſe, and the wings of a tranſparent yellowiſh-brown; the ſting, or terminal tube, is very conſpicuous. The larva, which meaſures about an inch and a quarter in length, is of a yellowiſh-white colour, and inhabits decayed firs and pines; at firſt view it bears ſome reſemblance to the larvæ of the beetle tribe, but is thinner in proportion, and furniſhed, at the tip of the abdomen, with a ſhort black ſpine or proceſs. It changes to a chryſalis in the month of July; firſt enveloping itſelf in a ſlight ſilken

web of a whitiſh colour. The chryſalis is of a lengthened ſhape, with the antennæ, legs, and terminal tube or proceſs, very diſtinctly characterized. If the change to chryſalis takes place, as it ſometimes does, in ſummer, the fly proceeds from it in the ſpace of about three weeks; but if at the cloſe of autumn, the animal continues a chryſalis the whole winter, emerging in the following ſpring. The male inſect is conſiderably ſmaller than the female, and may be farther diſtinguiſhed by the want of the caudal tube or proceſs, ſo conſpicuous in the female inſect: the tip of the abdomen is alſo of a black colour. The eggs, which are depoſited by the female in the decayed parts of the trees already mentioned, are very ſmall, and of a lengthened oval ſhape, with pointed extremities.

Psyllius. Abdomen yellow at the baſe and before the tip; the body is black. It inhabits different European countries, and is half the ſize of the laſt. The antennæ and legs are yellow, and the thighs black; the head is black, with a yellow ſpot on each ſide, behind the eyes; certain ſegments of the abdomen yellow.

Columba. This is an American ſpecies, and is diſtinguiſhed by its black body, marked by teſtaceous bands. The ſpecific character is as follows: thorax villous, ferruginous; abdomen black, the ſides are ſpotted with yellow; the antennæ are ſhort and black, ferruginous at the baſe; the abdomen beneath is black, with a yellow ſtreak; the projection is ſhort, acute, ſerrate, yellow tipped with black; the legs are yellow; hind-thighs black.

Magus. Black, thorax villous; tip of the antennæ, lateral ſpots on the abdomen, ſhanks, and baſe of the tarſi, are white. It is of the ſize of the S. gigas, and is found in many parts of Saxony. The abdomen beneath is white in the middle; the wings are duſky.

Nigricornis. Thorax villous, blueiſh-black; abdomen ferruginous, blue at the baſe. It is found in North America. The head is ſhining blue-black; the antennæ are black; the legs are piceous; thighs yellow; ſting pitchy.

Flavicornis. Thorax villous, black, immaculate; four bands on the abdomen, antennæ, and legs, yellow. It is found at Labrador, in America. The head is black; the upper part of ſome of the ſegments is yellow; the appendage ſerrate, yellow; the ſting is black.

Fuscicornis. Thorax villous, black; abdomen with eight yellow bands; the antennæ are black; the legs are yellow. This, which is of the ſize of the gigas, inhabits Saxony. The wings are ſubteſtaceous; the ſting is black, with a yellow ſheath; the horn of the abdomen is ſubulate, yellow tipt with black; the thighs are black.

* Spectrum. The abdomen of this ſpecies is black; the thorax is villous, with a yellow ſtripe before the wings. It is found in this country, and in many other parts of Europe. The antennæ are black or yellow, and the legs are yellow.

* Juvencus. The abdomen is blueiſh-black; the thorax villous, immaculate. This alſo is a native of England and other European countries. The antennæ are black or yellow; the legs are yellow.

Phantoma. Abdomen above yellow, with black belts; the head and legs are yellow. It inhabits Germany. The mouth is black; the thorax yellowiſh before, beneath black; the abdomen beneath is black.

Cyanus. This is of a ſhining blue colour; the legs are yellow. It inhabits North America. The antennæ are black; the thorax ſubvillous; the wings are hyaline.

Albicornis. Black; head with a white ſpot on each ſide; the antennæ are white in the middle. It is a native of North America. The antennæ are black at the tip; the abdomen with a white dot on each ſide on the laſt ſegment but one; the legs are black; the ſhanks and ends of the tarſi are white.

Nigrita. This is of a black-blue, immaculate; the hind-legs are compreſſed. It is a native of Saxony, and is of the ſame ſize as the S. mariſcus, hereafter to be noticed.

* Camelus. The abdomen is black, the ſides ſpotted with white; the thorax ſmooth. This is found in England and other European countries.

Emarginatus. Black; thorax emarginate before, and pale at the ſides; the fore-legs are rufous. It inhabits Germany. The antennæ are black; the head is black, with a pale ſpot on each ſide: the ſides of the thorax are ſlightly ſerrate. The four front legs are rufous; the ſhanks are tipt with black; the hind ones are black; the thighs rufous.

Dromedarius. Abdomen black, rufous in the middle, with a white dot on each ſide. The ſhanks are pale at the baſe. It is chiefly found at Kiel, and reſembles the S. camelus. The head is black, with two white lines; the thorax is black, with a white dot before the wings; ſome of the ſegments of the abdomen are black, ſome rufous, one black, with a white ſpot on each ſide, and one is altogether black.

Pacca. Abdomen black, two of the ſegments are rufous, the reſt dotted with white. This alſo is found at Kiel, and is the ſize of the S. camelus. The antennæ are black, a little thicker towards the tip; the thorax is villous and black, with two minute white ſpots on the fore margin; the horn of the abdomen yellowiſh, ſting rufous; legs compreſſed, black.

Similis. Black; firſt ſegment of the abdomen at the baſe and ſecond rufous, the reſt with five yellow ſpots. It inhabits the Cape of Good Hope. The head is black; the orbits yellow; antennæ ferruginous; the baſe and tip black; the thorax black, with a yellow dot on each ſide; the legs are rufous, the thighs black; the tail is pointed, without any projection.

Vespertilio. Black; abdomen ferruginous, the baſe is black. This is a ſmall inſect, and is found in divers parts of Germany. The antennæ are black, with a whitiſh ring; the tail is black beneath, without the appendage; the upper wings are white, with a broad brown patch before the tip, and white marginal dots; the legs are black, tip of the thighs and baſe of the ſhanks white.

Mariscus. Of this ſpecies the abdomen is teſtaceous, the two laſt ſegments are black; the thorax villous. This is found in divers parts of Europe. Antennæ yellow; head with a yellow callous dot behind the eyes; the abdomen beneath is black, ſpotted with yellow: it has no ſting.

Troglodyta. Smooth, black; abdomen with ſeven yellow dots, and two bands. It inhabits Saxony. The legs are yellow; the thighs black.

Noctilia. This is of a black-blue colour; the antennæ are black; the thorax is villous; the abdomen teſtaceous in the middle. It inhabits ſeveral parts of Germany, and is about the ſize of the S. mariſcus. Thorax blue; abdomen blue at the baſe and tip; wings yellowiſh; legs yellow; hind ones compreſſed, black, the thighs yellow.

Compressa. Black; abdomen compreſſed, ferruginous; the firſt and laſt ſegments are black. It inhabits Barbary, and is very ſmall. Legs white; thighs black; hind ones black; the ſhanks are compreſſed, black, with two yellow dots, and three bands.

* Pygmæus. Abdomen compreſſed, black, with two yellow dots and three bands. It is a native of this country, and of other parts of Europe. This is one of the ſmalleſt of the European ſpecies, being, according to Linnæus, about

the ſize of a gnat, with a black abdomen, marked by three yellow bands, the middle of which is interrupted. It is found in Sweden.

Macilentus. Black; abdomen compreſſed, yellow at the ſides. It inhabits Barbary, and reſembles the next. The head is black, with two yellow dots between the eyes; the thorax black, with a yellow dot, and a larger one beneath; the abdomen is yellow at the ſides, and projecting into two bands on the back; the wings are hyaline; the rib black beyond the middle; the legs are black; the fore-thighs are yellowiſh.

* Tabidus. Black; ſides of the abdomen dotted with yellow; fore-ſhanks teſtaceous. It inhabits England, and a ſpecimen is in ſir Joſeph Banks's muſeum.

SIRGAI-SOUSAI-PO, in *Geography*, a town of Chineſe Tartary. N. lat. 42° 15′. E. long. 117° 50′.

SIRGIAN, Serjan, or *Kerman*, the ancient *Carmana*, a city of Perſia, which at a former period rivalled the proudeſt cities of the empire; and its ſituation, in the direct road from the northern provinces of Perſia and Bucharia to Gombroon, then the great emporium of the India trade, contributed to the increaſe of its opulence and proſperity. It has, however, ſuffered much from deſtructive wars, domeſtic and foreign, and from the plunder of an exaſperated and licentious army. After having been courageouſly defended, in 1794, by Lutf Ali Khan, it was betrayed into the hands of his rival Aga Mohamed Khan, by Nujuf Kooly Khan, one of his treacherous adherents. The city was abandoned for nearly three months to the rapacity of the ſoldiers, the walls and public buildings were levelled with the ground, great numbers of the inhabitants were put to death, and 30,000 of them were exiled into the diſtant provinces of the empire: nor will it probably ever recover from the effects of this dreadful calamity. The preſent fortifications incloſe but a ſmall portion of the ancient city, which is quite deſerted, and in a moſt ruinous condition. It is ſituated on the weſtern ſide of an extenſive plain, ſo cloſe to the mountains as to be completely commanded by two of them. The walls are high, and built of mud, with 19 or 20 poſitions in each face, and a dry ditch, 20 yards wide and 10 deep. It has four gates, and the ark or citadel, where the governor reſides, is on the S. ſide of the fort. Its preſent population is not more than 20,000 ſouls, of which ſome few are Guebres; there are alſo Armenians, Jews, and Hindoos in the place. Its trade is ſtill very conſiderable; and it is celebrated for its manufacture of ſhawls, match-locks, and carpets, which are chiefly exported to Khoraſſan and the northern provinces, and returned in drugs, ſkins from Bockhares, furs, ſilk, ſteel, and copper. Theſe articles, as well as piſtachio nuts, carpets, roſe-buds for preſerves, and bullion, are ſent to India, whence are imported, tin, lead, iron, chintz, wrought ſilk, ſpices, indigo, maſtic, gold brocade, china and glaſs-ware, broad-cloth, hard-ware, &c. The bazar is well ſupplied with articles of every deſcription, and in one part neatly arched with a fine blue ſtone, procured in the adjoining mountains. There are nine caravanſeras within the walls, and many inferior ones both within and without. N. lat. 29° 30′. E. long. 56° 50′.

SIRGOULIN, a town of Chineſe Tartary. N. lat. 41° 53′. E. long. 119° 14′.

SIRGUNE, a river of Pruſſia, which runs into the Friſch Haff, below Elbing.

SIRHIND, a circar of Hindooſtan, between the ſoubah of Delhi and Lahore, bounded on the N. by Thibet, on the E. by the Jumnah, which ſeparates it from Schaurunpour, on the S. by the circar of Nardeck, and on the W. by Moultan and the province of Jallindar.—Alſo, a town of Hindooſtan, and capital of the above-mentioned circar, N. of Delhi, ſuppoſed by ſome to be built on the ſpot where the battle was fought between Alexander and Porus. Juſtinian is ſaid to have had ſilk from hence: it is an ancient city, but, like moſt of the Indian cities, has greatly declined: between it and Delhi are extenſive plains, within which are ſituated the towns of Panniput and Carnawl, famous for great battles, both in ancient and modern times; 140 miles S.E. of Lahore. N. lat. 30° 41′ 30″. E. long. 76° 6′.

SIRHUD, literally meaning a boundary, and metaphorically applied to a cold region, a diſtrict of Perſia, comprehending moſt of the mountainous part of the province of Fars, extending from the latitude of Kazaroon to that of the town of Yezdekhaſt, ſituated on the bed of what appears to have been formerly a river, which ſeparates this province from Irak. The plains which here interſect the mountains ſeldom exceed eight or ten miles in breadth, but vary in length from 15 to 100. They are in general fertile, and afford abundance of paſturage; neither are they ſo deficient in water as ſome have ſuppoſed. It is the want of population and of encouragement to induſtry that retards their improvement.

SIRI, among the Romans, were ſubterranean caves or vaults, in which wheat could be kept ſound and freſh for fifty years.

Siri, Vittorio, in *Biography*, a writer in politics and hiſtory, was born at Parma about the year 1607: he was educated for the ſtudy of theology, and took the habit of the Benedictine order, in the monaſtery of St. John, and there began to publiſh a work entitled "Mercurio Politico," by which he acquired ſome temporary celebrity. Fifteen volumes of this work appeared ſucceſſively, containing an account of the public events from 1635 to 1655. After this he added to it "Memoriæ Reconditæ," in eight vols. which going back to 1601 come to 1640. The author not only records facts, but endeavours to inveſtigate cauſes in the ſecret negociations of cabinets, and to give the documents confirming his narrative. Of theſe pieces, a great number is to be found in his publications, communicated by popes' nuncios and the ambaſſadors of different crowned heads, and eſpecially by the miniſters of Louis XIV. Through the influence of cardinal Mazarin, he was invited by that monarch to Paris, and preſented to a ſecular abbey, on which occaſion he quitted his religious habit for that of an eccleſiaſtic. He aſſumed to himſelf the title of counſellor, almoner, and hiſtoriographer to his moſt Chriſtian majeſty, and he ſpent all the latter years of his life at Paris, where he died in the year 1685, at the age of 78. He is characterized by biographers as a man without any fixed principles, who had a venal pen, which was always ready to juſtify and defend any cauſe, provided he was liberally paid for his ſervices; yet the opportunities he poſſeſſed of gaining information from authentic ſources, and the number of original documents publiſhed by him, have given a marked value to his works as materials for the hiſtory of his time. The circumſtances of his being a foreigner, and writing in Italian voluminous publications little read in France, are ſaid by Le Clerc to have induced him to ſpeak more freely of Louis XIII., his brother and miniſters, than the French writers have done. The firſt four volumes of his "Memoriæ Reconditæ" are extremely rare. A tranſlation into the French language, of the moſt important parts of all his works, has been publiſhed in ſeveral volumes by M. Requier. Siri is ſaid alſo to have written under a feigned name ſome pieces reſpecting the war of Montſerrat.

Siri, in *Geography*, a mountain of Thibet; 36 miles N.E. of Taringaſong.

Siri, or *Dſiri*, a town of Thibet; 45 miles E. of Taringaſong.

SIRIA, or Sirja, a town of Syria, in the pachalic of Aleppo; 70 miles S.E. of Aleppo.

SIRIAGULLY, a town of Mocaumpour; 20 miles S.S.W. of Mocaumpour.

SIRIAN, a ſea-port town of Pegu, on the river Appoo, and whilſt it remained in poſſeſſion of the Portugueſe, a place of great trade. Before their time it had a king of its own: it is now frequented by French, Engliſh, and Dutch; 72 miles S. of Pegu. N. lat. 16° 54′. E. long. 96° 50′.

SIRIASIS, in *Medicine*, from σιϱος, *a cavity*, a diſeaſe of children, ſo named by the older writers, in conſequence of an accompanying depreſſion of the fontanelle, but which in fact appears to have been an inflammation of the brain and its membranes; and accordingly Dr. Cullen ranks it as ſynonimous with *phrenitis*. It is very indiſtinctly deſcribed, and in ſome reſpects reſembles hydrocephalus. Aëtius, indeed, expreſsly aſſerts that it is an inflammation of the brain and its membranes; but the only ſymptoms which he enumerates, are hollowneſs of the ſinciput and of the eyes, ardent fever, paleneſs, dry ſkin, and total loſs of appetite. See Aëtius, Tetrab. i. Serm. iv. cap. 13. Foreſt. Obſ. Med. lib. xxviii. cap. 82. Sennert. Pract. lib. i. part i. cap. 20.

SIRIBOA, in *Botany*, Rumph. Amboin. v. 5. 340. t. 117. *Piper Siriboa*, Linn. Sp. Pl. 51, is a kind of long pepper, reckoned one of the kinds of Betle, and uſed for chewing with the *Areca*, or Betle nut, on account of its gratefully aromatic, and not too pungent, flavour. See Piper.

SIRICA, in *Geography*, a town of Tripoli; 120 miles S. of Meſurada.

SIRICIUS, *Pope*, in *Biography*, was a native of Rome, and ſucceeded to the pontifical throne in 384. There are extant ſeveral letters of this pope, which are accounted his firſt decretals. In his firſt epiſtle, in anſwer to ſome queſtions propoſed by Himerius, biſhop of Tarragona, are many curious particulars of the eccleſiaſtical diſcipline obſerved at that period. He was a warm oppoſer of the Priſcillianiſts and Jovinians, and in one of his letters relative to the latter, an example appears of the ancient manner in which the apoſtolic ſee paſſed its judgments: Siricius acquainted the church of Milan that he had condemned Jovinian and his followers, with the conſent and advice of the prieſts, deacons, and all the clergy. In another of his letters, a cogent teſtimony is given of the reverence paid by the ancient popes to the deciſion of councils: it is addreſſed to ſome biſhops reſpecting the hereſy of one Bonoſus, who was accuſed of aſſerting that the Virgin Mary had children after the birth of Chriſt. The pontiff replies, that the ſynod of Capua having ordained that the prelates in the vicinity of Bonoſus ſhould take cognizance of his cauſe, it did not belong to him to enter into the diſpute. Siricius had the ſatisfaction of ſeeing ended the long continued ſchiſm of Antioch, the biſhop of which, Flavianus, had occupied the ſee for a number of years, without being acknowledged by the Egyptian biſhops. Through the mediation of John Chryſoſtom, a reconciliation was effected, and Flavianus was acknowledged by the pope, who died ſoon after in 398, leaving behind him a very reſpectable character.

SIRICON Plumbi, a name given by ſome chemical writers to calcined lead, or the grey powder made of lead by a ſlight calcination in an open fire.

SIRINAGUR, Srinagor, or *Caſhmere*, in *Geography*. See Cashmere.

Sirinagur, or *Srinagur*, a town of Thibet, capital of a diſtrict in Alucknundra, or Alacananda, a branch of the Ganges, which has its ſource in the ſnowy mountains of Thibet, the poſition of which, according to Capt. John Guthrie, who viſited it in 1789, is 85 miles from Coadwar Gaut, through the hills, and 60 coſſes from Hurdwar, up the Ganges to the E.N.E., aſcertained by a compaſs and perambulator. Mr. Daniel, who viſited it in the ſame year, gives the ſame idea of its geographical poſition. It is ſituated in an exceeding deep and very narrow valley, formed by mount Sewalick, the northern boundary of Hindooſtan on one ſide, and the vaſt ridge of ſnowy mountains of Himmaleh, or Imaus, on the other. Mr. Daniel was much ſtruck with the magnificence of the ſcenery of this valley, in which the thermometer roſe, in the ſhade, to 100°, though in croſſing the mountain of Sewalick, it ſtood at 58½°. We ſhall here ſubjoin ſome further particulars on this ſubject, with which we are furniſhed by a narrative of a ſurvey for the purpoſe of diſcovering the ſources of the Ganges, by Capt. Raper, communicated to the ſociety at Calcutta. This ſurvey was ordered by the ſupreme government of Bengal in 1807, and at the recommendation of Lieut. Col. Colebrooke, executed by Lieut. Webb, accompanied by Capt. Raper and Capt. Hearſay. The party commenced their tour at Hurdwar, an inconſiderable town of one ſtreet, in N. lat. 29° 57′ 9″. E. long. 78° 8′ 30″, April 1ſt, 1808. On the 13th of May they arrived at Srinagur, in N. lat. 30° 10′ 52″. E. long. 78° 43′. The town is ſituated on the S. bank of the Alacananda, in the centre of a valley, which is about four miles in length, running nearly in the direction of E.N.E. to W.S.W., and about two miles in its greateſt breadth. It extends along the banks of the river, and forms, in ſhape, a ſmall ſegment of a circle, of which the ſtream conſtitutes the chord. The principal ſtreet runs through the city, about four furlongs in length, and contains the grand bazar. The houſes are in general two ſtories high, conſtructed of large ſtones, with a ſhelving ſlated roof of ſhingles. The lower apartments are allotted for ſhops and merchandize, the upper for the accommodation of the families. The rigid uniformity of the buildings, both in ſtructure and materials, ſhews what little advancement has been made in architecture, at the ſame time that it detracts from the beauty of the place. A narrow projecting verandah, or balcony, forms the only apparent difference in the houſes of the higher claſs of inhabitants; and ſuch a ſyſtem of equality prevails, that one might ſuppoſe it the effect of deſign, or of a cautious fear to manifeſt an increaſe of wealth, by an oſtentatious diſplay in their outward appearance. Even thoſe of the two chiefs by no means convey the idea of manſions appropriated to the reſidence of men to whom was committed the government of a province. When this capital was viſited by Col. Hardwicke, in the year 1796, it was under the government of a raja, to whom it had hereditarily deſcended through many generations, and might then be ſuppoſed to be in its moſt flouriſhing ſtate; yet its appearance did not indicate opulence or ſplendour; but ſince that period, many natural and fortuitous cauſes have combined to reduce it to a lower ſtate of poverty and inſignificance. The encroachments annually made by the Alacananda, on the houſes contiguous to the river, the earthquake of 1803, which ſhook every building from its foundation, and the Gurc'hali invaſion at the cloſe of the ſame year, devolved ſuch an accumulation of evils on this devoted capital, that one might have inclined to conclude that it would not ſurvive its native princes,

princes. Every houſe and every ſtreet, not excepting the palace of the raja, exhibited marks of dilapidation. Many of the inhabitants expreſſed their ſorrow and regret on account of the events that had occurred, and ſpoke of their former ſovereign with great tokens of feeling. Under its Gurc'hali rulers the city is not likely to recover from this forlorn condition; for all claſſes of people complain much of the peculation of the chiefs, and of the injuſtice, with the want of method, that attends all their proceedings. The inhabitants are compoſed chiefly of the deſcendants of emigrants from the Dooab, Rohilcund, and Audh. The Hindoos form the greateſt proportion: the number of Muſſulman families not exceeding ſixty or ſeventy. Moſt of theſe are petty ſhopkeepers, who, to gain a ſcanty ſubſiſtence, are forced to enter into various ſpeculations; and a piece of ſilk or a ſer of onions may be procured at the ſame ſhop. The principal perſons are the agents of great banking houſes at Najibabad and in the Dooab, who are employed in the ſale and exchange of merchandize and coins. They reſide here only eight months in the year; quitting the hills, and returning to their houſes, at the commencement of the rainy ſeaſon. The traffic in ſilver and ſpecie forms one of the moſt profitable branches of commerce, and is carried on to a conſiderable amount. Bullion and coins are imported, for the purpoſe of being converted into temaſhas, the currency of the hills; and as a conſtant coinage of them is kept up at the mint, the ſupplies are furniſhed by the Serrafs, who receive a premium, agreeable to the quality of the ſilver, amounting to one and a half, or two *per cent.* on the Farrakabad or Bareli rupee. The temaſha is a ſmall uneven ſilver coin, four of which paſs for the nominal rupee of the hills; and five for the Farrakabad or Bareli. Spaniſh dollars alſo find their way hither, and are converted into the ſame currency. The inferior coin is a ſmall piece, ten tacas of which are equal to one temaſha.

The other articles of ſpeculation conſiſt in the produce of the hills, and imports from Bootan. The former are *bhang* (hemp); a coarſe cloth, or ſort of canvas, manufactured from it, called *bhangela;* lead, copper, drugs, gums, wool, and a ſpecies of flannel made from it called *panc'hi;* from Bootan are received chaurs or cow-tails, muſk in pods, ſaffron, borax, ſalt, drugs of different kinds, and a few ſhawls, which come by that route from Caſhmere. Among the drugs is one called nirbiſi, or zedoary. Hawks are alſo brought down from the hills. In exchange for the above, the following articles are ſupplied from the low countries. Coarſe cotton and woollen cloths, ſilk, ſpices, Lahore ſalt, ſugar and tobacco. On all theſe goods a greater or leſs duty is levied at Sirinagur, amounting, on an average, to one ana in the rupee, or about eight and a third *per cent.*; and additional duties are collected at different poſts, in their tranſit through the country.

The territories which formerly belonged to the raja of Sirinagur, are now divided into 84 perganahs, included in three pat'his, or diviſions, over each of which is appointed a military governor, who has the ſame juriſdiction in his own diſtrict.

In the year 1803 an army of 8000 or 10,000 men was ſent from Napal, to execute a project which had been long formed at the court of Napal, *viz.* that of invading the territories of the raja of Sirinagur, and extending their poſſeſſions to Caſhmere. The troops of the raja amounted to 15,000 or 20,000 men, principally mercenaries, who endeavoured to ſhun an engagement: the death of their chief ſecured the conqueſt of the whole country to the Gurc'halis.

On taking a view of Sirinagur from a height, it has the appearance of a double valley; one ſituated on a level with the river, the other on its banks, elevated about forty or fifty feet, and extending along the baſe of the mountain. The lower one, in which the city ſtands, has apparently been formed by the receding of the Alacananda from the ſouth ſhore; and although the period be too remote to aſcertain the fact, the appearance of the ridge or bank, marking the concavity, would incline one to ſuppoſe that ſuch has been the caſe; and that, in its preſent progreſſive inclination, it is gradually returning to its former channel. From the bottom of the upper valley, to the city, is a ſpace of three or four furlongs, laid out in ſmall fields and incloſures, with a few mango trees, thinly ſcattered among them. Oppoſite to the city, the Alacananda divides into two or three ſtreams, which reunite about one mile below. On one of the ſmall iſlands are the ruins of buildings, which were formerly connected with the city. The aſpect of the ſurrounding mountains is very barren; here and there a ſolitary tree may be ſeen; but the general features betray a rocky and unfriendly ſoil, and the little vegetation that is produced on them is ſoon parched up and dried. On the oppoſite ſide of the river, ſeveral hamlets are ſeen, ſituated along the foot of the hills, with which a communication is open, by a jhula to the W. and a ferry boat to the E. of the city. One of the largeſt of theſe villages is called Rani Hat't, containing a temple ſacred to raja Iſwara, at whoſe ſhrine ſome rites are performed, in imitation of the myſteries obſerved in the temple of the Cyprian goddeſs. It is inhabited chiefly by dancing women; and the ceremony of initiation to this ſociety conſiſts in anointing the head with oil, taken from the lamp placed before the altar; by which act they make a formal abjuration of their parents and kindred, devoting their future lives to proſtitution. A ſhort diſtance beyond it is a Mat'h or fane of Raſſea Devi, the god of love; whoſe ſhafts, if we may believe the reports and complaints of his numerous votaries, are tainted with a fatal and pernicious poiſon: indeed, his wounds appear to be ſo generally diffuſed, that four-fifths of the inhabitants are ſuppoſed to labour under the effects of them, and the calamity is heightened by their ignorance of proper remedies to check their progreſs. Aſiatic Reſearches, vol. xi.

Sirinagur, a town of Bengal; 20 miles N.N.E. of Calcutta. N. lat. 23° 7′. E. long. 88° 48′.

SIRIS, Siro, or *Sinno*, in *Ancient Geography*, a river of Italy, near the Acinis, in Lucania. See Sinno.

Siris, a very ancient town of Italy, in Lucania, ſaid by Strabo to have been founded by Trojans, and eminent for its college of prieſts ſkilled in cabaliſtic lore. It was ſituated at the mouth of a river of the ſame name, now called *Sinno* (which ſee), and became a dependance of Heraclea, to which the principal inhabitants of Siris were obliged to remove. When the Ionians took poſſeſſion of this city, they changed its name into that of Policram. In proceſs of time, the Tarentines drove the inhabitants from Siris, and having ſent a colony into this country, they built Heraclea at a ſmall diſtance from Siris. Strabo diſtinguiſhes theſe two towns; but Pliny (l. iii. c. 10.) ſays that they were the ſame under different names. The adjacent country was called Siritis, or Sirentis.—Alſo, a town of Pæonia, in Thrace.

SIRISHEK, in *Geography*, a town of Perſia, in Khoraſſan; 30 miles S.S.W. of Herat.

SIRIUM, in *Botany*. See Santalum.

SIRIUS, σειριος, in *Aſtronomy*, the *Dog-ſtar*, a very bright ſtar of the firſt magnitude, in the mouth of the conſtellation Canis Major, or the Great Dog.

This, indeed, is the brighteſt of all the ſtars in our firmament, and, therefore, probably, ſays Dr. Maſkelyne, the late aſtronomer royal, in a paper recommending the diſcovery of its parallax, Phil. Tranſ. vol. li. p. 889, the neareſt to us of them all. Some, however, ſuppoſe Arcturus to be the neareſt.

The Arabs call it *Aſchere, Elſchecre, Scera;* the Greeks, *Sirius;* and the Latins, *Canicula,* or *Canis candens.* See Canicula.

Sirius, in *Geography*, an iſland in the South Pacific ocean, diſcovered and ſo called by lieutenant Ball, in 1790; it is about 18 miles in circumference. S. lat. 10° 52′. E. long. 162° 30′.

SIRMAN, Mad., in *Biography*, a celebrated performer on the violin, who had her muſical education in a conſervatorio at Venice. Her maiden name was Maddalena Lombardini. She was a favourite élève of Tartini, and it was for her that he drew up his little tract on the uſe of the bow on the violin, in the form of a letter, "Arte dell' Arco."

After quitting the conſervatorio, ſhe married a German of the name of Sirman, and came to England in 1773; when her performance of Tartini's compoſitions on the violin was juſtly and univerſally admired. But in the operas of "Sofoniſba" by Vento, and the "Cid" by Sacchini, ſhe unadviſedly undertook the ſecond woman's part on the ſtage, as a ſinger; but having been firſt woman ſo long upon the violin, ſhe degraded herſelf by aſſuming a character, in which, though not deficient in voice or taſte, ſhe had no claim to ſuperiority.

SIRMARKS, in *Ship-Building*, the different ſtations marked on the moulds where the reſpective bevellings are to be applied, as the lower ſirmark, floor-ſirmark, &c.

SIRMIONE, in *Geography*, a peninſula of Italy, about ſeven miles from the Lago di Garda, anciently celebrated under the name of Benanus, and always eſteemed one of the grand ornaments of Italy. From *Peſchiera* (which ſee), Sirmione appears as an iſland; ſo low and ſo narrow is the bank that unites it to the main land. Its entrance is defended, and indeed totally covered, by an old caſtle, with its battlements and high antique tower in the centre, in the form of a Gothic fortification. The promontory ſpreads behind the town, and riſes into a hill, entirely covered with olives; which hill may be ſaid to have two ſummits, as there is a gentle deſcent between them. On the neareſt is a church and hermitage, now uninhabited and neglected. On the fartheſt, in the midſt of an olive grove, ſtand the walls of an old building, ſaid to be a Roman bath; and near it is a vault, called the grotto of Catullus. The extremity of this promontory is covered with arched ways, towers, and ſubterranean paſſages, ſuppoſed by the inhabitants to be Roman, but bearing, in fact, a ſtrong reſemblance to Gothic ruins. At all events, Catullus undoubtedly inhabited this ſpot, and preferred it, at a certain period, to every other region. He has expreſſed his attachment to it in ſome beautiful lines.

> "Peninſularum Sirmio, inſularumque
> Ocelle, quaſcunque in liquentibus ſtagnis
> Marique vaſto fert uterque Neptunus:
> Quam te libenter, quamque lætus inviſo."
>
> Catull. 32.

He could not, in fact, have choſen a more delightful retreat. In the centre of a magnificent lake, ſurrounded with ſcenery of the greateſt variety and majeſty, apparently ſecluded from the world, yet beholding from his garden the villas of his Veroneſe friends, he might have enjoyed alternately the pleaſures of retirement and ſociety; and daily, without the ſacrifice of all his connexions, which Horace ſeemed inclined to make, in a moment of deſpondency, beheld the grandeur and agitation of the ocean, without its terrors and immenſity. Beſides, the ſoil is fertile, and its ſurface varied; ſometimes ſhelving in a gentle declivity, at other times breaking in craggy magnificence, and thus furniſhing every requiſite for delightful walks and luxurious baths; while the views vary at every ſtep, preſenting rich coaſts or barren mountains, ſometimes confined to the cultivated ſcenes of the neighbouring ſhore, and at other times bewildered and loſt in the windings of the lake, and the receſſes of the Alps. In ſhort, more convenience and more beauty are ſeldom united; and ſuch a peninſula is, as Catullus enthuſiaſtically obſerves, ſcarcely to be matched in all the wide range of the world of waters.

SIRMIUM, or Sirmich, a town of Sclavonia, where the emperor Probus was born and killed. It is now in ruins, though the ſee of a biſhop, founded, it is ſaid, in the reign of Trajan. In the year 270, the emperor Claudius died here of the plague; 40 miles N.W. of Belgrade.

SIRMOND, James, in *Biography*, a theologian of conſiderable note, born at Riom in 1559, was the ſon of a magiſtrate in that city. He was educated at a college of the Jeſuits, which ſociety he entered in 1576. Being ſent to Paris, he taught in a college there, and at the ſame time purſued his ſtudies with ſo much ſucceſs, that he acquired a perfect knowledge of the learned languages, and formed a ſtyle in the latter, which, it is ſaid, has rarely been excelled, either with reſpect to its ſtrength or purity. He obtained ſo high a character for erudition, that he was ſummoned to Rome, in 1590, by Aquaviva, general of the order, to take upon him the office of his ſecretary. This office he held 16 years with high honour, and, in the mean time, he made uſe of all the advantages of the ſituation for the ſtudy of antiquities. He cultivated the acquaintance of all the great men of that period, among whom were Bellarmine, Barberini, and Baronio. To the latter he rendered important ſervices in the compoſition of his Annals, eſpecially by furniſhing him with memorials relating to the Grecian hiſtory, tranſlated into the Latin language. He returned to Paris in 1608, and reſided four years in the houſe of the Jeſuits, during which he edited ſeveral works of antiquity. He alſo entered into the controverſy occaſioned by Richer's famous treatiſe concerning the eccleſiaſtical and civil powers, in which he appeared as a partizan of the court of Rome. In 1612 he was employed in the labour of making a collection of the French councils; but this work did not cauſe him to intermit his publication of ancient writings; and a year ſeldom paſſed without ſending one of them to the preſs, with learned commentaries. He was choſen rector of the Jeſuits' college in Paris, in the year 1617, continuing to occupy himſelf as an editor and writer of original works. Pope Urban VIII. invited Sirmond to Rome, but Lewis XIII. would not conſent to loſe ſo eminent a ſcholar from his capital; and in 1637 he choſe father Sirmond as his confeſſor. In this ſituation he conducted himſelf ſo as to merit the eſteem of the king and his court. He rarely aſked any favours for his relations; but he conferred an important benefit on his native place, by obtaining the revocation of an edict, which had tranſferred the board of finances of Auvergne from Riom to Clermont. When he quitted the court, he continued his literary occupations, which he purſued to a very advanced age. Huet, who, when a very young man, was introduced to Sirmond, then 90 years of age, found him inactive in body, but alert and vigorous with regard to his underſtanding and mental powers. He has deſcribed him as poſſeſſed of uncommon courteſy and elegance of manners, like one who had been long converſant with important public buſineſs.

neſs. He died in 1651, at the age of 92. He was editor chiefly of the authors of the middle ages, the MSS. of which he diſcovered among the libraries at Rome, and other places. Thoſe of his own compoſition were, in a great part, controverſial. One, entitled "Cenſura de ſuburbicariis Regionibus," which related to the ſuburbicarian churches under the juriſdiction of the Roman pontiff, impugned the opinions of Godefroy and Saumaiſe. He had a diſpute with Peter Aurelius reſpecting the ſecond canon of the council of Orange, which was conducted on both ſides with much acrimony. He was attacked with great bitterneſs, on account of a diſſertation which he wrote, to prove that St. Denis the Areopagite was a different perſon from St. Denis of France; but all fair judges of the ſubject admitted the validity of his arguments. He was leſs ſucceſsful in a controverſy reſpecting predeſtination, by which he became involved in hoſtility with the Janſeniſts. He never brought out, at firſt, all he knew on the ſubject, but made a reſerve of ſome arguments for replication. His works were publiſhed collectively at Paris, in five volumes folio, 1696.

SIRNAME. See Surname.

SIROCC, or Sirocco, a ſouth-eaſt wind of Sicily, particularly at Palermo, attended with an uncommon degree of heat, and ſingularly relaxing and oppreſſive in its effects. The blaſt of it is repreſented as reſembling burning ſteam from the mouth of an oven: the whole atmoſphere, during its continuance, ſeems to be in a flame. Its effect is deſcribed by Brydone like that of one of the ſubterranean ſweating ſtoves at Naples; but it was much hotter. In a few minutes, thoſe who are expoſed to it find every fibre relaxed in a moſt inconceivable manner, and the pores opened to ſuch a degree, that they expect immediately to be thrown into a moſt profuſe ſweat. At this time the thermometer, which ſtood in a room only at 73, roſe immediately in the open air to 110, and ſoon after to 112. The air was thick and heavy, but the barometer was little affected, having fallen only about a line. The ſun did not appear during the whole day; otherwiſe the heat, ſays Mr. Brydone, muſt have been inſupportable; and on that ſide that was expoſed to the wind, it could not be borne without difficulty for a few minutes. Upon expoſing pomatum to it, the heat of the wind melted it as if it had been laid before the fire. This wind is more or leſs violent, and of longer or ſhorter duration at different times: however, it ſeldom laſts more than 36 or 40 hours, ſo that the walls of the houſes are not warmed throughout, or elſe it is apprehended that it would be inſupportable. Whilſt it laſts, the people of the country confine themſelves within; their windows and doors are ſhut cloſe, to prevent the external air from entering; and where window-ſhutters are wanting, they hang up wet blankets on the inſide of the window. The ſervants are conſtantly employed in ſprinkling water through all the apartments, in order to preſerve the air in as temperate a ſtate as poſſible; and for this purpoſe, each houſe in the city of Palermo is provided with a fountain. By theſe means the people of faſhion ſuffer very little from this wind, except the ſtrict confinement to which it obliges them. Notwithſtanding the ſcorching heat of the ſirocc, it has never been known to produce any epidemical diſorders, or to do any injury to the health of the people. They feel, indeed, very weak and relaxed after it; but a few hours of the Tramontane, or north wind, which generally ſucceeds it, ſoon braces them up again, and reſtores them to their former ſtate. However, in Naples, and ſome other parts of Italy, where its violence is not to be compared with that of Palermo, it is often attended with putrid diſorders, and ſeldom fails to produce almoſt a general dejection of ſpirits. But there the ſirocc laſts for many days, and even for weeks; ſo that, as its effects are different, it probably proceeds from a different cauſe. Some have ſuppoſed that this is the ſame wind with that which is ſo dreadful in the ſandy deſarts of Africa, where it ſometimes proves mortal in the ſpace of half an hour; but that in its paſſage over the ſea, it is cooled and deprived of its tremendous influence, before it reaches Sicily. If this were true, we might expect to find it moſt violent on that ſide of the iſland that lies neareſt to Africa, which is not the caſe; though it is poſſible, that its heat may be again increaſed by its paſſage acroſs the iſland to Palermo, near the moſt northern part: and beſides, this city is almoſt ſurrounded by very high mountains, the ravines and vallies betwixt which are entirely parched up and burning hot at this ſummer ſeaſon of the year. Theſe likewiſe contain ſprings of warm water, the ſteams of which may increaſe the heat, and at the ſame time ſoften the air, ſo as to diſarm it of its noxious qualities. It is a practice too, at this ſeaſon, to burn heath and bruſh-wood on the mountains, which muſt ſtill add to the heat of the air.

SIROD, in *Geography*, a town of France, in the department of the Jura; 3 miles S.S.W. of Nozeroy.

SIRO-DEVA, a name of the Hindoo deity *Siva*; which ſee.

SIRONG, in *Geography*. See Seronge.

SIROTE, a town of Bootan; 60 miles S.E. of Taſſaſudon. N. lat. 27° 18′. E. long. 90° 25′.

SIROWY, a circar of Hindooſtan, in Agimere, lying on each ſide of the river Puddar, bounded N. by Joodpour, E. by Mewat, S. by Oudipour, and W. by ſandy deſerts. The chief towns are Sirowy and Jalour.

SIRPY, a town of Hindooſtan, in the Myſore; 30 miles S.E. of Chittledroog.

SIRR. See Sir.

SIRSA, a town of Bengal; 30 miles S.E. of Ghidore.

SIRVENT, or Vasir, a town of Charaſm; 60 miles S.E. of Urghenz.

SIRUN, a town of Perſia, in the province of Segeſtan, or Seiſtan; 40 miles E. of Zareng.

SIRUPA, a town of New Mexico, in the province of Hiaqui; 80 miles N.E. of Riochico.

SIRZESZYN, a town of Lithuania, on the Dnieper; 50 miles N.E. of Mozyr.

SIS, a town of Aſiatic Turkey, in the government of Sivas; 24 miles S. of Tocat.—Alſo, a town of Aſiatic Turkey, in Caramania; 150 miles E.S.E. of Cogni.

SISAL. See Sical.

SISALO, in *Ancient Geography*, a town of Spain, upon the route from Emerita to Saragoſſa, in paſſing by Luſitania, between Mirobriga and Corcuvium, according to the Itinerary of Antonine.

SISAN, a town of Aſia, in the confines of Cilicia.

SISAPO, *Almaden*, a town of Spain, in Bœtica, towards the eaſt. Suppoſing it to be the ſame with Almaden, it yielded, in the time of the Romans, a mine of quickſilver, in high eſtimation, the produce and revenues of which were of great importance to the republic.

SISAPONE, the ſame with the former, a town of Spain, in the Tarragonenſis, towards the confines of Bœtica, which belonged to the Oreſoni, according to Ptolemy.

SISAR, a river of Africa, in Mauritania Tingitana, between the towns of Chobar and that of Jerſeth, according to Ptolemy.

SISARA Palus, the lake of Siſara, a lake of Africa, being the ſouthern part of the lake Hipponibis, mentioned by Ptolemy.

SISARACA, a town of Spain, in the Tarragonenſis, belonging to the Murbogi. Ptolemy.

SISARIS, *Manſourah*, a river in the eaſtern part of Mauritania Cæſarienſis. Its mouth was five leagues N.E. of that of the river Naſava.

SISARMES, in *Ancient Armour*. See GISARMES.

SISARUM, in *Botany*, the Skirret, an eatable root, now out of uſe with us, though cultivated in the days of Gerarde and Parkinſon. Its flavour is ſaid to be aromatic, with a ſweetneſs not acceptable to every body, and of a flatulent, or indigeſtible, quality. See SIUM.

SISAURANUM, in *Ancient Geography*, a famous town of Perſia, at the diſtance of two journies from Dara and three miles from Rabdian, according to Procopius. This town was taken and razed by the emperor Juſtinian.

SISCAR, in *Geography*, a town of Spain, in Arragon; 19 miles E.N.E. of Balbaſtro.

SISCO, a town of the iſland of Corſica; 6 miles N. of Baſtia.

SISECKE, a river of Germany, in the county of Mark, which runs into the Lippe, a little below Lunen.

SISIBOU, or SISSIBOU, a town of Nova Scotia, on the W. coaſt; 25 miles S.S.E. of Annapolis.

SISINILLA, a town of the iſland of Cuba; 12 miles E.N.E. of Trinidad.

SISKIN, in *Ornithology*. See SPINUS.

SISNOVIA, in *Geography*, a town of Iſtria; 3 miles S.E. of Pedena.

SISOGUICHI, a town of Mexico, in the province of Biſcay; 140 miles W. of Parral.

SISOLSK, UST, a town of Ruſſia, at the confluence of the rivers Vim and Vitchegda, in the province of Uſtiug; 120 miles N.E. of Uſtiug. N. lat. 61° 55′. E. long. 49° 40′.

SISON, in *Botany*, a name adopted from Dioſcorides, whoſe σισων, as he tells us, "is a little ſeed, produced in Syria, reſembling parſley, oblong, black, and of a hot taſte. Many of theſe ſeeds grow together at the tops of the ſtalks." There can be little doubt that this deſcription applies to one of the umbelliferous order, but to what preciſe ſpecies or genus, can ſcarcely be gueſſed; nor did Dr. Sibthorp, when he examined the famous manuſcript of Dioſcorides at Vienna, find any thing to guide him reſpecting this point.—Linn. Gen. 139. Schreb. 188. Willd. Sp. Pl. v. 1. 1436. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 315. Prodr. Fl. Græc. Sibth. v. 1. 195. Ait. Hort. Kew. v. 2. 145. Purſh 194. Juſſ. 221.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Umbellatæ*, Linn. *Umbelliferæ*, Juſſ.

Gen. Ch. *General Umbel* of fewer than ſix unequal rays; *partial* of fewer than ten unequal rays. *General Involucrum* of about four unequal leaves; *partial* ſimilar to it. *Perianth* ſcarcely diſcernible. *Cor. Univerſal* uniform; all the flowers fertile; *partial* equal, of five lanceolate, inflexed, flattiſh petals. *Stam.* Filaments five, capillary, the length of the corolla; anthers ſimple. *Piſt.* Germen inferior, nearly ovate; ſtyles two, reflexed; ſtigmas obtuſe. *Peric.* Fruit ovate, ſtriated, ſeparating into two parts. *Seeds* two, ovate, convex and ſtriated on one ſide, flat on the other.

Eſſ. Ch. Flowers uniform, all fertile. General and partial involucrum each of few leaves. Fruit ovate, ſtriated. Petals lanceolate, inflexed.

1. S. *Amomum*. Hedge Honewort, or Baſtard Stone-parſley. Linn. Sp. Pl. 362. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 954. Jacq. Hort. Vind. v. 3. 13. t. 17. (Petroſelinum macedonicum Fuchſii; Ger. Em. 1016.)—Leaves pinnate. Umbels erect, of about four rays.—Native of England, Germany, the ſouth of France, and the neighbourhood of the Bithynian Olympus. With us it chiefly occurs in moiſt ſhady places, where the ſoil is marly or chalky, flowering in Auguſt. The *root* is ſpindle-ſhaped, annual or biennial. *Stem* two or three feet high, branched, widely ſpreading, leafy, ſtriated, ſmooth. *Leaves* dark green, ſmooth, ſimply pinnate, with a terminal lobed leaflet; the upper ones more compound or divided; all ſharply ſerrated and cut. *Umbels* numerous, terminal, ſolitary, erect when in flower, white, but ſmall and inconſpicuous. *Fruit* roundiſh-ovate. *Seeds* aromatic and pungent when ripe. In a green ſtate, their ſcent, like that of the whole herb, when bruiſed, is peculiarly nauſeous, ſomewhat like *Coriander*, but even worſe. Theſe ſeeds have been known in the European Pharmacopæas by the name of *Amomum*, no one knowing what was the true *Amomum*; and have been celebrated as diuretic, uſeful in the ſtone and gravel, &c.; but they are now out of uſe, probably with no loſs to the patient.

2. S. *ſegetum*. Corn Honewort. Linn. Sp. Pl. 362. Willd. n. 2. Fl. Brit. n. 2. Engl. Bot. t. 228. Jacq. Hort. Vind. v. 2. 63. t. 134. (Selinum ſii foliis; Ger. Em. 1018. Sium terreſtre, ſeu ſegetale; Moriſ. ſect. 9. t. 5. f. 6.)—Leaves pinnate; leaflets roundiſh, numerous. Umbels drooping, ſhapeleſs.—Native of England and Switzerland, but rare, chiefly in moiſt low fields, on a calcareous ſoil, flowering in Auguſt. Scarcely any body but a curious botaniſt would obſerve this little plant, which appears like a ſtarved ſpecimen of many a more common kind. The numerous crowded *leaflets*, imbricated, in a manner, before they expand, and the ſtraggling, drooping, little *umbels*, are peculiar. The *flowers*, and their *anthers*, are tinged with purple.

3. S. *canadenſe*. Three-leaved Canadian Honewort. Linn. Sp. Pl. 363. Willd. n. 3. Ait. n. 3. (Chærophyllum canadenſe; Purſh 195. Myrrhis canadenſis; Riv. Pentap. Irr. t. 54. M. canadenſis trilobata; Moriſ. ſect. 9. t. 11. f. 4.)—Leaves ternate. General involucrum wanting. Seeds elliptic-oblong.—Common in the woods of North America, from Canada to Virginia, flowering in July. *Purſh*. *Root* perennial, of many tapering fibres. *Stem* two feet high, branched, round, ſmooth, leafy. *Leaflets* ſmooth, broad, acute, doubly and ſharply ſerrated; the lateral ones, of the lower leaves, often deeply divided, and their intermediate one ſometimes three-lobed. *Umbels* ſlender, unequal, deſtitute of a general involucrum, and with very ſmall partial ones, but otherwiſe having the genuine habit of this genus, and no character of *Chærophyllum*. *Fruit* elliptic-oblong, ſtrongly ribbed, ſmooth, crowned with the ſmall, conical, converging ſtyles.

4. S. *Ammi*. Fennel-leaved Honewort. Linn. Sp. Pl. 363. Willd. n. 4. Jacq. Hort. Vind. v. 2. 95. t. 200. (Ammi; Camer. Epit. 522. Matth. Valgr. v. 2. 120. Riv. Pentap. Irr. 91. A. perpuſillum; Lob. Ic. 725. Ger. Em. 1037.)—Leaves triply pinnate; the radical ones with linear ſegments; the upper ſetaceous.—Native of Portugal, Italy, and Egypt. A ſlender, annual, ſmooth *plant*, about a foot high, with an aromatic parſley-like ſmell. Segments of the *leaves* alternate, or ternate, acute. *General umbels* of five or more rays, with an unequal, ſomewhat leafy, *involucrum*; *partial* of numerous ſhort rays; their *involucral leaves* linear, minutely fringed. Jacquin ſays his plant had neither general nor partial *involucrum*. *Flowers* white. *Germen* in the original Linnæan ſpecimen, from Clifford's garden, ovate, minutely granulated, of which mark we find no account. The ripe *ſeeds* are deſcribed by Jacquin and Rivinus as ovate.

5. S. *puſillum*. Dwarf Honewort. Michaux Boreal-Amer. v. 1. 168. Purſh n. 1. (Daucus divaricatus;

Walt. Carol. 114, according to Purſh.)—"Leaves twice-ternate, many-cleft. Partial umbels of three to five flowers. Seeds roughiſh." In dry ſandy fields in Carolina, flowering in April and May. *Root* annual. *Purſh.*

6. S. *trifoliatum.* Three-leaved Carolina Honewort. Michaux, ibid. Purſh n. 2.—"Leaves all ternate; leaflets toothed; the lower ones oval, with two or three lobes; upper oval-lanceolate. Umbel terminal, ſtalked, ſolitary. Seeds roundiſh."—Found by Michaux in North Carolina.

7. S. *marginatum.* White-edged Honewort. Michaux, ibid. Purſh n. 3.—"Leaves pinnate; the upper ones quinate; leaflets all ſeſſile, lanceolate, entire, bordered with white. General and partial involucrum wanting."—In wet meadows, from Virginia to Carolina, flowering in July and Auguſt. Perennial. *Purſh.*

8. S. *ſalſum.* Salt Honewort. Linn. Sp. 181. Willd. n. 7. ("Peucedanum redivivum; Pallas Act. Petrop. 1779. v. 2. 252. t. 8. f. 1—3.")—Leaves radical, doubly pinnate; leaflets digitate, ſomewhat whorled. Stem leafleſs, panicled, with numerous umbels.—In dry, muddy, ſalt plains about the Wolga; gathered by Pallas, whoſe ſpecimen is before us. The *root* is perennial. *Leaves* all radical, appearing in the ſpring, ſtalked, ſpreading, three inches long, doubly compound, the *leaflets* crowded as if whorled, in many ſmooth, oblong, briſtle-pointed ſegments, all together reſembling ſome feathery ſort of *Conferva.* *Stem* appearing after the leaves are gone, twelve or eighteen inches high, ſlender, round, ſmooth, bearing in Auguſt a panicle, alternately compounded, of ſlender ſpreading *umbels*, each of from three to five rays. At the baſe of each branch is a ſharp membranous-bordered leaf, or *bractea.* *Partial umbels* of five or ſix capillary rays. *General involucrum* of two or three ſmall membranous leaves; *partial* like it, but ſmaller. *Flowers* white. *Germen* ovate. *Fruit* more oblong, ſmooth, obſcurely ribbed. Some of the *flowers* in each partial umbel do indeed appear to be abortive, whence perhaps Pallas referred this curious ſpecies to *Peucedanum;* but we find no traces of a wing to the ſeeds, to confirm that meaſure.

9. S. *crinitum.* Capillary-leaved Honewort. Willd. n. 8. "Pallas Act. Petrop. 1779. v. 2. 250. t. 7."—"Radical leaves triply pinnate: thoſe of the ſtem bipinnate; leafleſs briſtle-ſhaped. General involucrum of many doubly pinnate leaves."—Native of Siberia. *Pallas.* We have not ſeen the plate cited, but the *involucrum* is deſcribed as doubly compound and ſetaceous.

Two Britiſh Linnæan ſpecies, the *inundatum* and *verticillatum,* are removed, in the Flora Britannica, from the preſent genus; the former to Hydrocotyle, and the latter to Sium; ſee thoſe articles. We are as confident of the propriety of this alteration, as it is poſſible to be on any queſtion regarding the genera of umbelliferous plants. *Siſon* itſelf is conſidered, by ſome botaniſts, as a doubtful genus, and is reduced to *Sium* by Lamarck in his Dictionary, v. 1. 404.

Sison *Syriacum,* a name given by ſome authors to the ammi, or biſhop's weed, a plant whoſe ſeeds were once much uſed in medicine.

SISSA, in *Geography,* a town of the duchy of Parma; 11 miles N.N.W. of Parma.

SISSACH, a town of Switzerland, in the canton of Bâle; 13 miles S.E. of Bâle.

SISSAN, a town of Iſtria; 3 miles E.N.E. of Pola.

SISSITIEPTERIS, in *Botany,* a name uſed by Pliny, and ſome others of the old authors, for the pimpinella, or burnet.

SISSONNE, in *Geography,* a town of France, in the department of the Aiſne, and chief place of a canton, in the diſtrict of Laon; 10 miles E. of Laon. The place contains 1105, and the canton 10,327 inhabitants, on a territory of 337½ kilometres, in 20 communes.

SISSOPOLI. See Sizeboli.

SISSUER, a town of Hindooſtan, in Oude; 24 miles E.S.E. of Manickpour.

SISTAN, or Segestan. See Seistan.

SISTER, a female born of the ſame parents.

Sister-*Blocks,* in *Block-Making,* are blocks made of aſh, ſimilar to two ſingle blocks, and turned out of a ſolid piece, about two inches long, one above the other: between the blocks is a ſcore for a middle-ſeizing; a round head is turned at each end, and hollowed underneath, to contain the end-ſeizings: along the ſides, through which the pins are driven, is a groove, large enough to receive part of the top-maſt ſhroud, in which it is ſeized. In theſe blocks reeve the lifts, and reef-tackle pendants of the topſail-yards.

SISTERON, in *Geography,* a town of France, and principal place of a diſtrict, in the department of the Lower Alps, ſituated on the Durance, with a ſmall caſtle on a rock; and before the revolution the ſee of a biſhop, ſuffragan of Aix; 15 miles N.W. of Digne. The place contains 3891, and the canton 7070 inhabitants, on a territory of 230 kilometres, in 9 communes. N. lat. 44° 11′. E. long. 6° 1′.

SISTERS, two ſmall iſlands in the Red ſea. N. lat. 19° 30′. E. long. 39° 15′.—Alſo, two very ſmall iſlands near the coaſt of Sumatra, covered with wood, lying in S. lat. 5° 0½′. E. long. 106° 12′; nearly N. and S. from each other, and ſurrounded by a reef of coral rocks; the whole circumference of which is about four or five miles.

SISTERSDORF. See Zistersdorf.

SISTOTREMA, in *Botany,* a genus of *Fungi,* of which ſeveral ſpecies are deſcribed, and ſome figured, in Albertini and Schweiniz's very learned work, entitled *Conſpectus Fungorum in Luſatiæ ſuperioris agro Niſkienſi creſcentium,* p. 260—264. We, however, find there no generic character. The plants ſeem moſt akin to Hydnum; ſee that article. The name appears to be compounded of συςω and τρημα, alluding to the regular rows of pores; but if ſo, it ought to be *Syſtotrema.*

SISTOVA, or Szisto, in *Geography,* a town of European Turkey, in Bulgaria, on the right bank of the Danube; 25 miles E. of Nicopoli. N. lat. 43° 45′. E. long. 24° 44′.

SISTROID *Angle.* See Angle.

SISTRUM, a ſacred muſical inſtrument with the ancient Egyptians; and one that is ſtill uſed by the Abyſſinians in religious ceremonies.

Spon deſcribes it of an oval form, made in manner of a racket, with three ſticks traverſing it breadthwiſe, which, playing freely by the agitation or beating of the inſtrument, yielded a kind of ſound, which, to the ancients, ſeemed melodious. The upper part was adorned with three figures; that of a cat with a human face in the middle, the head of Iſis on the right ſide, and the head of Nephthys on the left. The repreſentation which we have given in the *Plate of Muſic* was drawn from an ancient ſiſtrum preſerved in the library of St. Genevieve at Paris. It has been diſputed by the abbé Winckelman, whether the ſiſtrum was of very high antiquity in Egypt, becauſe it did not appear in the hands of ſuch Egyptian ſtatues as he had ſeen at Rome; but as there is one in the hand of a very ancient ſtatue of Iſis, which doctor Pococke brought into England from Egypt, it puts that point of muſical hiſtory out of all diſpute. The ſiſtrum appears in the Iſiac Table; and Apuleius makes an old Greek invoke an Egyptian prieſt "by the ſtars in the firmament; by the infernal divinities; by the elements which compoſe the univerſe; by the ſilence of the night; by the ſanctuary in the temple of Coptos; by the increaſe of the Nile; by the myſteries of Memphis; and by the ſiſtrum of Pharos." By Pharos, an Egyptian iſland, was here figuratively meant, all Egypt.

Mr. Malcolm takes the ſiſtrum to have been no better than a kind of rattle. Jer. Boſius has an expreſs treatiſe on the ſiſtrum, intitled, " Iſiacus de Siſtro."

Oiſelius obſerves, that the ſiſtrum is found repreſented on ſeveral medals; and alſo on taliſmans. Oſiris, on ſome medals, is painted with the head of a dog, and with a ſiſtrum in his hand.

SISUPALA, in *Hindoo Mythology*, is the name of a malignant perſonage, into whoſe body an inſolent celeſtial was doomed to be re-born on earth, as an expiation of his offence. He was ſlain by Kriſhna.

SISY-*ſur-Ourcq*, in *Geography*. See LIZY-*ſur-Ourcq*.

SISYMBRIUM, in *Botany*, Σισυμβριον of the Greeks, at leaſt the Σ. ἥμερον of Dioſcorides is probably included under our preſent genus. His firſt ſpecies, celebrated for its fragrance, has been ſuppoſed Wild Thyme, and by ſome our *Mentha hirſuta*, which laſt has alſo occaſionally a very ſweet ſmell. De Theis ſeems not to have been aware of this; nor might the plant in queſtion find a place in garlands dedicated to Venus, ſo much on account of its odour, as of its warm and cordial properties.—Linn. Gen. 338. Schreb. 441. Willd. Sp. Pl. v. 3. 489. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 700. Prodr. Fl. Græc. Sibth. v. 2. 18. Ait. Hort. Kew. v. 4. 111. Purſh 440. Juſſ. 239. Lamarck Dict. v. 7. 201. Illuſtr. t. 565.—Claſs and order, *Tetradynamia Siliquoſa*. Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of four lanceolate-linear, ſpreading, coloured, deciduous leaves. *Cor.* cruciform, of four oblong ſpreading petals, often leſs than the calyx with very ſmall claws. *Stam.* Filaments ſix, longer than the calyx, of which the two oppoſite ones are rather the ſhorteſt; anthers ſimple. *Piſt.* Germen oblong-thread-ſhaped; ſtyle ſcarcely any; ſtigma obtuſe. *Peric.* Pod long, incurved, gibbous, round, with two cells and two ſtraight valves, which are rather ſhorter than the partition. *Seeds* numerous, ſmall.

Eſſ. Ch. Pod burſting, with nearly ſtraight valves. Calyx and corolla ſpreading.

A copious genus, tolerably natural as to habit, but not very diſtinctly defined; of which the 14th edition of Linn. Syſt. Veg. contains twenty-nine ſpecies, and Willdenow's Sp. Pl. fifty-three. Nine of them are found wild in Britain. We ſhall deſcribe all the latter, and give a general view of the five ſections, into which the whole genus is divided by Linnæus. Mr. Brown, in his very ingenious attempt at reforming the genera of the claſs *Tetradynamia*, in Ait. Hort. Kew. has ſeparated ſome ſpecies, principally of the firſt ſection, into a genus called *Naſturtium*, and he has referred two of the Britiſh ones to SINAPIS, (ſee that article,) and one to BRASSICA. Reſpecting theſe very ſpecies, there has heretofore been a difference of opinion among botaniſts, as will appear when we come to ſpeak of them in order. The whole genus is herbaceous, either annual or perennial, with alternate *leaves*, various, and ſometimes inconſtant, in ſhape and diviſion moſtly ſmooth. The *flowers* are almoſt invariably yellow; though always white in the firſt ſpecies.

Sect. 1. *Pods declining, ſhort.* Eleven ſpecies in Willdenow.

S. *Naſturtium.* Common Water-creſs. Linn. Sp. Pl. 916. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 855. Curt. Lond. faſc. 6. t. 44. Woodv. Med. Bot. t. 48. Fl. Dan. t. 690. (Naſturtium officinale; Br. in Ait. Hort. Kew. v. 4. 110. N. aquaticum, ſive Cratevæ Sium; Ger. Em. 257.)—Pods declining. Leaves pinnate; leaflets roundiſh-heart-ſhaped.—In clear rivulets and ſprings throughout Europe, from Sweden to Greece, as well as in North America; and, according to Mr. Purſh, on the high mountains of the iſland of Dominica. It is perennial, flowering in June and July. No Britiſh plant is in ſuch popular requeſt as a ſalad; the young leaves having a pleaſantly warm pungent flavour, and being ſuppoſed, like ſcurvy-graſs, to purify the blood. The *ſtems* are branched, angular and leafy, floating by the help of their foliage, ſending down long, white, fibrous *roots*, and terminating in aſcending corymboſe tufts, of numerous, white, purpliſh-tinted *flowers*, ſucceeded by long cluſters of ſhort, gibbous, recurved, ſtalked *pods*. The *leaves* are ſmooth, of a dark ſhining green, conſiſting of five or ſeven leaflets, the terminal one largeſt. There can be little doubt of this being σισύμβριον ἥμερον of Dioſcorides. The modern Greeks call it νεροκάρδαμον; a word ſynonimous with Water-creſs.

S. *ſylveſtre.* Creeping Water Rocket. Linn. Sp. Pl. 916. Willd. n. 2. Fl. Brit. n. 2. Engl. Bot. t. 2324. Curt. Lond. faſc. 3. t. 41. (Naſturtium ſylveſtre; Br. in Ait. Hort. Kew. v. 4. 110. Eruca aquatica; Ger. Em. 248. Brachiolobos ſylveſtris; Allion. Pedem. v. 1. 278. t. 56. f. 2.)—Pods declining. Leaves pinnate; leaflets lanceolate, deeply ſerrated or cut.—Native of gravelly waſte ground, in marſhy places, or near rivers, flowering from June to September, in ſeveral parts of England, as well as in Germany, Switzerland, and France. Dr. Sibthorp obſerved it on mount Hæmus. The *root* creeps ſo extenſively, that the *pods* are moſtly abortive. *Stems* erect, leafy, angular, zig-zag, roughiſh, ſomewhat panicled. *Leaves* ſmooth; the leaflets of the lower ones decurrent, variouſly toothed; of the upper narrower, more ſlightly cut or ſerrated. *Flowers* of a golden yellow; their cluſters after flowering elongated and zig-zag.

Willdenow ſuppoſes *S. lippizenſe*, Jacq. Ic. Rar. t. 505, to be a variety of this, with more entire leaflets; but it is drawn with a fibrous, not creeping, root.

S. *terreſtre.* Annual Water Rocket. Curt. Lond. faſc. 5. t. 49. Fl. Brit. n. 3. Engl. Bot. t. 1747. (S. paluſtre; Willd. n. 3. Pollich v. 2. 230. Purſh n. 2. S. amphibium α; Hudſ. 296. Naſturtium terreſtre; Br. in Ait. Hort. Kew. v. 4. 110. Raphanus aquaticus, foliis in profundas lacinias diviſis; Bauh. Prodr. 38.)—Pods declining, turgid. Leaves pinnatifid, unequally toothed. Root ſimply fibrous. Petals ſcarcely ſo long as the calyx.—Found in watery places, about the ſides of ditches, in the north of Europe, as well as America. Very plentiful about London, flowering from June to September.—The *root* is annual, ſometimes branching at the top, but not creeping. *Stem* a foot high, nearly upright, branched, leafy, furrowed, ſmooth. *Leaves* lyrate, unequally toothed. *Flowers* numerous, yellow, ſmall and inconſpicuous, ſucceeded by ſhort, turgid, erect *pods*, whoſe partial ſtalks are widely extended.

S. *amphibium.* Great Water Rocket, or Radiſh. Linn. Sp. Pl. 917. Willd. n. 4. Fl. Brit. n. 4. Engl. Bot. t. 1840. Purſh n. 3. Fl. Dan. t. 984. (S. amphibium β; Hudſ. 296, and γ, 297. Naſturtium amphibium; Br. in Ait. Hort. Kew. v. 4. 110. Raphanus aquaticus alter; Bauh. Prodr. 38. R. aquaticus; Ger. Em. 240.)—Pods declining, on longiſh partial ſtalks. Leaves oblong, pinnatifid or ſerrated. Petals longer than the calyx.—Not rare in the rivers and ditches of America, and the north of

Europe; frequent in England, flowering copiouſly in July and Auguſt. In running ſtreams it grows to a great ſize, with long floating *ſtems,* throwing out abundance of white fibrous radicles, and bearing, under water, deeply pectinated *leaves.* On the neighbouring banks it is found ſmaller, with broader, and merely ſerrated, foliage. The primary *roots* are perennial, long, perpendicular, not creeping. The *leaves* which grow out of the water are more or leſs oblong, jagged, claſping the ſtem with their dilated baſe; the radical ones ſtalked. *Flowers* yellow, not very bright. *Pods* ſhort and ſmall, often abortive. This ſeems to be the plant which Chateaubriand obſerved in Suffolk, and of which he has given ſo extravagant an account in his travels; as if the works of the Creator were not, of themſelves, ſufficiently admirable, without bombaſt or exaggeration.

S. *tanacetifolium.* Tanſy-leaved Wild-rocket. Linn. Sp. Pl. 916. Willd. n. 6. Ait. n. 12. (Eruca, n. 460; Hall. Hiſt. v. 1. 200. E. tanaceti folio; Moriſ. ſect. 3. t. 6. f. 19. E. fruticoſo, con foglie di tanaceto, indiana; Zanon. Iſt. 86. t. 33.)—Leaves pinnate; leaflets lanceolate, cut or deeply ſerrated; hoary beneath; the ultimate ones confluent. Pods erect, ſomewhat club-ſhaped.—Native of thickets and groves, on the loftieſt alps of Savoy and Switzerland, but eſteemed one of the rareſt plants of thoſe countries. We gathered it in ſeed on mount Cenis, Auguſt 13, 1787. Miller is ſaid to have cultivated this *Siſymbrium* in 1731, and we believe it is ſtill to be met with in curious collections. The *root* is perennial. *Stem* two or three feet high, clothed with very handſome ſpreading *leaves,* finely downy and hoary beneath, and often beſprinkled with minute ſtarry hairs on their upper ſurface. *Flowers* of a golden yellow, numerous, in terminal corymbs, growing out into long, lax cluſters of ſmooth, erect, obtuſe *pods,* half an inch or more in length, tapering at their baſe; their partial *ſtalks* about the ſame length, aſcending obliquely.

S. *tenuifolium.* Wall Wild-rocket. Linn. Sp. Pl. 917. Willd. n. 9. Fl. Brit. n. 5. Engl. Bot. t. 525. (Braſſica muralis; Hudſ. 290. Curt. Lond. faſc. 3. t. 38. Sinapis tenuifolia; Br. in Ait. H. Kew. v. 4. 128. Sinapi erucæ folio; Bauh. Pin. 99. Tourn. Inſt. 227. S. tertium; Matth. Valgr. v. 1. 516. Eruca ſylveſtris; Ger. Em. 246.)—Pods erect, ſomewhat beaked. Leaves ſmooth, pinnatifid or bipinnatifid, nearly entire; the uppermoſt undivided.—Native of old walls and rubbiſh, in England, Germany, Switzerland, and France, as well as about Conſtantinople, flowering from July to October. The *root* is perennial. *Plant* buſhy, ſmooth, ſomewhat glaucous. *Leaves* acute, variouſly ſinuated and pinnatifid; their ſegments lanceolate. *Flowers* large, lemon-coloured, ſtrongly ſcented. *Pods* diſtant, tipped with the ſlightly elongated *ſtyle.*

S. *ſagittatum.* Arrow-leaved Wild-rocket. Willd. n. 10. (S. molle; Jacq. Coll. v. 1. 68. Ic. Rar. t. 122. Naſturtium ſagittatum; Br. in Ait. H. Kew. v. 4. 111.)—Downy. Leaves oblong, with ſhallow teeth; the radical ones haſtate; the reſt claſping the ſtem with their arrow-ſhaped baſe.—Native of Siberia. Sent to Kew, by Pallas, in 1780. The *root* is ſpindle-ſhaped, perennial. Whole *plant* clothed with ſoft, depreſſed, ſomewhat ſtellated down. *Leaves* bluntiſh, bearing ſome reſemblance to thoſe of Shepherd's Purſe. *Flowers* yellow, ſucceeded by long cluſters of drooping downy *pods.*

Sect. 2. *Pods often axillary, nearly ſeſſile.* Five ſpecies.

S. *polyceratium.* Dandelion-leaved Wild-rocket. Linn. Sp. Pl. 918. Willd. n. 13. Ait. n. 11. Prodr. Fl. Græc. n. 1535. Jacq. Hort. Vind. v. 1. 34. t. 79. (Irio alter; Matth. Valgr. v. 1. 524. Eryſimum alterum italicum; Ger. Emac. 254.)—Pods axillary, aggregate, awl-ſhaped, nearly ſeſſile. Leaves wavy or toothed.—Native of Switzerland, France, Italy, and Greece. Dr. Sibthorp found it, very common, throughout the laſt-mentioned country and the iſlands of the Archipelago, in waſte ground, court-yards, and about villages, as Dioſcorides reports of his ερυσιμον, which therefore the Oxford profeſſor judged this plant to be; perhaps rightly; but the deſcription of the Greek author, particularly the yellow flowers, and the terminal pods, anſwer better to our *Eryſimum officinale* (*Siſymbrium officinale,* Br. in Ait. H. Kew. n. 1.), which is alſo a Greek plant. The preſent *Siſymbrium,* a mean and ill-looking weed, is perfectly naturalized about Bury, in Suffolk, and might be taken for a native Britiſh plant, had we not the authority of ſir T. G. Cullum, for its having eſcaped, many years ſince, from the botanic garden of the Rev. Mr. Laurence of that town. The *root* is annual. *Stems* branched, decumbent, leafy, ſmooth, gradually elongated after flowering. *Leaves* about an inch long, on ſhort ſtalks, ſimple, ſomewhat haſtate, ſlightly toothed or wavy, ſmooth. *Flowers* ſmall, white, axillary, on ſhort ſtalks, two or three together. *Pods* rather curved, an inch long, uneven, ſmooth, with a zig-zag furrow along each ſide.

S. *toruloſum.* Rough-podded Wild-rocket. Desfont. Atlant. v. 2. 84. t. 159. Willd. n. 16. Sm. Fl. Græc. Sibth. t. 632, unpubliſhed.—Pods racemoſe, ſeſſile, awl-ſhaped, hairy. Stem diffuſe. Leaves lanceolate, toothed.—Native of uncultivated fields, in Tunis, and the iſle of Cyprus. An annual, branched, nearly proſtrate *herb,* very like the laſt in general appearance, but the *leaves* are longer, truly lanceolate, and regularly toothed. *Flowers* terminal, denſely corymboſe, white, their ſtalk lengthening out into a long *cluſter,* or rather *ſpike,* of crowded, ſeſſile, ſpreading, rugged, hairy *pods,* each about an inch in length.

Sect. 3. *Stem for the moſt part naked.* Eight ſpecies.

S. *murale.* Sand Wild-rocket. Linn. Sp. Pl. 918. Willd. n. 17. Dickſ. Dr. Pl. 12. Engl. Bot. t. 1090. Fl. Brit. 1401. (Eruca viminea, iberidis folio, luteo flore; Barrel. Ic. t. 131. Sinapis muralis; Br. in Ait. H. Kew. v. 4. 128.)—Pods erect. Stem ſpreading, ſhort, roughiſh. Leaves lanceolate, deeply ſerrated.—Native of France, Italy, and the iſle of Thanet, in waſte ſandy ground, flowering in autumn. *Root* truly annual. *Stems* branching, diffuſe, often very ſhort, leafy, round, more or leſs rough with deflexed hairs. *Leaves* of a graſs green, tapering at the baſe into long footſtalks; their margin deeply and irregularly ſerrated. *Flowers* ſmaller than thoſe of *S. tenuifolium,* their *corymbs* becoming long looſe *cluſters* of erect, cylindrical, ſmooth *pods,* on ſpreading, hairy ſtalks. *S. Erucaſtrum,* Gouan Illuſtr. t. 20, is preciſely this plant, not a variety.

S. *monenſe.* Dwarf Sea Wild-rocket. Linn. Sp. Pl. ed. 1. 658. Fl. Brit. n. 6. Engl. Bot. t. 962. Willd. n. 18. Lightf. Scot. 353. t. 15. f. 1. (Braſſica monenſis; Hudſ. 291. Br. in Ait. H. Kew. v. 4. 124. Eruca monenſis laciniata, flore luteo majore; Dill. Elth. 135. t. 111. f. 135.)—Pods nearly erect, quadrangular, with a long beak. Leaves pinnatifid, ſlightly hairy. Stems ſimple, almoſt naked, ſmooth.—Native of the ſandy ſhores of Bute, Arran, and the weſt of Scotland, as well as of Cumberland, and the iſles of Walney, Angleſea, and Man. *Root* thick, woody, and perennial. *Stems* ſeveral, a ſpan high, leafy at the bottom only. *Leaves* almoſt all radical, numerous, ſtalked, rather fleſhy and glaucous; their ſegments deep, tolerably uniform, either entire, or with broad inciſions. *Flowers* large, numerous, lemon-coloured, corymboſe, succeeded by a long cluſter of ſmooth, obſcurely quadrangular, upright, ſtalked, long-beaked *pods.* *Calyx* leſs ſpreading than in moſt of the ſpecies, its leaves hairy at the tips. *Petals* veined.—We have been led to doubt whether Gerard's plant from Provence, deſcribed in the ſecond edition of Sp. Pl. and preſerved in the Linnæan herbarium, be the ſame with our's; becauſe its *flowers* are ſmaller, and the veins of their *petals* ſcarcely diſcernible, though in our's very ſtrong. It may nevertheleſs be a mere variety. We find in its young *pods* plain indications of the remarkable lanceolate beak, half the length of the *pod* itſelf, ſo ſtriking in our *S. monenſe*, and figured, as well as deſcribed, in Engliſh Botany. Willdenow was miſled by Villars to conſider Gerard's as the ſame with the following.

S. *repandum*. Wavy-leaved Wild-rocket. Willd. n. 19. (S. monenſe; Villars Dauph. v. 3. 350. t. 39, the ſynonyms moſtly, if not entirely, wrong.)—Pods nearly erect, compreſſed, uneven, with a ſhort quadrangular beak. Leaves with wavy teeth, ſmooth. Stems ſimple, ſmooth, quite naked.—Native of the mountains of Dauphiny; our ſpecimen is from Villars himſelf, and proves, notwithſtanding his aſſertion, very diſtinct from the plant of Gerard, mentioned under our preceding ſpecies, as well as from Britiſh ſpecimens of that ſpecies. We have no means of knowing exactly how far the author is correct in Tournefort's ſynonym; but the phraſe *radice craſſâ* anſwers admirably to Gerard's ſpecimen, and not to that of Villars. The *root* of the latter is long and tapering, divided, but not very thick, at the crown, where it bears ſeveral ſimple tufts of ſtalked, oblong, or obovate, bluntiſh *leaves*, about an inch only in length, always quite ſmooth; their margins either wavy, or more or leſs deeply toothed. *Stems* ſolitary, four or five inches high, quite leafleſs, ſimple, round and ſmooth, each bearing from four to nine large corymboſe *flowers*, of a fine yellow. *Calyx* ſmooth, ſlightly ſpreading, a little coloured. *Pods* ſlightly ſpreading, rather longer than the laſt as to their valvular part, meaſuring from one and a half to two inches; but the beak is hardly two lines, inſtead of three-quarters of an inch, long, by which the plants are clearly diſtinguiſhed. Willdenow rightly deſcribes the *valves* of the preſent, which are unequally bunched out by the *ſeeds*, as marked with an elevated line, that makes them ſeem quadrangular; but they are much leſs really ſo than in *S. monenſe*, whoſe *pods* few botaniſts appear to have ſeen.

S. *vimineum*. Ruſhy-ſtalked Wild-rocket. Linn. Sp. Pl. 919. Willd. n. 21. (Eruca pumila, burſæ paſtoris folio; Bocc. Sic. 19. t. 10. f. 2. E. minimo flore, monſpelienſis; Bauh. Hiſt. v. 2. 862; the leaves, as the author obſerves, too ſharp.)—Pods erect, compreſſed, with a ſhort quadrangular beak. Stems widely ſpreading, leafy at the baſe. Leaves ſmooth, obovate; toothed or pinnatifid. Petals erect, ſcarcely exceeding the calyx.—Native of Sicily and the ſouth of France. A hardy annual, which we have had for near twenty years, ſpringing up ſpontaneouſly, in a garden, ſo that it merits a place in Mr. Aiton's work, though of no attractive aſpect, to procure it general notice. The *root* is ſmall and fibrous. *Stems* ſeveral, branching at the very baſe only, from three to eight inches long, widely ſpreading or decumbent, ſimply racemoſe, round, ſlender, ſmooth. *Leaves* numerous, about the bottom of each ſtem, ſtalked, from one to two or three inches long, very obtuſe; either ſimply obovate, entire, and partly wavy, or pinnatifid in a lyrate manner, ſometimes rather deeply. *Flowers* extremely ſmall, with a tawny and purpliſh tinge, ſucceeded by a long cluſter of diſtant *pods*, hardly an inch long, ſmooth, ſlightly unequal in their ſurface, each valve marked with a ſlender elevated line. This ſpecies, though very diſtinct, is ſo much akin to the laſt, that their characters are difficult to define. The *calyx* and *corolla* of the preſent hardly anſwer indeed to the idea of a *Siſymbrium*, but rather to that of *Arabis*.

Sect. 4. *Leaves pinnate, or deeply pinnatifid.* Twenty ſpecies.

S. *Sophia*. Flix-weed. Linn. Sp. Pl. 920. Willd. n. 29. Fl. Brit. n. 7. Engl. Bot. t. 963. Mart. Ruſt. t. 57. Fl. Dan. t. 528. Purſh n. 4. (Sophia chirurgorum; Ger. Em. 1068. Lob. Ic. 738.)—Leaves doubly pinnate, with decurrent ſegments, a little hairy. Petals ſmaller than the calyx.—Native of waſte ground, rubbiſh, and banks throughout Europe, from Sweden to Greece, flowering in ſummer. Mr. Purſh ſpeaks of it as occurring by road-ſides in Virginia, but rarely. We preſume the ſeeds may have been imported from England. The *root* is annual. *Stem* about two feet high, erect, copiouſly clothed with finely divided ſpreading *leaves*, whoſe ultimate diviſions are rather pinnatifid than pinnate. *Flowers* pale yellow, very ſmall and inconſpicuous, denſely corymboſe, ſucceeded by long *cluſters* of ſlender, upright, toruloſe *pods*, on ſlender, ſpreading, partial ſtalks, their valves ſeparating and ſpreading from the baſe, ſomewhat like a *Cardamine*. The herb has been thought uſeful in fluxes.

S. *millefolium*. Mill-foil-leaved Wild-rocket. Willd. n. 28. Ait. n. 14. (Sinapis millefolia; Jacq. Coll. v. 1. 41. Ic. Rar. t. 127.)—Leaves triply pinnate, downy and hoary. Petals larger than the calyx.—Native of the Canary iſlands, from whence Mr. Maſſon brought it in 1779. This is a perennial, ſhrubby, greenhouſe plant, flowering from May to September. Though like the laſt in general aſpect, the *leaves* are more compound and hoary, with uſually more rounded ſegments or leaflets; and the *flowers* are much more conſpicuous, on account of their ſpreading yellow *petals*, double the length of the *calyx*.

S. *Irio*. London Wild-rocket. Linn. Sp. Pl. 921. Willd. n. 36. Fl. Brit. n. 8. Engl. Bot. t. 1631. Curt. Lond. faſc. 5. t. 48. Jacq. Auſtr. t. 322. (Eryſimum latifolium majus glabrum; Bauh. Pin. 101. Moriſ. ſect. 3. t. 3. f. 3, at the bottom. Irio lævis apulus, erucæ folio; Column. Ecphr. 264. t. 265.)—Leaves runcinate, toothed, naked. Stem ſmooth. Pods erect, very long, thread-ſhaped.—Native of cultivated ground throughout Europe. Very common about London, where it was ſuppoſed by the ſapient advocates of ſpontaneous generation, to have been generated in conſequence of the great fire, in 1666. If, therefore, we confide in the bold aſſertion on the Monument, or the inſcription on the fat boy at Pye-corner, this plant ought to be a cure for popery, or "the ſin of gluttony," or for both. However this may be, the *root* is annual, the whole *herb*, except the upper *flower-ſtalks* and *calyx* occaſionally, is invariably ſmooth, with an acrid flavour, like muſtard. *Stem* erect, about two feet high, round, leafy, ſlightly zigzag, moſtly branched. *Leaves* none of them truly pinnate, but deeply pinnatifid, with ſpreading or reflexed oblong lobes, moſt toothed at their upper or fore edge. *Flowers* corymboſe, numerous, ſmall, yellow; their *petals* ſpreading, longer than the *calyx*. *Pods* an inch and a half long, very ſlender, on partial ſtalks, about a quarter of an inch in length, all together compoſing a long lax *cluſter*. *Stigma* ſeſſile.

S. *Loeſelii*. Loeſel's Wild-rocket. Linn. Sp. Pl. 921. Willd. n. 38. Jacq. Auſtr. t. 324. (Turritis Loeſelii; Br. in Ait. Hort. Kew. v. 4. 109. Eryſimum hirſutum, ſiliquis erucæ; Loeſ. Pruſſ. 69. t. 14. Rapiſtrum montanum, irionis folio, macroleptoceraton; Column. Ecphr. 266. t. 268.)—Leaves runcinate, toothed, hairy. Stem rough with deflexed briſtles. Pods erect, thread-ſhaped, on long ſpreading ſtalks.—Native of Pruſſia, Auſtria, France, Italy, and Greece. More branched than the laſt, from which it differs in having the *ſtem* clothed with deflexed hairs, found more ſparingly on the *flower-ſtalks*, which latter agree in length and ſlenderneſs with thoſe of *S. Irio*. Nor do the *leaves* differ much in ſhape from that plant, though diſtinguiſhed by their hairineſs. The length and ſlenderneſs of the *pods*, in the Linnæan ſpecimen, likewiſe accord with *Irio;* but in one from Jacquin they are ſhorter, as expreſſed in his plate. The *ſtigma* is ſeſſile. There are, in the Linnæan and Bankſian collections, ſpecimens from Jacquin, of what he, at one time, ſeems to have confounded with his *S. Columnæ*, Fl. Auſtr. t. 323, as mentioned in Prodr. Fl. Græc. v. 2. 21. Theſe ſpecimens appear a ſmoothiſh variety of *S. Loeſelii*, and bring this ſpecies very near to *Irio*. We now no longer feel any ſcruple reſpecting Columna's t. 268, cited indeed by Linnæus and Willdenow for *S. Loeſelii*, though heedleſsly by the latter for *S. Columnæ* alſo, after Jacquin, and though the hairs on the ſame do not point downward.

S. *orientale*. Oriental Wild-rocket. Linn. Sp. Pl. 921. Willd. n. 40. Ait. n. 40. Prodr. Fl. Græc. n. 1540. (S. Columnæ; Jacq. Auſtr. t. 323. Ait. n. 3.)—Leaves runcinate, downy. Stem without briſtles. Pods erect, thread-ſhaped, on ſhort, thick, ſpreading ſtalks.—Native of the Levant. Dr. Sibthorp had a wild ſpecimen from Zante. According to Jacquin, this ſpecies alſo grows in Auſtria. The *root* is annual. Habit of the *plant* not unlike the two laſt, but the whole herbage is more or leſs denſely clothed with fine cloſe pubeſcence, and the *partial ſtalks*, ſupporting the *pods*, are much ſhorter and thicker than in either. The *leaves* of all three are pinnatifid, not pinnate: the upper ones are more lanceolate and entire in *S. orientale*, than in the others.

S. *obtuſangulum*. Blunt-lobed Wild-rocket. Willd. n. 39. Schleich. Cat. 48. (Eruca, n. 459; Hall. Hiſt. v. 1. 199, excluding all the ſynonyms, except the following. E. inodora; Bauh. Hiſt. v. 2. 862.)—Leaves pinnate or pinnatifid, lyrate, with obtuſe, deeply-toothed lobes. Stem rough with deflexed hairs. Pods erect, on long ſpreading ſtalks.—Native of various parts of Switzerland. We have ſpecimens gathered by the late Mr. Davall near Aigle; where Haller indicates his variety γ, having larger and yellow flowers. We dare not anſwer for all his varieties, any more than for his very incorrect maſs of ſynonyms, but our's is ſurely the plant of Schleicher and Willdenow. The *root* is annual. *Stem* two feet high, leafy, ſomewhat angular, clothed with more minute deflexed hairs than *S. Loeſelii*. *Leaves* well compared by Haller to thoſe of Common Ragwort, *Senecio Jacobæa*, as to their general aſpect. They are often pinnate, not merely pinnatifid; their leaflets, or lobes, nearly uniform, remarkably blunt, moſt toothed backward. *Flowers* numerous, large, denſely corymboſe, on long ſtalks. *Calyx* hairy, ſpreading, as well as the *petals*.

S. *catholicum*. Notch-leaved Wild-rocket. Linn. Mant. 93. Willd. n. 43.—Leaves pinnate; leaflets elliptic-oblong, cut or ſerrated, ſmooth. Stem branched, ſpreading. Pods erect, on long ſpreading ſtalks.—Native of Spain and Portugal, to which the ſpecific name alludes; but this is particularly unfortunate, for we have the ſame plant from Barbary. The *root* is woody, and apparently perennial. *Stem* buſhy, not a foot high, leafy. *Leaves* ſtalked, ſmooth, fleſhy, of about ſix or ſeven, oppoſite or alternate, leaflets, ſharply ſerrated, and ſometimes elegantly cut or pinnatifid, tapering at their baſe, each an inch long, more or leſs. *Flowers* yellow, half the ſize of *S. tenuifolium*, and ſituated like them on corymboſe, finally racemoſe, long, terminal ſtalks. Linnæus, in his herbarium, has confounded a Stockholm ſpecimen of this laſt-mentioned, in which the ſegments of the leaves happen to be jagged, with his real *catholicum*.

Sect. 5. *Leaves oblong, ſcarcely divided.* Nine ſpecies.

S. *barbareæ*. Plantain-leaved Wild-rocket. Linn. Sp. Pl. 921. Willd. n. 41. (S. orientale, barbareæ facie, plantaginis folio; Tourn. Cor. 16.)—Leaves ſimple; the upper ones ovate, toothed, elongated and claſping the ſtem at their baſe; radical ones ſomewhat heart-ſhaped, entire.—Native of the Levant. Linnæus had an incomplete ſpecimen of this very rare plant from profeſſor Burmann. Its general appearance is very like *Eryſimum Barbarea*. The whole herb is ſmooth, and ſaid to be inſipid. *Stem* ſtout, branched, angular and furrowed, leafy. Upper *leaves* gradually ſmaller, and more toothed. *Flowers* ſmall, yellow, terminal, corymboſe, rather numerous. We have ventured to remove this ſpecies from the laſt ſection, as the leaves cannot even be termed pinnatifid.

S. *ſtrictiſſimum*. Spear-leaved Wild-rocket. Linn. Sp. Pl. 922. Willd. n. 46. Ait. n. 15. Prodr. Fl. Græc. n. 1542. Jacq. Auſtr. t. 194. (Arabis a quibuſdam dicta planta; Camer. Epit. 342.)—Leaves ovato-lanceolate, toothed, downy, ſtalked. Corymbs panicled. Pods aſcending.—Native of open, dry, mountainous ſituations, in Germany, Switzerland, and Italy. A hardy perennial, long known in our botanic gardens, flowering from June to Auguſt. The *ſtems* are a yard high, erect, round, or ſlightly angular, wand-like, clothed copiouſly with taper-pointed *leaves*, two or three inches long, dark-green, chiefly downy beneath, occaſionally entire. *Flowers* very abundant and ſhowy, of a golden yellow, in roundiſh, ſimple or compound, corymboſe heads, on long ſtalks, collected at the upper part of the ſtem, into a denſe oblong panicle. *Pods* racemoſe, two inches or more in length, ſlender, ſmooth, thread-ſhaped, two-edged, with a thick, nearly ſeſſile, *ſtigma*.

S. *hiſpanicum*. Spaniſh Wild-rocket. Jacq. Coll. v. 1. 69. Ic. Rar. t. 124. Willd. n. 48.—Leaves lanceolate, ſeſſile, ſmooth, with tooth-like ſerratures. Stem branched, ſpreading. Corymbs racemoſe. Pods cloſe-preſſed.—Native of Spain. Biennial; flowering in May and June, after being protected in the ſtove at Vienna through the winter. The whole *herb* is perfectly ſmooth, a foot and a half high. *Leaves* one or two inches long, bright green, rarely quite entire. *Flowers* deep yellow, ſmaller than the laſt, ſucceeded by long cloſe *cluſters* of crowded or imbricated *pods*, an inch in length.

S. *integrifolium*. Linear Siberian Wild-rocket. Linn. Sp. Pl. 922. Willd. n. 51. (S. n. 38; Gmel. Sib. v. 3. 270. t. 63.)—Leaves linear, entire. Flower-ſtalks hairy, glandular, and viſcid. Pods ſpreading.—In mountainous ſandy parts of Siberia. *Gmelin*. The *root* is ſlender, woody, ſuppoſed by Willdenow to be annual; but of this there is no certain account. *Stem* ſometimes erect, ſometimes procumbent, always hairy and glutinous, round, leafy, more or leſs branched. *Leaves* an inch and a half long, narrow, fleſhy, obtuſe, channelled, ſtalked, deſcribed by Gmelin as ſmooth, which they may perhaps uſually be, but in his ſpecimens before us they are clothed with longiſh ſcattered hairs. *Flowers* much larger than he delineates them, corymboſe, purple or yellow. *Calyx* hairy. *Pods* an inch long, linear, rather aſcending, beſprinkled, like their ſtalks, with prominent glands. *Stigma* very nearly ſeſſile.

S. *indicum*. Indian Wild-rocket. Linn. Sp. Pl. 917. Mant. 93. Willd. n. 52. Burm. Ind. 140.—Leaves ovato-lanceolate, ſtalked, ſerrated, ſmooth; the lower ones ſomewhat lyrate. Stem zigzag, branched, ſpreading. Pods ſpreading, curved upwards.—Native of the Eaſt Indies.

The Malay name on the Linnæan ſpecimen is *Saſavi Sihina*, given by Burmann *Seſuri-china*. He deſcribes the *leaves* as lyrate, of which we trace ſome indications on the ſpecimen, and doubt not the lower ones are ſo. Linnæus has deſcribed this ſame ſpecimen twice, not adverting to his *Sp. Pl.*, when he wrote the *Mantiſſa;* but both are ſufficiently correct. The plant is annual, unknown in our gardens. Its affinity to *S. hiſpanicum*, induces us, with Willdenow, to place it in this ſection, rather than in the firſt, to which Linnæus firſt referred it; but not having ſeen the lower *leaves*, we cannot be poſitive. The *ſtem* is ſlender, ſmooth, and leafy. *Flowers* ſmall, white, ſucceeded by long cluſters of *pods*, each pod hardly an inch in length, nearly cylindrical, obſcurely quadrangular, curved upwards, ſupported by a horizontal ſtalk, a quarter of an inch long. *Stigma* elevated on a ſhort ſtyle. The *pods* have not the ſhort turgid aſpect proper to the firſt ſection of the genus, but accord preciſely with the plants ranged in ſeveral of the latter ſections, whoſe *pods* have more or leſs of a quadrangular ſhape, though two of the angles are often merely indicated by an elevated line along each valve.

Whoever ſhall take the trouble of tracing our remarks through this genus, and examining the other ſpecies, which, for brevity's ſake, we have paſſed over, will ſee how much is ſtill wanting towards a correct generic diſtribution of the whole order. Mr. Brown's, in *Hort. Kew.*, is, notwithſtanding, an able and uſeful attempt at a reform, of which we may ſay more hereafter under the article TETRADYNAMIA. See alſo SILIQUOSÆ and SILICULOSÆ.

Siſymbrium, among the Romans, was one of the ingredients, of which the nuptial garlands were compoſed.

SISYMBRIUM, in *Gardening*, contains a plant of the hardy herbaceous kind, of which the ſpecies cultivated is the common water-creſs (S. naſturtium).

Method of Culture.—This may be effected by parting the roots, or by ſeed. In the firſt method, while the plants are young, a quantity of ſlips ſhould be made with root-fibres to them, and be planted out immediately in a ſhallow, trickling, watery ſituation, when they will readily ſtrike roots, ſeed, and increaſe themſelves.

The ſeed ſhould be collected during the ſummer ſeaſon, and ſown in the ſame places; or, which is better, the plants, with the ripened ſeeds upon them, be thrown into them, where they will ſtrike root, and ſhed their ſeeds for future increaſe.

Theſe plants are in much eſteem as winter and ſpring ſallad herbs.

SISYMBRIUM *Naſturtium*, *Water-Creſſes*, in the *Materia Medica*. The leaves of the water-creſſes have a moderately pungent taſte, and emit a quick penetrating ſmell, like that of muſtard-ſeed, but much weaker. Their pungent matter is taken up both by watery and ſpirituous menſtrua, and accompanies the aqueous juice, which iſſues copiouſly upon expreſſion: it is very volatile, ſo as to ariſe, in great part, in diſtillation, with rectified ſpirit, as well as with water, and almoſt totally to exhale in drying the leaves, or inſpiſſating by the gentleſt heat to the conſiſtence of an extract, either the expreſſed juice, or the watery or ſpirituous tinctures. Both the inſpiſſated juice, and the watery extract, diſcover to the taſte a ſaline impregnation, and in keeping throw up cryſtalline efflorescences to the ſurface. On diſtilling conſiderable quantities of the herb with water, a ſmall proportion of a ſubtile, volatile, very pungent oil is obtained.

Water-creſſes obtain a place in the materia medica for their antiſcorbutic qualities, which have been long very generally acknowledged by phyſicians. They are alſo ſuppoſed to purify the blood and humours, and to open viſceral obſtructions; they are nearly allied to ſcurvy-graſs, but are more mild and pleaſant, and for this reaſon are frequently eaten as ſallad. In the pharmacopeias the juice of this plant is directed with that of ſcurvy-graſs and Seville oranges; and Dr. Cullen has remarked, that the addition of acids renders the juices of the plantæ ſiliquoſæ moſt certainly effectual, by determining them more powerfully to an aceſcent fermentation. Lewis Mat. Med. Woodville Med. Bot.

SISYMBRIUM is alſo a name uſed to expreſs the wild water-mint. See MINT.

SISYRA, among the *Ancients*, a woolly ſkin uſed for a covering to beds.

SISYRINCHIUM, in *Botany*, from συς, *a hog*, and ῥυγχος, *a ſnout*, the name of a bulb, mentioned by Pliny amongſt other bulbs, under various Greek denominations. He relates, after Theophraſtus, book vii. chap. 13. that it is remarkable for increaſing, during winter, in the lower part, which in ſpring becomes contracted, and the upper part is then eatable. Nobody has aſcertained the real σισυῤῥιγχιον of Theophraſtus or Pliny. Botaniſts have applied this appellation according to their fancy, without even pretending to aſcertain whether it alludes to the fondneſs of ſwine for the root, or to any reſemblance in its figure to their ſnout. The *Siſyrinchium* of Columna, *Ecphr.* 328. *t.* 327, is *Ixia Bulbocodium*, in whoſe minute bulb that fanciful author traces ſuch a reſemblance. That of Bauhin and Tournefort is *Iris Siſyrinchium* of Linnæus, a common Greek plant, whoſe bulb increaſes at its ſummit, and is eatable. The name is now retained for a modern genus, of the ſame natural order indeed, but otherwiſe having nothing in common with the plant of the ancients.—Linn. Gen. 465. Schreb. 450. Willd. Sp. Pl. v. 3. 577. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 135. Gawler (Ker) in Sims and Kon. Ann. of Bot. v. 1. 246. Purſh 31. Cavan. Diſſ. 344. Juſſ. 57. Lamarck Illuſtr. t. 569. (Bermudiana; Tourn. t. 208. Gærtn. t. 11.)—Claſs and order, *Monadelphia Triandria.* (*Gynandria Triandria*, Linn.) Nat. Ord. *Enſatæ*, Linn. *Irides*, Juſſ.

Gen. Ch. *Common Sheath* two-edged, of two compreſſed, pointed valves; *partial* ones ſeveral, lanceolate, concave, obtuſe, inferior, ſingle-flowered. Perianth none. *Cor.* ſuperior, of ſix nearly equal, flattiſh, obovate, minutely pointed petals, ſpreading in their upper half; the three alternate exterior ones a little the broadeſt. *Stam.* Filaments three, united half way up, or more, into an obſcurely triangular tube, ſhorter than the corolla, their extremities ſpreading; anthers incumbent, roundiſh. *Piſt.* Germen inferior to the corolla, obovate; ſtyle triangular, the length of the tube; ſtigmas three, erect, ſcarcely tumid, undivided, notched. *Peric.* Capſule obovate, rounded, with three ſlight angles, of three cells, and three valves; the partitions from the centre of each valve. *Seeds* numerous, roundiſh, inſerted in two rows, into each of the partitions.

Eſſ. Ch. Common ſheath of two or more leaves. Calyx none. Petals ſix, nearly equal, flat. Style one. Capſule of three cells, inferior.

1. S. *latifolium*. Broad-leaved Siſyrinchium. Swartz Prodr. 17. Ait. n. 1. (S. palmifolium; Cavan. Diſſ. 348. t. 191. f. 1. Moræa plicata; Willd. Sp. Pl. v. 1. 243. M. palmifolia; Jacq. Ic. Rar. t. 227. Coll. v. 3. 192. Marica plicata; Curt. Mag. t. 655. Bermudiana palmæ folio, radice bulboſâ; Plum. Ic. 35. t. 46. f. 2.)—Stalk round. Sheath many-flowered. Leaves lanceolate, plaited. Native of the Weſt Indies. Cultivated by Miller in 1737. It requires the heat of a ſtove, flowering from

June to Auguſt. The *root* is an ovate bulb, with numerous, very thick and fleſhy, fibres. *Leaves* radical, ſtalked, erect, from one to two feet long, taper-pointed, ſmooth, dark-green, with many longitudinal parallel ribs and plaits. *Stalk* ſolitary, taller than the leaves, very ſmooth and round, bent obliquely, and horizontally at the top, where it bears ſeveral white, inodorous, ſhort-lived *flowers*, hardly an inch broad, accompanied by one ſmall erect leaf. *Anthers* yellow. Linnæus unaccountably confounded this with his true *S. palmifolium*, hereafter deſcribed.

2. S. *elegans*. Yellow Green-ſpotted Siſyrinchium. Willd. n. 1. (Moræa elegans; Jacq. Hort. Schoenbr. v. 1. 6. t. 12.)—Stalk round, ſimple, ſheathed, ſingle-flowered, ſhorter than the ſolitary, linear, decumbent, radical leaf. Petals oblong, acute.—Native of the Cape of Good Hope; flowering in a greenhouſe in May. *Bulbs* the ſize of hazel-nuts, each bearing a long, narrow, decumbent, ribbed, green *leaf*, and an erect *ſtalk*, about a ſpan high, clothed with many large, alternate, ſheathing, rather tumid, *bracteas*. The ſolitary terminal *flower* is full two inches broad, of a bright yellow; the diſk of each of the three outer *petals* marked with a broad green ſpot, highly ornamental. This and the following have not the true compreſſed bivalve *ſheath* of the genus.

3. S. *collinum*. Tawny Siſyrinchium. Cavan. Diſſ. 346. Willd. n. 2. Redout. Liliac. t. 250. (Moræa collina; Thunb. Moræa n. 13. Prodr. 11. Jacq. Ic. Rar. t. 226.)—Stalk round, ſheathed, ſomewhat branched, ſhorter than its linear, pointed, aſcending leaf. Petals oblong, acute. Plentiful on hills at the Cape of Good Hope. Taller than the laſt, with a branched *ſtalk*, bearing about three *flowers*, either of a tawny bluſh-colour, or pale buff, unſpotted. The *leaf*, which grows from the lower part of the ſtalk, ſtands erect, its point drooping over the uppermoſt flower.

4. S. *grandiflorum*. Large-flowered Siſyrinchium. Cavan. Diſſ. 346. t. 192. f. 2. Willd. n. 3.—Stalk round, ſimple, leafy. Sheath with about three flowers. Petals obtuſe, pointleſs. Leaves lanceolate, plaited. Native of Peru. *Bulb* ovate, an inch long, with capillary fibres. *Stem* a foot high, jointed, bearing three or four ſtalked *leaves*, from three to ten inches in length. *Flowers* an inch and a half broad, with obovate *petals*, yellow in the dried ſpecimen. Column of the *ſtamens* meaſuring near an inch. *Cavanilles*.

5. S. *Bermudiana*. Iris-leaved Siſyrinchium. Linn. Sp. Pl. 1353, β. Willd. n. 4. Ait. n. 2. Cavan. Diſſ. 346. t. 192. f. 1. Mill. Illuſtr. t. 73. Redout. Liliac. t. 149. (S. iridioides; Curt. Mag. t. 94. Bermudiana iridis folio, radice fibroſa; Dill. Elth. 48. t. 41. f. 48.)—Stalk two-edged, branched, leafy. Sheath ſhorter than its four flowers. Petals pointed. Leaves ſword-ſhaped.—Native of the Bermuda iſlands. Common in our ſtoves or greenhouſes ſince the time of Dillenius, flowering in ſummer. The *root* is fibrous, perennial. *Plant* erect, about a foot high, ſmooth, with a narrow compreſſed *ſtem* and *leaves*. *Flowers* numerous, an inch wide, dark blue, pale green in the centre, on ſlender partial ſtalks.

6. S. *anceps*. Narrow-leaved Siſyrinchium. Cavan. Diſſ. 345. t. 190. f. 2. Willd. n. 5. Ait. n. 3. Purſh n. 2. (S. Bermudiana; Linn. Sp. Pl. 1353, α. S. gramineum; Curt. Mag. t. 464. Redout. Liliac. t. 282. Bermudiana graminea, flore minore cæruleo; Dill. Elth. 49. t. 41. f. 49.)—Stalk two-edged, winged, unbranched, nearly leafleſs. Sheath unequal, longer than its four flowers. Petals pointed. Leaves ſword-ſhaped.—Native of North America. On dry hills and graſs-plats, from Canada to Carolina, flowering in July and Auguſt. *Purſh*. Hardy in our gardens, but ſeldom preſerved, the *flowers* being ſo much ſmaller and leſs conſpicuous than the former. The whole *plant* is about half the ſize of that ſpecies, of a graſſy aſpect; the *root* crowned with numerous fibres, from the decayed foliage of former ſeaſons.

7. S. *mucronatum*. Pointed-ſheathed Siſyrinchium. Michaux Boreal-Amer. v. 2. 33. Purſh n. 1.—Stalk unbranched, ſomewhat ſetaceous as well as the leaves. Sheath coloured; one valve ending in a long point. In wet meadows of ſhort graſs, in Pennſylvania and Virginia, flowering in June and July. Perennial. *Flowers* of a beautiful blue, ſmaller than the laſt. *Purſh*. The lower part of the *leaves* and the *ſheaths* are purple. *Michaux*.

8. S. *micranthum*. Small-flowered Siſyrinchium. Cavan. Diſſ. 345. t. 191. f. 2. Willd. n. 6.—Stalk two-edged, branched, leafy. Sheath about equal to its two or three flowers. Petals linear, pointed. Leaves channelled.—Gathered by Joſeph de Juſſieu in Peru.—*Root* fibrous. Whole *plant* but three inches high. *Leaves* ſeveral, linear, pointed, concave or channelled, ſheathing, ſhorter than the ſtem. *Sheath* ſomewhat unequal. *Flowers* very ſmall, on capillary ſtalks.

9. S. *californicum*. Yellow Unbranched Siſyrinchium. Ait. n. 4. (Marica californica; Ker in Curt. Mag. t. 983.)—Stalk two-edged, winged, unbranched. Petals obovate, pointleſs. Leaves linear-ſword-ſhaped.—Diſcovered on the coaſt of California, by Mr. Archibald Menzies, who brought ſeeds to England, in 1796. It proves a hardy greenhouſe perennial plant, flowering in ſummer and autumn, and readily propagated, either by ſeed or parting the roots, which, like thoſe of perhaps all the indubitable ſpecies of this genus, unfortunately for the origin of its name, are fibrous. The *ſtalk* is about two feet high, being taller than the *leaves*, though nearly the ſame breadth, and bears but one tuft of numerous *flowers*, from a cloſe *ſheath*, one of whoſe valves riſes ſomewhat above them. The *corolla*, *ſtamens*, and *ſtyle*, are of an uniform bright yellow. Mr. Ker remarks, that the *filaments* are combined in their lower part only.

10. S. *convolutum*. Yellow Branched Siſyrinchium. Redout. Liliac. t. 47.—Stalk two-edged, branched, leafy. Petals ovate, ſcarcely pointed. Leaves linear-ſword-ſhaped.—Said to be a native of the Cape of Good Hope, but for this M. Redouté had no certain authority. It was ſent from Italy to the Paris gardens, and we ſhould not be greatly ſurpriſed, if future enquiries ſhould prove it of American origin. There ſeems very little difference between this ſpecies and the laſt, except its more humble growth, and the *ſtem* being divided or branched, and leafy. Redouté has erroneouſly defined the latter as round, which is corrected in his fifth volume, at *t.* 275. The name alludes to the rolling in of the *petals* as they fade, which is alſo the caſe in *californicum*, and many, if not all, of the other ſpecies.

11. S. *tenuifolium*. Yellow Slender-leaved Siſyrinchium. Redout. Liliac. t. 275.—Stalk compreſſed, branched, ſpreading. Petals ovate, acute. Leaves linear-awlſhaped. Germen hiſpid.—Communicated to the Paris garden by M. Zea, a celebrated Spaniſh botaniſt; ſo that we preſume the plant to be a native of Mexico or Peru, though nothing has been made known as to its origin. This ſpecies agrees with the laſt in its yellow *flowers*, which however appear to be rather more numerous, ſometimes ſix, in each *ſheath*. The *ſtem* and *leaves* are much more ſlender, and hardly ſo tall; the former twice-branched, in a ſpreading manner, the *branches* curved upwards, with an erect leaf or two at each ſubdiviſion. The *germen* is remarkable

for being rough with little glandular hairs, which fall off as the *capſule* ripens. Theſe have not been noticed in any other ſpecies.

12. S. *ixioides*. White New Zealand Siſyrinchium. Forſt. Prodr. 61. (Ferraria ixioides; Willd. Sp. Pl. v. 3. 582. Morea ixioides; Thunb. Moræa n. 7.)—Stalk triangular, branched. Leaves linear, with cartilaginous edges. Outer petals half the ſize of the inner.—Gathered in New Zealand, by Forſter, whoſe ſpecimens are before us. The *root* is woody, furniſhed with very long, tough, zigzag fibres. *Stalks* a ſpan high, nearly leafleſs, branched in the upper part. *Leaves* ſhorter than the ſtalks, erect, flat, linear, a quarter of an inch wide, ſtrongly ſtriated, with a pale cartilaginous edge, but not ſword-ſhaped, as they have no prominence or rib in the middle; their baſes are ſheathing, or equitant. *Partial flower-ſtalks* rigid, widely ſpreading, two, three, or four together, with very ſmall lanceolate *ſheaths* at their origin. *Flowers* about half an inch broad, white, their three outer *petals* ſomewhat coloured, if we may judge from the dried ſpecimen. *Germen* ſmooth. The ſpecimens Thunberg ſaw were taller than our's. The inequality of the *petals* probably led Willdenow to make this plant a *Ferraria*; but it wants the genuine character of that genus, the jagged and curled *corolla*, and has altogether the habit of a true *Siſyrinchium*.

13. S. *palmifolium*. Palm-leaved Siſyrinchium. Linn. Mant. 122, excluding the ſynonym. Willd. n. 7. Ait. n. 5? (Moræa palmifolia; Thunb. Moræa n. 6.)—Stalk two-edged, winged, denſely corymboſe at the ſummit. Leaves ſword-ſhaped, ſtrongly ribbed.—Gathered in Braſil, by father Panegai, who ſent it, with many other new plants, to profeſſor Arduino of Padua, by whom they were tranſmitted to Linnæus. The preſent has all the appearance of a true *Siſyrinchium*, with a fibrous perennial *root*. The *ſtem* is two feet high, erect, unbranched, naked, with two oppoſite leafy wings. *Leaves* equitant, erect, ſhorter than the ſtem, three-quarters of an inch wide, having about five principal ribs in the middle part, and a few finer ones towards the edges. *Flowers* very numerous, in a denſe, corymboſe, compound, terminal *panicle*, two or three inches high, accompanied by one erect ribbed leaf, about the ſame height. *Bracteas* and *ſheaths* near an inch long, ovate, pointed, ſtriated, concave, membranous at the edges. *Flowers* apparently pale, with numerous dark or purpliſh veins; their partial *ſtalks* longer than the ſheaths. *Germen* roundiſh, ſmooth. We are unable to account for the *flowers* having been termed *ſpiked*, unleſs Thunberg has confounded any thing elſe with this rare ſpecies. Linnæus ſays the *ſtyle* is three-cleft more than half way down.

14. S. *ſtriatum*. Yellow Striated Siſyrinchium. Sm. Ic. Pict. t. 9. Willd. n. 8. Ait. n. 6. Redout. Liliac. t. 66. (S. ſpicatum; Cavan. Ic. v. 2. 2. t. 104. Moræa ſertata; Jacq. Hort. Schoenbr. v. 1. 6. t. 11. Marica ſtriata; Ker in Curt. Mag. t. 701.)—Stem much branched, leafy, compreſſed, winged, many-flowered. Flowers faſciculated, with a ſimple ſheath to each.—Native of Mexico; a hardy perennial in our gardens, propagating itſelf ſpontaneouſly by ſeed. The *root* is fibrous, tufted. *Stems* ſeveral, two or three feet high, accompanied by copious, equitant, ſword-ſhaped, ſtriated, glaucous *leaves*, edged with purple, and tinged with ſaffron-colour at their baſe. *Flowers* very numerous, inodorous, forming tufts along the branches, as if whorled, each tuft accompanied by a large concave ſimple *bractea*, and each of the numerous partial ſtalks attended by a ſimple membranous *ſheath*. *Corolla* above an inch wide, expanding in ſunſhine only, when the flowers make a handſome appearance, laſting in ſucceſſion through moſt part of the ſummer. *Petals* obtuſe with a point, ſlightly cohering at the baſe, into the form of a bell, yellow and more or leſs ſpotted within; their upper part widely ſpreading, pale yellow above, ſtriated with purple veins beneath. *Germen* roundiſh, ſmooth. *Capſule* the ſize of a black currant, gibbous. It will be perceived that the ſheaths of this ſpecies do not exactly anſwer to the generic character, yet nothing can be a more genuine *Siſyrinchium*. Much has been done to diſcriminate the genera of this order, and great improvements have been made, but much is ſtill wanting.

SISYRINCHIUM, in *Gardening*, contains plants of the flowery perennial kind, of which the ſpecies cultivated are, the Iris-leaved ſiſyrinchium (S. bermudiana); and the narrow-leaved ſiſyrinchium (S. anceps).

It is obſerved, that the leaves, ſtalks, and flowers of the firſt ſort are three times as large as in the ſecond, and the ſheath incloſes ſix or ſeven flowers; whereas the ſecond has rarely more than two, and theſe expand only for a ſhort time in the morning, while, in the former, they continue open the whole day.

Method of Culture.—Theſe plants may be increaſed by ſeeds and parting the roots: in the former method, the ſeeds of the firſt ſort ſhould be ſown in the autumn, as ſoon as they become ripe, on a border which has an eaſtern aſpect, in drills at three or four inches diſtance, covering them about half an inch with fine mould; they ſhould afterwards be kept clean from weeds with care. They ſucceed beſt in a loamy ſoil in a ſhady ſituation, and where the ground has not been manured. But in the latter ſort the ſeeds ſhould be ſown in pots, in order that they be protected in the green-houſe, or by ſome other means.

The firſt kind affords ornament in the large open borders and clumps of pleaſure-grounds, and the latter among other green-houſe plants of the ſame growth.

SISZEK, in *Geography*, a town of Croatia, at the conflux of the rivers Save and Kulpa, fortified with a wall and moat; captured by the Turks in 1593, and burned by them in 1594, but rebuilt by the Hungarians; 48 miles S. of Varaſdin. N. lat. 45° 38′. E. long. 16° 44′.

SIT, an iſland in the Adriatic. N. lat. 4° 14′. E. long. 15° 24′.

SITA, in *Hindoo Mythology*, is a celebrated incarnation of the goddeſs Lakſhmi, celeſtial conſort of Viſhnu, in his avatara, or deſcent in the form of Rama. In the language of Hindoo fable, ſhe was his ſakti, or energy; and numberleſs poems have been written in honour of her beauty, merits, and deeds. She is one of the moſt popular goddeſſes of the Hindoo Pantheon, and is indeed one of the moſt virtuous and intereſting characters in their puranic or heroic legends. Her hiſtory and that of her lord forms the ſubject of the Ramayana, which epic poem, like the Iliad, is grounded on a rape. (See RAMAYANA.) As noticed in that article, and RAVENA, the carrying off, by the treachery of the tyrant of that name, the virtuous ſpouſe of Rama, rouſed that hero to the mighty deeds neceſſary for her reſcue from the hands of her powerful perſecutor, and celebrated in the fine poem of Valmiki; and, as noticed above, in numberleſs others of ſecondary and minor fame.

The outline of Sita's hiſtory is this. The childleſs raja Janaka, (ſee JANAKA,) having duly propitiated the gods, was led to the benevolent adoption of a female child about five years old, found incloſed in a box by a Brahman in a field. She was called Sita, from *ſit* or *ſet*, meaning a furrow or field; and Janeki, after her adoptive father. Sita, however, means alſo *fair*, and may be thence derived, and is in this ſenſe, of denoting beauty, given alſo to Parvati and Saraſwati, conſorts of the other two divine perſons of the Hindoo triad. She proved to be an incarnation of Lakſhmi, as before noticed; and on attaining maturity was won by Rama, in a conteſt of archery with many ſovereigns, ambitious of obtaining a prize of ſuch incomparable beauty. This ſtory, as it is related in the Ramayana, reminds us of the unyielding bow of Ulyſſes; as none but Rama had power to accompliſh the required and ordained feat; which was piercing the eye of a fiſh whirling on a pin fixed on a high pole; and not looking at the mark, but at its reflection in a veſſel of oil placed on the ground. The ten-headed-twenty-handed tyrant Ravena had previouſly failed. See RAVENA.

Burning with the rage of diſappointed deſire, the tyrant carried her off; and having been in his power, her purity might be poſſibly ſuſpected; ſhe therefore plunged into the flames, where, defended by Pavaka, the regent of fire, her incombuſtibility atteſted her innocency. She was of courſe triumphantly reſtored to her overjoyed huſband. In the Ramayana ſhe is deſcribed as "endued with youth, beauty, goodneſs, ſweetneſs, and prudence; an inſeparable attendant on her lord, as the light on the moon; the beloved ſpouſe of Rama, dear as his own ſoul; formed by divine illuſion, amiable, and adorned with every charm;" and always held forth as an example of conjugal faith and affection.

While confined on the iſland of Lanka, or Ceylon, (ſee thoſe articles,) and perſecuted by the addreſſes of its tyrannical ſovereign, the anguiſh and lamentation of Sita are copious ſubjects of hyperbole for Hindoo poets. Travellers are ſtill ſhewn a lake or pool, called Sita-koonda, ſaid to have originated in the floods of tears ſhed by the captive beauty. This extravaganza was not loſt on our early miſſionaries and travellers. Ceylon being with them the garden of Eden, they find Adam's peak, Adam's bridge, &c. called Rama's by the natives. Eve perſonates Sita, in reſpect to this pool. Sir John Mandeville notices it in his quaint way. Deſcribing Ceylon, he has fair ſcope for his poetical exuberance. "In that iſle is a gret mountayne, and in mydd place of the mount is a gret lake in a full fayre pleyne, and there is gret plentie of watre. And thei of the contrie ſeyn that Adam and Eve wepten upon that mount 100 zeer, when thei weren dryven out of Paradys. And that watre thei ſeyn is of here teres; for ſoe much watre they wepten that made the foreſede lake." Sir John died in 1372. See MANDEVILLE.

A beautiful tree, called Aſoka by Sanſcrit botaniſts, bears a mythological reference to the above fable of Sita. She was confined in a grove of thoſe trees, whoſe name is derived from grief, or lamentation. It is hence, perhaps, alſo ſacred to the god of tears, or the avenging Siva. (See SIVA.) Aſoka, indeed, rather from its privative initial, denotes the abſence of grief, equivalent to grief-diſpeller; thus named poſſibly from its beauty, ſo greatly admired by a poetical and taſteful people.

A numerous ſect of Hindoos adore Sita as Lakſhmi herſelf. It is a branch of the ſect of Ramanuj. (See that article, and SECTS *of Hindoos*, for an account of their peculiarities.) Under the article SAKTI will be found farther thereon. She is ſaid to have borne Rama two ſons, Kuſhi and Lava, who were great orators and minſtrels; but they are ſeldom heard of, except in legends immediately relating to their family.

In our article RAMA we have noticed a Peruvian feſtival, called Ramaſitoa, which, as well as in name (Rama-Sita), remind us of uſages ſtill common among Hindoos. Thoſe diſpoſed to lay ſtreſs on etymological coincidences, may, perhaps, here alſo find the ſource of the much diſputed ſenſe of the word *Paraſiti*. (See Potter's Archæol. Græc. b. ii. c. iii.) This was the name of an order of men among the Greeks, whoſe office ſeems originally to have been the gathering from the huſbandmen the corn allotted for public ſacrifices. Para and Sita are names, in fact, of all the three principal Hindoo goddeſſes, Lakſhmi, Parvati, and Saraſwati (ſee thoſe articles, and PARA,) and may be ſaid to mean *firſt* and *faireſt*, as well as firſt field or fruits. To all theſe, corn and other firſt-fruits of the field are appropriate offerings; the gathering and care of which might give the prieſts the name of Paraſiti. The common appropriation of theſe tithes to their own uſes would naturally in time degrade them and their name in the eſtimation of their flock, who, detecting the impoſtures of prieſtcraft, brought them to their proper level in the ſenſe of the thence derived word Paraſite. See that article.

SITACA, or SITACE, in *Ancient Geography*, a large and well-peopled town of Aſia, in the Perſide, near Babylon, and 15 ſtadia from the Tigris, according to Xenophon. This town was ſituated nearly at an equal diſtance from the Tigris and the Euphrates, N.W. of Seleucia.

SITACAS, a river of Aſia, in the Perſide, which runs into the Perſian gulf, about 800 ſtadia beyond the mount Areon, according to Nearchus.

SITALA, in *Geography*, a river of Mexico, which runs into the Pacific ocean, N. lat. 17° 38′. W. long. 101° 40′.

SITANG, a river of Hindooſtan, one of the branches of the river called Pegu, which runs into the bay of Bengal.

SITANTA, the name of a fabulous mountain, in which is deſcribed the terreſtrial abode of the god Indra, the Hindoo regent of the firmament. (See INDRA.) In the Hindoo Pantheon, the wonderful mountain Meru is deſcribed from the Puranas. (See MERU.) On one of its three peaks is Kailaſa, the Olympus of Siva; and on another is the Swerga, or paradiſe of Indra. But his terreſtrial abode is on Sitanta, a part probably of Meru; and it may be amuſing to ſee in what the delights of Hindoo gods are ſuppoſed, by their ſacred writers, to conſiſt. Sitanta is "ſkirted by a moſt delightful country, well watered, and enlivened by the harmonious noiſe of the black bee and frogs. There, among immenſe caves, is the Kridavana, or place of dalliance of Mahendra; where knowledge and the completion of our wiſhes are fully acknowledged. There is the great foreſt of the Pariyateka-tree of the king of the gods, known through the three worlds; and the whole world ſings his praiſe from the Veda. Such is the place of dalliance of him with a thouſand eyes, or Indra. In this charming grove of Sakra, or Indra, the gods, the danavas, the ſnakes, yakſhas, rakſhas, guhyas or kuveras, gandharvas, live happy; as well as numerous tribes of Upſara, fond of ſport." P. 270. The Gandharvas are celeſtial female choriſters.

The abode of Viſhnu is uſually called *Vaikontha*; which ſee, and SWERGA.

SITAWACA, in *Geography*, a town of the iſland of Ceylon; 44 miles S.S.W. of Candy.

SITCA, a Ruſſian ſettlement on the N.W. coaſt of America, ſomewhat S. of Cadiack, or Kadiak, in the interior of that deep bay to which Vancouver gave the name of Norfolk's ſound. The ſavages in this quarter are of a more lively and ferocious character than thoſe of Cadiack. Inſtead of dozing on the ridges of their houſes, they ſing and dance perpetually; and are both brave and expert in the uſe of fire-arms, with which they are ſupplied by the American traders, who occaſionally reſort to that coaſt. They killed five or ſix of M. Liſianſky's men, in a gallant defence of a kind of rude fort, from which that commander choſe to expel them, that the agents of the Ruſſian Company might occupy the ſpot as a factory. After cannonading it all day, it was found next morning that the natives had deſerted it in the night; and when M. Liſianſky went to take poſſeſſion, he was not a little ſhocked "to find, as in a ſecond maſſacre of innocents, numbers of young children lying together murdered! leſt their cries, if they had been carried along with them, might have led to a diſcovery of the flight of their cruel parents;—a number of dogs had been butchered for the ſame reaſon." They burn their dead, and maſſacre their priſoners. They are extremely muſcular and hardy; and apparently quite inſenſible to pain. One lad, who frequently viſited the navigators, and ſtole whatever he could lay his hands on, was at laſt threatened with the ſcourge, but abſolutely laughed at the menace,—and continued his deriſion and gaiety when under the moſt rigorous diſcipline that a Ruſſian flagellator could apply. They are great beaux withal;—paint their faces of various colours, and work up their hair with a red paſte, and then powder it in a magnificent manner with the fine white down of the ſea-ducks. Their country is obviouſly volcanic. M. Liſianſky climbed up the higheſt mountain on the coaſt, which Vancouver diſtinguiſhed by the name of Mount Edgecumbe, and found the ſummit formed into a huge crater, nearly two miles in circuit, and about three hundred feet deep. It was partly filled with ſnow; and there is no tradition of the volcano having been ſeen in a ſtate of activity. The height he eſtimated at no leſs than 8000 feet.

We ſhall here ſubjoin, from the work now before us, ſome account of the other ſettlement called *Cadiack.* This is a large barren iſland, at the eaſtern extremity of the Aleutian chain; inhabited by about 4000 of the moſt filthy and ſtupid ſavages of which we have any where an account. They are almoſt all covered over with itch and ulcers; and are extremely indolent and torpid. "Their favourite recreation," ſays M. Liſianſky, "after ſleeping, is to ſit on the roofs of their houſes, or on the beach, for hours together, looking at the ſea, and obſerving a profound ſilence, for they never converſe; and I am perſuaded," adds the worthy Muſcovite, "that *the ſimplicity* of their character exceeds that of any other people." Their great paſſion is for ſnuff and amber; and their chief occupation catching whales,—on the blubber of which they fatten luxuriouſly, in a favourable ſeaſon. They have a ſtrange ſuperſtition, which leads them to believe that the poſſeſſion of the dead bodies of any old or famous fiſhers contributes eſſentially to their good luck; and accordingly ſhew conſiderable ſagacity in hunting them up in the caverns and other ſecret places where they have been ſtowed by their relations. Some, ſays M. Liſianſky, have actually accumulated a treaſury of not fewer than twenty ſuch corpſes.

M. Liſianſky obſerves, that the volcanic energy ſeems to be more entire in this than in any other region of the world. In the neighbourhood of Oonalaſhka, which is ſituated about the centre of the Aleutian chain, a new iſland, nearly twenty miles in circumference, has been formed within theſe twenty years. The following is the account of it, which M. Liſianſky collected from eye-witneſſes at Cadiack.

"In the evening of the 26th, while I was alone, writing the memorandums of my journal, a Ruſſian introduced himſelf, who had reſided on the iſland of Oonalaſhka, when a new iſland ſtarted up in its vicinity. I had heard of this phenomenon, and was therefore deſirous to learn what he knew reſpecting it. He ſaid, that about the middle of April 1797, a ſmall iſland was ſeen where no iſland had been ſeen before. That the firſt intimation of its appearance had been brought by ſome Aleutians to Captain's Harbour, who, returning from fiſhing, obſerved a great ſmoke iſſuing out of the ſea; that this was the ſmoke of the volcano, which was then gradually riſing above the ſurface of the ſea, and which in May, 1798, burſt forth with a blaze, that was diſtinctly ſeen from a ſettlement called Macooſhino, on the iſland of Oonalaſhka, at the diſtance of no leſs than forty miles in the north-weſt. This new iſland is tolerably high, and about twenty miles in circumference. It has been remarked, that it has not increaſed in ſize ſince the year 1799; and that no alteration has taken place in its appearance, except that ſome of the higheſt points have been thrown down by violent eruptions." See Liſianſky's Voyage round the World, in the Years 1803, 4, 5, and 6, performed by Order of His Imperial Majeſty Alexander I. Emperor of Ruſſia, &c. 4to. London, 1814.

SITCHEVSK, a town of Ruſſia, in the government of Smolenſk; 96 miles E.N.E. of Smolenſk. N. lat. 55° 34′. E. long. 34° 44′.

SI-TCHUA, a town of the kingdom of Corea; 33 miles N. of Han-tcheou.

SI-TCHUEN, a town of China, of the third rank, in Ho-nan; 55 miles W. of Nan-yang.

SI TE *fecerit ſecurum*, in *Law*, a ſpecies of original writ, called peremptory, which directs the ſheriff to cauſe the defendant to appear in court, without any option given him, provided the plaintiff gives the ſheriff ſecurity effectually to proſecute his claim. This writ is in uſe, where nothing is ſpecifically demanded, but only ſatisfaction in general; to obtain which, and miniſter complete redreſs, the intervention of ſome judicature is neceſſary. Such are writs of treſpaſs, or on the caſe, in which no debt, or other ſpecific thing, is ſued for in certain, but only damages to be aſſeſſed by a jury. See PRÆCIPE.

SITE, or SCITE, *Situs*, denotes the ſituation of a houſe, meſſuage, &c. And ſometimes the ground-plot, or ſpot of earth on which it ſtands.

SITES *of Homeſtalls*, *Yards*, &c. the ſituations proper for them in different caſes. Theſe are very various, according to the nature and kind of the farms for which they are deſigned, as whether they are thoſe of the ſheep, the grazing, the dairying, the hay and graſs, or thoſe of the mixed, arable, and graſs ſort. In each kind there is a great number of different ſuitable requiſites to be provided, which muſt, in a great meaſure, depend upon the ſite itſelf. See FARM-*Yard*, and YARD.

SITE, *Situs*, in *Logic*, one of the predicaments, declaring a ſubject to be ſo and ſo placed.

SITENSKOI, in *Geography*, a town of Ruſſia, in the government of Novgorod, near the Ilmen; 20 miles W.S.W. of Kreitzei.

SITHA, a town of Hindooſtan, in Guzerat; 75 miles N.N.E. of Junagur.

SITHCUNDMAN, in our *Old Writers*, one whoſe province it was to lead the men of a town or pariſh. Leg. Inæ. cap. 56.

Dugdale ſays, that in Warwickſhire the hundreds were formerly called *ſytheſoca*, and that *ſitheſocundman*, and *ſithcundman*, was the chief officer within ſuch a diviſion, *i. e.* the high-conſtable of the hundred.

SITHE. See SCYTHE.

SITHESOCA, in our *Old Writers*, is uſed to denote the diſtrict now called a *hundred*. The word is Saxon, ſignifying a *franchiſe*, or *liberty*.

SITHON, in *Ancient Geography*, a mountain of Thrace.—Alſo, an iſland of the Ægean ſea.

SITHONIA, a part of Thrace, on the Toronæan gulf, in which were the towns of Torone, Galepſus, Sarmyles, Mecyberne, and Olymbe.

SITHONII, a people of Thrace, near the Euxine ſea, among whom Orpheus was born.

SITIA, a town of Spain, which had a voice in the aſſembly of Cordova.

SITICINES, among the Romans, perſons who ſounded a kind of trumpet, having a very mournful tone, at the burying of the dead.

SITJES, in *Geography*, a town of Spain, in the province of Catalonia; 12 miles S.W. of Barcelona.

SITIFIS, in *Ancient Geography*, a town of Mauritania Cæſarienſis, which became the capital of one of the Mauritanias, to which it gave name. See SITIPHA.

SITIGNAK, in *Geography*, one of the Fox iſlands, in the North Pacific ocean. N. lat. 53° 30′. E. long. 117° 14′.

SITINAGUR, a town of Hindooſtan, in Tellingana; 6 miles N. of Indelavoy.

SITIPHA, or SITIFI *Colonia*, *Settaf*, in *Ancient Geography*, a town of Africa, and the metropolis of Mauritania Sitifenſis. It was ſituated in the interior of the country towards the S.E. of Saldæ.

SITIOGOGUS, a river of Aſia, in the Perſide, which ran into the Perſian gulf.

SITODIUM, in *Botany*, Gærtn. v. 1. 344. t. 71, 72, a name originally applied to the genus affording the celebrated bread-fruit, by ſir Joſeph Banks and Dr. Solander, and derived from σῖτος, *bread*, *food*, or *proviſion*. This name has given way to ARTOCARPUS; ſee that article, and RADERMACHIA.

SITOMAGUM, or SITOMAGUS, in *Ancient Geography*, a town of the iſle of Albion, in the country of the Iceni, between Cambretonium and Venta Icenorun, according to Antonine's Itinerary.

SITON, a town of Greece, in Theſſaly.

SITONÆ, Σιτωναι, among the Athenians, officers appointed to lay in corn for the uſe of the city, for which purpoſe the ταμιας της διοικησεως, or the public treaſurer, was to furniſh them with as much money as they had occaſion for. Potter, Archæol. Græc. lib. i. cap. 15. tom. i. p. 83.

SITONE, in *Ancient Geography*, a town of Macedonia, in the vicinity of mount Athos.

SITONES, the name of one of the three principal claſſes of people who inhabited Scandinavia, beyond mount Savos, and bounded by the ſea to the weſt and the ſouth.

SITOPHYLAX, Σιτοφυλαξ, formed from σῖτος, *corn*, and φυλαξ, *keeper*, in *Antiquity*, an Athenian magiſtrate, who had the ſuperintendance of the corn; and was to take care that nobody bought more than was neceſſary for the proviſion of his family.

By the Attic laws, particular perſons were prohibited buying more than fifty meaſures of wheat a man; of thoſe meaſures, we mean, called φορμοι, and the ſitophylax was to look to the obſervation of this law. It was a capital crime to prevaricate in it.

There were fifteen of theſe ſitophylaces; ten for the city, and five for the Piræus.

SITORE, in *Geography*, a town of Hindooſtan, in the province of Tinevelly; 10 miles N. of Palamcotta.

SITPOUR, a town of Hindooſtan, in the ſubah of Moultan, on the Indus; 30 miles N.W. of Moultan.

SITRIGALLY, a town of Hindooſtan, in Myſore; 34 miles N.N.E. of Chitteldroog.

SITTA, the *Nuthatch*, in *Ornithology*, a genus of birds of the order Picæ, of which the generic character is, Bill ſubulate, roundiſh, ſtraight, entire; the upper mandible is a little longer, compreſſed, and angular at the tip; tongue jagged, ſhort, horny at the tip; the noſtrils are ſmall, covered with briſtles; the feet are formed for walking; the hind-toe is long. Gmelin reckons twelve

Species.

* EUROPÆA; European Nuthatch. Cinereous, beneath reddiſh; the tail-feathers black; the four lateral ones beneath are tipt with white. It weighs nearly an ounce; its length is five inches; the bill is ſtrong and ſtraight, and about three-quarters of an inch long; the upper mandible is black, the lower white; the irides hazel; the crown of the head, back, and coverts of the wings, are of a fine blueiſh-grey; a black ſtroke paſſes over the eye from the mouth; the cheeks and chin are white; the breaſt and belly are of a dull orange-colour; the quill-feathers are duſky; the wings underneath are marked with two ſpots, one white, at the root of the exterior quills, the other black, at the joint of the baſtard-wing; the tail conſiſts of twelve feathers, the two middle are grey, the two exterior feathers tipped with grey, then ſucceeds a tranſverſe ſpot, beneath that the reſt is black; the legs are of a pale yellow; the back toe very ſtrong, and the claws large. Such is Mr. Pennant's deſcription of the European nuthatch, who adds, that "this bird runs up and down the bodies of trees like the woodpecker tribe, and feeds not only on inſects but on nuts, of which it lays up a conſiderable quantity, as winter proviſion, in the hollows of trees. It breeds likewiſe in the hollows of trees; and if the entrance be too large, it ſtops up part of it with clay, leaving only room enough for admiſſion. In autumn it begins a chattering noiſe, being ſilent the greater part of the year. This bird makes its neſt of dead leaves, moſtly of the oak, which it heaps together without much order. It lays ſix or ſeven eggs, which are white, ſpotted with ruſt colour, ſo exactly like thoſe of the great titmouſe, that it is almoſt impoſſible to diſtinguiſh them. No perſecution will force this little bird from its habitation, when ſitting: it defends its neſt to the laſt extremity, ſtrikes the invader with its bill and wings, and makes a hiſſing noiſe; and after every effort of defence, will ſuffer itſelf to be taken in hand, rather than quit its poſt."

"The nuthatch," ſays colonel Montague, in his Ornithological Dictionary, "is more expert in climbing than the woodpecker; for it runs in all directions up and down a tree, whereas the other is never obſerved to deſcend: the ſtiff tail of thoſe birds ſupport them in the act of climbing and hacking. The flexible tail of the nuthatch gives it no ſuch advantage, nor does it ſeem to want it; for its moſt favourite poſition, when breaking a nut, is with the head downwards. In autumn it is no uncommon thing to find, in the crevices of the bark of an old tree, a great many broken nut-ſhells, the work of this bird, who repeatedly returns to the ſame ſpot for this purpoſe. When it has fixed the nut firmly in a chink, it turns on all ſides, in order to ſtrike it with the moſt advantage. This, with the common hazel-nut, is a work of ſome labour; but it breaks the filberd with eaſe. In defect of ſuch food, inſects and their larvæ are ſought after among the moſs on trees, and old thatched buildings. It is commonly met with about orchards, and is ſometimes ſeen, in the cider ſeaſon, picking the ſeeds from the refuſe of the preſſed apples. The note is various: in the ſpring it has a remarkably loud ſhrill whiſtle, which ceaſes after incubation; in autumn is a double reiterated cry." There is a variety, called the little nuthatch, which is much ſmaller than the common nuthatch, and of a more noiſy diſpoſition. It reſides in ſimilar ſituations, and is equally ſolitary; aſſociating only with its mate, and attacking any other it may happen to ſee.

Canadensis; Canada Nuthatch. Cinereous, beneath pale rufous; eye-lids white. This is of the ſize of the European ſpecies; the bill is blackiſh; crown of the head, hind part of the neck, and ſhoulders, black; the back and rump are of a light grey; over each eye is a white line; the cheeks are white; larger quill-feathers duſky, with grey edges; breaſt and belly pure white; the two middle tail-feathers are grey, the reſt black, with a white ſpot at the tip; the vent is ferruginous, and the legs are brown. It is, as its ſpecific name imports, a native of Canada, and extends its journies as far ſouth as New York. Mr. Pennant makes it a mere variety of the European nuthatch; but by Linnæus and Latham it is regarded as a diſtinct ſpecies.

Carolinensis; Black-headed Nuthatch. Cinereous, beneath whitiſh; lower part of the belly reddiſh; head and neck above black; lateral tail-feathers white, varied with black. It is a native of the temperate parts of America, and of the iſland of Jamaica.

Jamaicensis; Jamaica Nuthatch. Cinereous, beneath white; crown black; lateral tail-feathers blackiſh, tipped with tranſverſe white lines. This has been deſcribed by ſir Hans Sloane in his Natural Hiſtory of Jamaica. It is of the ſize of the common nuthatch, the length being five inches and a half; the bill nearly an inch long, and black; the head is large, with a black crown. It is, as its ſpecific name imports, a native of the iſland of Jamaica. It is alſo found in many parts of South America, feeding on inſects, and having the character of a ſtupid bird, eaſily ſuffering itſelf to be taken. From the ſize of its head, it is known in Jamaica by the name of loggerhead. There is a variety much leſs.

Pusila; Small Nuthatch. Cinereous, beneath dirty white; the head is brown, with a dirty white ſpot behind; the lateral tail-feathers are black. It inhabits North America, and is ſaid to be found in Carolina throughout the whole year.

Major; Great Nuthatch. Grey, beneath whitiſh; the chin is white; the quill and tail-feathers brown, edged with orange. This is deſcribed by ſir Hans Sloane in the Hiſtory of Jamaica; it is ſeven inches and a half long; the bill is thickeſt in the middle, and curved at the end; the head and back are grey; the under parts are whitiſh; the wings and tail are brown, with orange edges. It is a native of Jamaica, and feeds on worms, inſects, &c.

Nævia; Spotted Nuthatch. Above it is of a lead-colour, beneath glaucous; the chin is white; the wing-coverts are ſpotted with white. This bird is deſcribed by Edwards under the title of wall-creeper of Surinam, who ſays, the bill is long in proportion, ſtraight, ſomewhat compreſſed ſideways, a little hooked at the point, and of a duſky browniſh colour; the head, the hinder ſide of the neck, back, rump, tail, and wings, are of a dark blueiſh-lead colour; all the covert-feathers on the upper ſide of the wings are tipped with white; the inſides of the quills and under ſide of the tail-feathers are aſh-coloured, lighter than they are above; the throat is white; the breaſt, belly, thighs, and coverts beneath the tail, are of a blueiſh-aſh colour, lighter than the upper ſide of the bird; from the throat, as far as the legs, the breaſt is marked with white lines, drawn down the middle of each feather, which end in points; the legs and feet are of a duſky brown colour. The length of this bird is about ſix inches. It is, as its trivial name imports, a native of Surinam.

Surinamensis; Surinam Nuthatch. Reddiſh-cheſnut, beneath it is of a dirty white; middle of the back white; wings and tail black; wing and tail-coverts tipped, and ſecondary quill-feathers edged, with white. This is a very ſmall ſpecies, not much more than three inches in length; the bill is of a duſky brown, and a little curved; the hind-head and neck are marked with oblong black ſpots. It is, as its ſpecific name imports, a native of Surinam.

Caffra; Cape Nuthatch. Body beneath is yellow, above yellow, varied with black; the legs are black. It inhabits the Cape of Good Hope. This was deſcribed by Sparmann, and is by him ſaid to be nine inches in length, with a ſtraight blueiſh-black bill; the front, hind part of the neck, and back, mixed with brown and yellow; cheeks, neck, breaſt, and under parts, are of a duſky yellow, as are alſo the edges and tips of the wing-feathers; the tail is duſky black, beneath olive; the two middle feathers longer than the reſt; the legs are black.

Sinensis; Chineſe Nuthatch. The ſpecific character of this, according to Gmelin, is, that the lower eye-lid is purple. But Dr. Shaw denominates it the ferruginous nuthatch, with black head and neck, white breaſt and abdomen, a red ſpot behind the eye, and another white one. This bird is deſcribed by Latham as ſomething larger than the goldfinch; the bill and head are black; the back is of a deep blueiſh-ferruginous; the throat, breaſt, and belly, are white, but the throat is encompaſſed by a black band, deſcending from the ſides of the head, which is black and creſted; near the eye is a ſmall ſcarlet ſpot, ſucceeded by a large white one; the rump is yellow; the tail blackiſh, with a white tip; the bill and legs are black. It is, as its name denotes, a native of China, where it is ſaid to be much eſteemed on account of the elegance of its colours, and is a frequent ornament on Chineſe papers. "It appears," ſays Dr. Shaw, "to be much allied to the Lanius jocoſus, or red-vented ſhrike, and may perhaps prove, on future inveſtigation, to be no other than the ſame bird."

Longirostra; Long-billed Nuthatch. Blueiſh, beneath pale rufous; primary quill-feathers tipped with brown; the lores are black. This ſpecies is deſcribed by Dr. Latham, and is ſaid to meaſure nine inches; the bill is above an inch long, and black, but the baſe is pale or whitiſh; the crown of the head and whole upper parts of the bird are of a pale blueiſh-grey, but the cheeks and forehead are white, and a black ſtreak paſſes through each eye, along the ſides of the neck; the wings are tipped with brown, and the under parts of the bird are pale tawny; the legs are of a pale brown. It inhabits Batavia.

Chloris; Green Nuthatch. Above green, beneath white; the tail is black, tipped with yellowiſh; the bill is longer than the head, and blackiſh towards the tip: quill-feathers brown, outer edge greeniſh, yellowiſh in the middle, forming a yellowiſh band on the wings; the rump is yellowiſh, and the tail ſhort. It is a native of the Cape of Good Hope, and is of the ſize of the Surinam nuthatch.

SITTACENE, in *Ancient Geography*, a country of Aſia, in Aſſyria, near Suſiana. Ptolemy.

SITTACENI, the name of thoſe people of Aſiatic Sarmatia, who inhabited the vicinity of the Palus Mæotis.

SITTART, in *Geography*, a town of France, in the department of the Roer; 12 miles S. of Ruremond.

SITTEBERIS, in *Ancient Geography*, a town of India, on this ſide of the Ganges. Ptolemy.

SITTENBACH, Alt, in *Geography*, a town of Bavaria, in the territory of Nuremberg; 3 miles W. of Herſbruck.

Sittenbach, *Kirch*, a town of Bavaria, in the territory of Nuremberg; 5 miles N. of Herſbruck.

SITTENSEN, a town of Germany, in the duchy of Verden; 18 miles N.E. of Rottenburg.

SITTER, a river of Switzerland, which riſes in the canton of Appenzell, and joins the Thur, 9 miles W. of St. Gal.

SITTICHENBACH, a town of Saxony; 6 miles N.W. of Querfurt.

SITTICOTE, a town of Hindooſtan, in Dowlatabad; 30 miles S. of Renapur.

SITTINGBOURNE, a poſt and fair-town in a pariſh of the ſame name, hundred of Milton, and county of Kent, England, is ſituated on the high road from London to Canterbury, at the diſtance of 40 miles S.E. from the metropolis, and 13 miles N.E. by E. from Maidſtone. This place is of conſiderable antiquity, and derives its name, by corruption, from the Saxon word "Sædingburna," which ſignifies the village by the bourne or ſtream. Henry V. was entertained here, on his triumphant return from France, by John Northwood, eſq. of Northwood, in a ſtyle of magnificence befitting the royal dignity. Queen Elizabeth incorporated this town by charter, and conferred upon it the privileges of a weekly market and fairs, firſt in the 16th year of her reign, and again in her 41ſt year. By the latter deed, the corporation was conſtituted by the ſtyle of the mayor and jurats, and was inveſted with the right of ſending two members to parliament. Theſe privileges, however, never ſeem to have been exerciſed; and even the market was dropped in a few years; but the fairs are ſtill kept on Whit-monday and the two following days, and on the 10th of October and the four following days.

Sittingbourne chiefly forms one wide ſtreet on the high road, which here deſcends towards the eaſt. The principal ſupport of its inhabitants ariſes from the cuſtom of travellers who paſs through it. The inns are numerous, and ſome of them equal in magnificence to any provincial inn in the kingdom. The church is a ſpacious ſtructure, divided into a nave and two aiſles, a chancel, two chapels, and a tower, which riſes at the weſt end. The whole has been rebuilt, with the exception of the tower, ſince the year 1762, when it was deſtroyed by fire. By that cataſtrophe, moſt of the monuments periſhed; and ſuch of them as were preſerved, were ſo capriciouſly removed, that few of them cover the remains of the perſons they were intended to commemorate. The moſt curious monument remaining is one in the north, or Bayford chapel, which conſiſts of a table-ſlab of Betherſden marble, placed under an obtuſely pointed arch, ornamented with quatrefoil compartments, diſplaying heads, ſhields, fleur-de-lis, &c. and having, in the receſs behind it, the emaciated figure of a female in a winding-ſheet.

Sittingbourne pariſh is of ſmall extent, and contains, according to the parliamentary returns of 1811, 239 houſes, and 1362 inhabitants. Lewis Theobald, who publiſhed two editions of Shakſpeare's plays, with notes, in 1733 and 1740, was a native of this pariſh.

At Bayford, to the north of Sittingbourne, are ſome remains of an ancient intrenchment, ſaid to have been formed by king Alfred, when he came hither to repel the incurſions of the Danes, in the year 893. This place was afterwards the ſcite of a caſtle, which, in the time of Edward I., was the baronial ſeat of Robert de Nottingham, as appears from various deeds ſtill extant, bearing date "Apud caſtellum ſuum de Bayford apud Goodneſton." Haſted's Hiſtory of Kent, vol. vi. 8vo. edit. 1798. Beauties of England and Wales, vol. vii. by E. W. Brayley, 1806.

SITTUKERA, a town of Hindooſtan, in the ſoubah of Moultan; 15 miles from Shawanaz.

SITUA, in *Ancient Geography*, a town of Aſia, in Paphlagonia.

SITUS, in *Geometry* and *Algebra*, denotes the ſituation of lines, ſurfaces, &c.

Wolfius gives us ſome things in geometry, which are not deduced from the common analyſis; particularly, matters depending on the ſitus of lines and figures. M. Leibnitz has even invented a particular kind of analyſis thereon, called *calculus ſitus*.

SITZENBERG, in *Geography*, a town of Auſtria; 10 miles W.S.W. of Tulin.

SITZKOI, a town of Ruſſia, in the government of Olonetz; 12 miles E.S.E. of Ladeinoepole.

SIVA, in *Ancient Geography*, a town of Cappadocia, in the prefecture of Cilicia. Ptolemy.

SIVA, in *Hindoo Mythology*, is a perſonification of one of the three great powers of the deity. Siva is uſually deemed the third perſon in the Hindoo triad, and to repreſent the *deſtructive* energy. A detailed account of this important perſonage would extend itſelf to a hiſtory of the whole Hindoo Pantheon; for he appears in ſuch a variety of forms, and on ſo many occaſions, that ſcarcely a ſtep can be taken in any department whatever of eaſtern ſcience, art, or ſubject of literature, without encountering Siva in ſome of his varied characters. Under the articles SAIVA and VAISHNAVA we have ſtated, that the whole race of Hindoos are divided into thoſe two claſſes, denoting the worſhip of Siva, or of Viſhnu; Brahma, the firſt or creative power, having no worſhippers, or temples. Of this curious fact, ſee under SARASWATI, the name of his conſort. Theſe two comprehenſive claſſes are alſo called Saiva-bakht, and Viſhnu-bakht. See SECTS *of Hindoos*.

As the *deſtructive* energy of the deity, Siva is moſt uſually ſeen; but deſtruction being uſed in the ſenſe of renovation, the character of Siva is that of the renovator, or recreator; aſſociating him in character with Brahma, the producing or creative power. See VEDANTA.

We will try to exhibit, at one view, the variety of relations in which this and the other two members of the Hindoo triad appear; whether they be introduced mythologically, metaphyſically, or philoſophically. All three are ſymbols of the ſun, as he is typical of that great light, as the theologians expreſs it, "whence all proceeded, and to which all muſt return." See O'M.

Brahma	Power	Creation	Matter	The paſt	Earth.
Viſhnu	Wiſdom	Preſervation	Space	The preſent	Water.
Siva	Juſtice	Deſtruction	Time	The future	Fire.

But theſe characters, or attributes, are not excluſively applicable to the three powers, as indicated above. They coaleſce and participate, more or leſs, in ſeveral. An attempt has been made to ſhew in what degree, more particularly, they repreſent their material forms of earth, water, and fire: thus,

Brahma and Siva are Fire, in which Viſhnu	does not participate, or participates but remotely.
Viſhnu and Brahma are Earth, in which Siva	
Siva and Viſhnu are Water, in which Brahma	

As well as affinities, theſe powers have oppoſing properties; conteſts of perſons, in mythological language, and in that of the myſtics, attractions, and love.

The conteſts of theſe powers, or perſons, their quarrels and reconciliations, yield fine occaſions for poetical exuberance. The preſervative and regenerative powers, being in conſtant action, are feigned to have deſcended on earth innumerable times, in divers places, for the inſtruction and benefit, including the ſalutary puniſhment, of mankind.

The wives and children of theſe powers have alſo, like their lords and parents, deſcended and aſſumed a variety of forms on earth, for ſimilar purpoſes. The hiſtory of theſe endleſs incarnations affords ample ſcope for the imagination; and they are worked up by the poets, with wonderful fertility of genius and pomp of language, into a variety of ſublime deſcriptions, interſperſed with theological and moral texts, that at length were received as inſpired productions, and have become the ſtandard of divine truth. See Purana, the title of a ſeries of mythological poems, or rather of poems on every ſubject, under the ſimilitude of mythological adventure.

The wives or conſorts of theſe mythological perſonages are mentioned above. All the Hindoo deities are mated in fable, and their ſpouſes are their powers or active energies, and are called their *Sakti.* See that article.

The Hindoo deities have alſo vehicles aſſigned for the conveyance of themſelves and wives. Theſe are called vahan. The vahan of Siva is a bull, called Nandi. They have likewiſe peculiar ſymbols or attributes: thoſe that more particularly deſignate Siva, his ſakti, or any thing connected with them, are the Linga, or phallus, and the Triſula, or trident. The phallic emblem denotes his preſiding over generation; reminding us of the Jupiter Genitor of weſtern mythologiſts, with whom ſir William Jones identifies the Siva of the Eaſt.

There is yet another attribute of Mahadeva, (a name of Siva,) by which he is too viſibly diſtinguiſhed in the drawings and temples of Bengal. To *deſtroy,* according to the Vedantis of India, the Sufis of Perſia, and many philoſophers of our European ſchools, is only to *generate* and *reproduce* in another form. Hence the god of *deſtruction* preſides over *generation;* as a ſymbol of which he rides on a *white bull.* Can we doubt that the loves and feaſts of Jupiter *Genitor,* (not forgetting the white bull of Europa,) and his extraordinary title of *Lapis,* for which no ſatisfactory reaſon is commonly given, have a connection with the Indian philoſophy and mythology?

The Jupiter Marinus, or Neptune of the Romans, reſembles Mahadeva in his generative character; eſpecially as the Hindoo god is the huſband of Parvati, whoſe relation to the *waters* is evidently marked, by her image being reſtored to them at the concluſion of the great feſtival called Durgotſava. She is known to have attributes exactly ſimilar to thoſe of Venus Marina, whoſe birth from the ſea-foam, and ſplendid riſe from the conch in which ſhe had been cradled, have offered ſo many charming ſubjects for ancient and modern poetry. Diſſ. on the Gods of Greece, Italy, and India. Aſiat. Reſ. vol. i.

Another writer, Mr. Paterſon, in the eighth volume of the ſame work, offers a paſſage deſcriptive of the character and attributes of Siva. "To Siva," he ſays, "are given three eyes, probably to denote his view of the three diviſions of time; the paſt, the preſent, and the future. A creſcent on his forehead, pourtrays the meaſure of time by the phaſes of the moon; a ſerpent forms a necklace to denote the meaſure of time by years; a ſecond necklace, formed of human ſkulls, marks the lapſe and revolutions of ages, and the extinction and ſucceſſion of the generations of mankind. He holds a trident, to ſhew that the great attributes are in him aſſembled and united; in another is a kind of rattle, ſhaped like an hour-glaſs, and I am inclined to think that it was at firſt intended as ſuch, ſince it agrees with the character of the deity; and a ſand *gheri* is mentioned in the Saſtra as a mode of meaſuring time. In the hieroglyphic of Maha Pralaya, or grand conſummation of all things, when time itſelf ſhall be no more, he is repreſented as trodden under foot by Mahakala, or eternity." In this character he is called Kalanteka.

An anonymous writer (Edinburgh Review, N° XXXIV. p. 316.) has offered ſome points of compariſon between the Oſiris of Egypt, the Bacchus of Greece, and the Siva of India, that will ſerve to illuſtrate our obſervations on the latter. "Oſiris was adored in Egypt, and Bacchus in Greece, under the emblem of the phallus. It is under the ſame emblem that he is ſtill venerated in Hindooſtan, and Phalla is one of his names in the dictionary of Amara Singha. The bull was ſacred to him in Egypt. Plutarch aſſures us that ſeveral nations of Greece depict Bacchus with a bull's head; and that when he is invoked by the women of Elis, they pray him to haſten to their relief on the feet of a bull. In India he is often ſeen mounted on a bull; hence one of his Sanſcrit names, Vriſhadwaja, ſignifying, whoſe enſign is a bull. Plutarch informs us, that 'Nilum patrem ac ſervatorem ſuæ regionis, ac defluxum Oſiridis nominant.' The Ganges, in like manner, is fabled by the Hindoos to flow from the treſſes of Siva; hence another of his names, Gangadhara, the ſupporter of the Ganges. We conceive, by the way, that Scaliger and Selden are miſtaken in ſuppoſing that Siris, the Egyptian name of the Nile, is ſynonimous with Oſiris. Siris ſeems to us the Sanſcrit word Saras, a river in general, or *the* river, from its imputed ſuperiority. Iſis is the conſort of Oſiris; Iſa that of Iſwara, or Siva. (See Isa.) The attributes of the goddeſſes might be ſhewn to correſpond as preciſely as thoſe of their lords. The attendants of Iſwara reſemble in their frantic demeanour the furious Bacchants of the god of Naxos. It is remarkable, that many of the appellations by which the Greeks diſtinguiſh Bacchus, are alſo uſed by the Hindoos; but inſtead of applying them to Bagheſa himſelf, the latter give them to his ſon, whilſt both nations have their legends to account for them. Thus, the Greeks named Bacchus, Dimeter, having two mothers; the Hindoos call Skanda, the ſon of Bagheſa, Divimatri, with the ſame ſignification. (See Skanda.) Pyrignes, born from fire, and its equivalent in Sanſcrit, Agnija, are reſpectively Greek and Indian appellatives of Bacchus and Skanda. The title of Thriambus, we are told by Diodorus, was aſſumed by the Greek deity, in his triumph after the conqueſt of India. Tryambo, in like manner, is one of the moſt common appellations of the Indian Bacchus, but we are not aware of its ſignification." See Triambo.

We will ſubjoin what is given in the ſame article, as deſcriptive of Siva, under his name of Iſwara, taken from a copious treatiſe in the Imperial library at Paris, entitled Hyaſiras, but the MS. did not ſpecify from what Purana it was extracted. The Matſya Purana exhibits a full code of ſimilar inſtructions for the guidance of artiſts in pourtraying the various deities of the Hindoo Pantheon. (See Purana.) We premiſe that the name Iſwara means *powerful;* a character denoted by many hands, in the way that many heads denote ſapience.

Iſwara.—Let the arms, ſhoulders, and thighs of Iſwara be brawny and muſcular; his colour that of the beams of the creſcent which decorates his brow; his long hair muſt be knotted in many convolutions; his ſhoulders covered by a tiger's ſkin; his ten arms ornamented with bracelets of ſnakes; pendents hang from his ears: a ſword, a club, a trident, and other weapons, are perceived in his hands. When he appears in the character of the vanquiſher of Tripura, during the conflagration of the city, he has ſixteen arms. (See Tripura.) In the character of Yogeſwara, his aſpect muſt be terrific. See Yogeswara.

Images and pictures of Siva, which, in his various characters, are very common, repreſent him under a great many forms, which our limits will not allow us to enumerate.

In ſome pictures he is ſeen four, ſix, eight, or ten, and as far as ſixteen-handed; and in one character with five faces, thence called *Panchamuki*, which ſee; in ſitting, ſtanding, and dancing attitudes. His attributes are nearly ſimilar to thoſe of his ſakti Parvati. Repreſentations of him, or of his family or ſect, are diſtinguiſhed by the Linga, or cone, the Triſula, or trident, the Paſha, or cord of puniſhment, (ſee PASHA); the third eye, and collar of ſkulls, peculiar to him, his conſort, or family; the moon and Ganga in his hair; a hand drum, ſhaped like an hourglaſs, and called, both in Sanſcrit and Greek, *dindima*, and hence probably the name of Dindimia, and other ſimilar names given to the Grecian *queen of heaven;* and Dindymos, a fabulous mountain conſecrated by the Argonauts to the *mother of the gods;* titles as well of the conſort of the Indian Siva as of the Grecian Jupiter. An antelope, named Saſin, is ſometimes ſeen in Siva's hand, ſuppoſed to have ſome lunar alluſion. (See SASIN.) Theſe are his moſt common attributes. Sometimes he is joined to his ſakti, denoting then a myſtical reunion of the powers of nature.

The fable of Bramah loſing one of his heads has not hitherto been explained. It may probably mean that Bramah, or matter, undergoes curtailment by the deſtructive energy of fire, or Siva. Bramah had once five heads; he has now only four. Perhaps the older coſmogonies may have aſſigned five elements to the componency of matter, which a ſubſequent theory, promulgated by a Saiva, reduced to four. From ſuch ſpeculations originate the fables of mythology. Saying that Siva is Brahma, may mean, that as renovator of forms, he is the recreator; matter being by ſome theories eternal; and creation, as we term it, being merely a periodical reorganization. (See KALPA.) He is the parent and the offspring of Viſhnu. This is ſaid according with the theory or ſect, or the philoſophy or religion, of the relator. (See SECTS *of Hindoos.*) Philoſophically, it may mean that fire, or heat, is the *ſource* of water by its evaporating power, and the *effect* of humidity, through the proceſs of fermentation; either terreſtrial, or by aerial combination. Viſhnu, it will be recollected, is a perſonification of humidity, and we may thus diſcern why Siva and Viſhnu may be mythologically parent and offspring. In the article SRADHA an invocation to fire is given, from the funeral ceremonies of the Hindoos, denoting its renovating property. "Fire! thou was lighted by him; may he therefore be reproduced by thee."

As the patron of aſtronomy, Siva is the Uranus of the Eaſt. He is ſaid to guide the motions of the planet Jupiter, named by the Hindoos VRIHASPATI; ſee that article. He has been already noticed as the ſun, though that luminary, or its regent Surya, is more ſtrikingly aſſignable to a relationſhip with Viſhnu.

As deſtructive fire, that powerful changer of forms, Siva is, in a philoſophical view, more immediately conſidered. Of him in this character, the cone or linga, it is ſaid, is his ſymbol; being the form naturally aſſumed by flame; and the inverted cone, as the figure of water naturally deſcending, is ſymbolical of Viſhnu. A triangle, with its apex upward or downward, is therefore, being conical, the ſymbol of theſe important deities, in their primary characters of fire and water. Sometimes theſe are ſeen combined, and are then myſtically contemplated as the re-union of nature's elements.

The ſectaries of theſe powers, the conſervative and the changing, reſpectively uphold the ſupremacy of that worſhipped ſeverally by each. Siva being more immediately fire, and Viſhnu water, the philoſophical conteſts for ſupremacy, which have, it is related, been carried to the ſad length of theological war, on the parts of the adherents of theſe different doctrines, may remind one of thoſe controverſies, happily extending no farther, carried on in Europe by the parties at length denominated Vulcaniſts and Neptuniſts. The difference is, that in Europe the cauſes of the world's deſtruction by the deluge, and in India, the mode of its reformation at the period called kalpa, after a pralaya, or diſorganization, is the point in diſpute between their reſpective Saivas and Vaiſhnavas; or, in other words, the Vulcaniſts and Neptuniſts. Another inſtance, conſonant to an European diſtinction, may be here noticed. It is ſaid that individuals of the ſect of Saiva are of a more reſerved or ſerious caſt than thoſe of the Vaiſhnava ſect. Gloomy individuals are more diſpoſed to the reverent contemplation of the deſtructive and avenging attributes of the god of juſtice; or in other words, is it that thoſe who adopt ſuch adoration are thence gloomy and dark? Thoſe, on the other hand, who contemplate and adore the deity in his attributes of preſervation and mercy, are of a more cheerful turn. Thus the Saivas are the Calviniſts, the Vaiſhnavas or Baudhas the Lutherans of India.

Siva, as the conſort of Kali, is named Kal or Kala, ſuppoſed to be time; for *kal*, in Sanſcrit and other languages of India, means both yeſterday and to-morrow: it means alſo *black;* and in this character Siva, as well as his ſakti, is painted of that colour, though under other forms, and uſually, white is the colour of Siva. The contemplation of the diſtinctions of day and night; of the light and dark diviſions of the month, a notation of time eſpecially and ſuperſtitiouſly attended to in Hindoo ceremonials; of the ſix months' day and ſix months' night of the gods (occaſioned by the obliquity of the ſun's path); and, laſtly, the contraſt of the viſible creation with eternal night; are ſuppoſed by a writer in the Aſiatic Reſearches (Mr. Paterſon,) to have ſuggeſted the idea of painting Kal white and Kali black. When, however, he appears as Kal, he is ſometimes, as above noticed, alſo black.

To Siva, in his various forms, ſeveral plants are eſteemed ſacred, and are of courſe nouriſhed by his ſectaries; chiefly, it may be preſumed, by women, by the aged, or by Brahmans. A ſhrub named Aſoka, is one ſuppoſed to be pleaſing to Siva. It is deſcribed in the fourth volume of the Aſiatic Reſearches, art. 17, by ſir W. Jones, who ſays, that the vegetable world ſcarcely exhibits a richer ſight than an aſoka tree in full bloom: it is about as high as an ordinary cherry-tree. He expreſſes a hope that its Sanſcrit name may be retained by botaniſts, as it perpetually occurs in the old Indian poems, and in treatiſes on religious rites. It is planted near Siva's temples, and his worſhippers look for efficacy from bathing on a particular day in ſome holy ſtream, and drinking water with buds of the aſoka floating in it. The name means *grief*, or lamentation, and is derived by mythologiſts from the grief of Sita, when confined in a grove of it on Ceylon, by the tyrant Ravena. Sami is the name of another ſhrub ſacred to Siva, connected with which a great deal of enthuſiaſtic extravagance might be pointed out. It may be remarked, that in their ſelection of holy vegetables, the Brahmans have ſhewed conſiderable taſte by ſanctifying thoſe of the moſt lovely ſorts.

One of the Sanſcrit appellations of Siva is the god with a thouſand names. Theſe are given at length in the Padma Purana; and the ſixty-ninth chapter of the Siva Purana is allotted to their enumeration. We propoſed making a ſelection of ſome of them in this article; but it has already been enlarged to its utmoſt allowable extent.

For a further account of Siva and his family, we refer to ſeveral articles that have occurred in this work, and particularly to Kama, Lotos, Matri, Patra, Philosophy *of the Hindoos*, Sects *of Hindoos*, Sagnika, Sankya, and Vedanta.

To this article reference is made from Parvati, of which indeed this may be conſidered as a continuation, and ſeveral errors of the preſs occurring in the latter, we take this opportunity of pointing them out correctively.—In col. 3, line 6, for *cap*, read *cup;* col. 4, l. 35, for *beauty's*, read *brevity's;* col. 5, l. 2, for *Karlikya*, read *Kartikya;* col. 5, l. 9 from the bottom, for *central is*, read *central eye is*.

SIVAN, in *Chronology*, the third month of the Jewiſh eccleſiaſtical year, anſwering to part of our May and June.

SIVAS, in *Geography*, a very large and populous town of Aſiatic Turkey, and capital of a government, to which it gives name, the reſidence of a pacha; anciently called "Sebatte." It is very well watered by the river Caſſalmack, and ſeveral fountains and many clear ſtreams, which run through it. It is ſeated on the W. ſide of a very fertile valley, which is almoſt ſurrounded by lofty mountains, having no opening except where the river runs in and out, through a very narrow channel between two ſteep hills. Here are two ſtone bridges at the diſtance of about a mile from each other. Corn in great abundance grows in this valley, but here is not much fruit, excepting plums, apples, and pears; but of garden vegetables there is plenty. In the middle of the town are ſome very extenſive gardens; and on an artificial hill is an old caſtle, now tumbling into ruins. The houſes in general have a very ordinary appearance, though the neighbourhood furniſhes plenty of good materials for building; a great quantity of unſquared timber being employed to ſupport an immenſe weight of ſtone and clay, with which the houſes are covered. The inhabitants appear to enjoy much liberty; nor are the women confined, as in ſome large cities to the eaſtward. According to Mr. Jackſon's account in his "Journey from India," Sivas is nearly as large as Liverpool, contains as many houſes, and is fully as populous. Although moſt of the private houſes are indifferent ſtructures, many of the public buildings are elegant, and ſome of the monuments very lofty. In the year 1394 this city was taken by Bajazet, and ſoon after by Tamerlane, who deſtroyed the town and made a terrible ſlaughter of the inhabitants. N. lat. 38° 15′. E. long. 37°.

SIVATA, in *Ancient Geography*, a town of Aſia, in Galatia. Ptolemy.

SIVEH, in *Geography*, a town of Perſia, in the province of Mekran, on the Nehenk; 110 miles N.N.E. of Kidge.

SIUEN-TCHEOU, a city of China, of the firſt rank, in Fo-kien. N. lat. 24° 55′. E. long. 118° 29′.

SIVERIE. See Severia.

SIVERS, Henry Jacob, in *Biography*, was born at Lubec in 1709. At the age of 17 he took his degree, as maſter of arts, at Roſtock, and having become ſoon after a teacher in that ſeat of learning, he publiſhed, in 1730, a theſis, "De Fide Salvifica," by which he became advantageouſly known to the literary world. It was, in fact, an anſwer to a book written by Dr. Eric Pontoppidan, entitled "The Bright Mirror of Faith, in which are diſplayed the Marks of the Children of God." Soon after he ſtood candidate for the miniſtry at Lubec; and, on being licenſed, he acquired ſo much popularity, that the churches were crowded wherever he preached. In 1734 he made a tour to Denmark and Sweden, to collect objects for a muſeum of natural hiſtory which he begun to form, and ſettling in the latter, he was invited to be one of the paſtors of the German congregation at Norkoeping; after this he was ordained by biſhop Berzelius, and in 1746 was made one of the court chaplains. In 1747 he obtained the office of paſtor of Trynerym from count Horn, and in the following year he died, in the 50th year of his age. He was a man of conſiderable learning, and poſſeſſed a very fine library. He had likewiſe accumulated a numerous collection of antiquities, natural productions, and various curioſities of art; but in 1737 he had been obliged to ſell to count Charles Gyllenborg the half of his minerals, and a fine cabinet of Roman coins, which the count afterwards bequeathed to the academy of Lund. He carried on an extenſive correſpondence with the celebrated Linnæus, and in 1731 was elected a member of the Academy of Sciences at Berlin. He left behind him a large number of MSS., and he is ſaid to have publiſhed more than a hundred different pieces, the titles of many of which are given in the Gen. Biog.

SIVIDURG, in *Geography*, a town of Hindooſtan, in Myſore; 10 miles E. of Anantpour.

SIUM, in *Botany*, an old Latin name, *σιον* of Dioſcorides, of whoſe etymology nothing plauſible has occurred to us, except the opinion of De Theis, who deduces the word from the Celtic *ſiw*, water:—the plant thus called by Dioſcorides, and every other writer, being an aquatic, of a ſmall ſtature, ſucculent, and aromatic, with parſley-like leaves, as deſcribed in his work. Such is the *Sium* of modern botaniſts, as to moſt of its ſpecies; but their medical qualities do not well anſwer to the report of this old writer, the root eſpecially being eſteemed highly dangerous, like the generality of umbelliferous plants, that grow in water; nor ſhould we truſt to the herbage, either "recent or boiled, to break down and expel *calculi*, to promote urine or child-birth, or to cure the dyſentery."—Linn. Gen. 138. Schreb. 188. Willd. Sp. Pl. v. 1. 1431. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 312. Prodr. Fl. Græc. Sibth. v. 1. 194. Ait. Hort. Kew. v. 2. 144. Purſh 194. Juſſ. 222. Lamarck Illuſtr. t. 197. Gærtn. t. 23.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Umbellatæ*, Linn. *Umbelliferæ*, Juſſ.

Gen. Ch. *General Umbel* various in different ſpecies; *partial* ſpreading, flat. *General Involucrum* reflexed, of numerous lanceolate leaves, ſhorter than the umbel; *partial* of many ſmall linear leaves. *Perianth* ſcarcely diſcernible. *Cor. Univerſal* uniform; flowers all fertile; *partial* of five equal petals, rendered heart-ſhaped by their inflexed points. *Stam.* Filaments five, ſimple; anthers ſimple. *Piſt.* Germen minute, inferior; ſtyles two, reflexed; ſtigmas obtuſe. *Peric.* Fruit roundiſh-ovate, compreſſed, ſmall, ſtriated, ſeparable into two parts. *Seeds* two, nearly ovate, convex and ſtriated on the outer ſide, flat on the other.

Eſſ. Ch. Fruit nearly ovate, compreſſed, ſtriated. General and partial involucrum of many leaves. Petals heart-ſhaped, uniform.

1. S. *filifolium*. Thread-leaved Water-parſnep. Thunb. Prodr. 50. Willd. n. 1. ("Conium tenuifolium; Vahl Symb. v. 3. 49.")—"Radical and ſtem-leaves ſimple, thread-ſhaped. Involucrum elongated."—Native of the Cape of Good Hope. We know nothing further about this ſpecies.

2. S. *latifolium*. Broad-leaved Water-parſnep. Linn. Sp. Pl. 361. Willd. n. 2. Fl. Brit. n. 1. Engl. Bot. t. 204. Fl. Dan. t. 246. Jacq. Auſtr. t. 66. (Sium; Rivin. Pentap. Irr. t. 78. S. majus latifolium; Ger. Em. 256.)—Leaves pinnate; leaflets oblong-lanceolate, equally ſerrated.—Native of rivulets, ditches, and watery ground, in the north of Europe; rather common in England, flowering in July and Auguſt. *Root* perennial, of many long, thick, whorled fibres, from the lower joints of the ſtem, by

which the plant in ſome degree creeps along the muddy bottoms of pools and ditches. *Stem* erect, angular, hollow, leafy, ſmooth, ſcarcely branched. *Leaves* alternate, of about three pair of oblong, ſeſſile, ſmooth leaflets, beſides a terminal, ſtalked, rather longer one; all acute, neatly ſerrated, varying in breadth; thoſe under water are liable to be finely divided. *Umbels* large, flattiſh, white, erect, ſolitary, terminal and lateral. *Involucral leaves* widely ſpreading, lanceolate, white-edged, ſometimes lobed, often ſerrated. *Calyx* of five ſmall teeth. *Petals* ſometimes ſlightly unequal in ſize, as is nearly univerſal in this tribe. The whole *herb* is acrid, and the *roots* eſpecially are reckoned poiſonous. This ſpecies does not appear to be a native of Greece, nor to have been known to Dioſcorides.

3. S. *anguſtifolium*. Narrow-leaved Water-parſnep. Linn. Sp. Pl. 1672. Willd. n. 3. Fl. Brit. n. 2. Engl. Bot. t. 139. Prodr. Fl. Græc. n. 674. Jacq. Auſtr. t. 67. (S. nodiflorum; Fl. Dan. t. 247. S. erectum; Hudſ. ed. 1. 103. S. minus; Rivin. Pentap. Irr. t. 79. S. majus anguſtifolium; Ger. Em. 256.)—Leaves pinnate; leaflets irregularly lobed and ſerrated. Umbels ſtalked, oppoſite to the leaves. Stem erect.—Native of rivulets and ditches in Germany, England, France, and the ſouth of Europe. Dr. Sibthorp found it in Greece; and it is more common with us than the preceding, flowering about July or Auguſt. The perennial *root* creeps to a conſiderable extent. The *herb* is of a ſmaller more delicate habit than the laſt, and known by the more unequal inciſions of its *leaves*, at leaſt the upper ones. The *leaflets* of the radical foliage are ſomewhat heart-ſhaped, their edges regularly ſerrated, and the lower pair diſtant from the next. *Umbels* ſolitary, each on a lateral ſtalk, ſhorter than the oppoſite leaf. Leaves of the general *involucrum* drooping, often cut or pinnatifid, often entire. *Calyx* of five hardly viſible teeth.

4. S. *nodiflorum*. Procumbent Water-parſnep. Linn. Sp. Pl. 361. Willd. n. 4. Fl. Brit. n. 3. Engl. Bot. t. 639 Prodr. Fl. Græc. n. 675. Woodv. Med. Bot. t. 182. (S. aquaticum repens et procumbens, ad alas floridum; Moriſ. ſect. 9. t. 5. f. 3.)—Leaves pinnate; leaflets ovate, equally ſerrated. Umbels ſeſſile, oppoſite to the leaves. Stem procumbent.—Frequent in ditches and rivulets, throughout Europe, from Sweden to Greece, flowering in ſummer. Dr. Sibthorp obſerving this ſpecies abundantly in all the waters of the laſt-mentioned country, concludes it, with great probability, to be the real σιον of Dioſcorides, as anſwering well to his deſcription, and being called νεροσέλινον, or water-parſley, by the modern Greeks. The *root* is perennial and creeping. *Stems* procumbent or floating, branched, bearing a nearly ſeſſile greeniſh-white *umbel*, oppoſite to each leaf. The *leaflets* are ſomewhat heart-ſhaped at the baſe, acute, neatly and equally ſerrated, from five to nine in each leaf; the terminal one occaſionally confluent with the next. *General involucrum* of one leaf, and often wanting; *partial* of ſeveral ovate ones. *Calyx* ſcarcely perceptible. The qualities of this ſpecies are probably milder than the two former, inſomuch that three large ſpoonfuls, mixed with milk, have been given twice a day, to cure cutaneous diſorders; and this anſwers to the account given by Dioſcorides, better than any thing we know of the reſt of the genus.

5. S. *repens*. Creeping Water-parſnep. Linn. Suppl. 181. Willd. n. 5. Fl. Brit. n. 4. Engl. Bot. t. 1431. Jacq. Auſtr. t. 260.—Leaves pinnate; leaflets roundiſh, with deep tooth-like ſegments. Umbels ſtalked, oppoſite to the leaves. Stem creeping.—Native of moiſt paſtures, and watery turfy bogs, in Bohemia, Auſtria, Scotland, and England, flowering from June to Auguſt. This is a much ſmaller plant than the laſt, growing on wet ground, but not floating in water. The *ſtems* are quite proſtrate, throwing out many radicles. *Leaflets* fewer, with broad notches, not fine ſerratures. *Umbels* more ſtalked, and whiter. *General involucrum*, as well as the *partial*, of ſeveral ribbed leaves. *Calyx* obſolete.

6. S. *Siſarum*. Skirret. Linn. Sp. Pl. 361. Willd. n. 6. Ait. n. 5. (Siſarum; Ger. Em. 1026. Siſer primum; Matth. Valgr. v. 1. 402. Sju ſjin, vulgò Niſji, &c.; Kæmpf. Am. Exot. 818. t. 819. See Dryandr. in Tr. of Linn. Soc. v. 2. 228.)—Lower leaves pinnate; upper ternate; all ſharply ſerrated. Umbels terminal.—Native of China. Cultivated, time out of mind, in Europe, for the ſake of its perennial, fleſhy, oblong, eſculent roots, formerly reputed to poſſeſs an exciting quality. This notion perhaps originated with the Chineſe; and that knaviſh nation ſeems, as Mr. Dryander firſt remarked, to have impoſed upon the Japaneſe with theſe roots, for the true Ginſeng of Tartary, or *Panax quinquefolia* of Linnæus, which latter ſeems to be *S. Ninſi* of Thunberg. One may be as efficacious as the other, nor would a practitioner, of any deſcription, now perhaps confide in either. The *herb* of the Skirret is twelve or eighteen inches high, erect, branched, leafy. *Lower* leaves of five or ſeven leaflets; *upper* of three; all copiouſly, neatly, and ſharply ſerrated; the lowermoſt ſerratures often much the largeſt, or deepeſt, and ſomewhat ſpreading. *Umbels* at the tops of the branches, white, rather ſmall, with few or no leaves in the *general involucrum*, but ſeveral linear or ſetaceous ones in the *partial*.—*Sium Ninſi*, Linn. Sp. Pl. 361, having been entirely adopted from Kæmpfer's figure of the preſent, that ſpecies falls to the ground; nor is it entitled to rank even as a variety, though marked as ſuch by Willdenow.

7. S. *rigidius*. Virginian Water-parſnep. Linn. Sp. Pl. 362. Willd. n. 7. Ait. n. 6. Purſh n. 1. (Oenanthe maxima virginiana, pæoniæ fœminæ foliis; Moriſ. ſect. 9. t. 7. f. 1.)—Leaves pinnate; leaflets lanceolate, very nearly entire.—“In wet meadows, from Pennſylvania to Virginia, flowering in July and Auguſt. *Flowers* ſmall. This and the following, *S. lineare*, are conſidered as very poiſonous plants, eſpecially to horned cattle, and every farmer who knows their bad qualities is buſily employed to deſtroy them.” *Purſh*. The *roots*, and general habit, of this ſpecies bear conſiderable reſemblance to the laſt; but the *leaflets* are more numerous, narrower, tapering at each end, and either quite entire, or with two or three broad notches only, here and there, in the lower *leaves*. The *umbels* are thrice the ſize of *S. Siſarum*, but, like them, are accompanied by only a ſlight general *involucrum*, nor are the partial ones much more conſiderable.

8. S. *lineare*. Linear Water-parſnep. Michaux Boreal-Amer. v. 1. 167. Purſh n. 2. (S. ſuave; Walter Carol. 115.)—“Leaves pinnate, leaflets elongated, linear, or ſlightly lanceolate, rather diſtantly ſerrated. General involucrum of few leaves; partial of many linear ones. Umbel with ſhort rays.”—In wet meadows, and by the ſides of ditches, from Canada to Pennſylvania, flowering in July; perennial. *Purſh*.

9. S. *longifolium*. Long-leaved Water-parſnep. Purſh n. 3.—“Leaves pinnate; leaflets of the lower ones very long, linear, falcate, ſparingly toothed. Stem ſlightly leafy; naked above. Umbels uſually in pairs, with ſcarcely any involucrum.”—In the ditches and bogs of New Jerſey, flowering in Auguſt.—Very ſlender, perennial. *Purſh*.

10. S. *japonicum*. Japaneſe Water-parſnep. Thunb. Jap. 118. Willd. n. 8.—Leaves pinnate; leaflets of the lower ones oblong or ovate, variouſly cut; of the upper

lanceolate, entire. Umbels terminal.—Native of Japan, flowering in June. The inhabitants call it *Saiko*, or *Mits Suba Seri.* The *ſtem* is erect, zig-zag, branched at the upper part. *Leaves* ſmooth, the lower ones very large, with ſpreading variouſly ſhaped *leaflets,* which are either ovate or oblong, undivided or cut; the upper *leaves* minute. *Umbels* terminating the branches. *Thunb.*

11. S. *Falcaria.* Decurrent Water-parſnep. Linn. Sp. Pl. 362. Willd. n. 9. Ait. n. 7. Prodr. Fl. Græc. n. 676. Jacq. Auſtr. t. 257. (S. n. 782; Hall. Hiſt. v. 1. 347. Falcaria; Rivin. Pentap. Irr. t. 48. Eryngium montanum; Ger. Em. 1164. Ammi perenne repens, &c.; Moriſ. ſect. 9. t. 8. f. 1.)—Leaflets linear, decurrent, confluent, finely ſerrated.—Native of Germany, Flanders, Switzerland, France, Greece, and Aſia Minor; a hardy perennial, kept chiefly in botanic gardens, flowering in July and Auguſt. The *root* is long and cylindrical, white, friable when dried, ſaid to reſemble Eryngo in its ſweetiſh, aromatic, rather acrid, flavour. *Herb* rigid, ſmooth, two or three feet high. *Stem* round, leafy, much branched, terminating in numerous ſlender *umbels* of many rays, with ſmall white *flowers.* The general and partial *involucral leaves* are numerous, long, and very narrow. The radical *leaves* have long ſtalks; the reſt ſhorter more ſheathing ones; all are rigid, ſmooth, ternate in the firſt inſtance; the middle leaflet ternate; the lateral ones binate; the external edge of each lateral leaflet ſtrongly decurrent.

12. S. *verticillatum.* Whorled Water-parſnep. Fl. Brit. n. 5. Roth. Germ. v. 2. p. 1. 336. (Siſon verticillatum; Linn. Sp. Pl. 363. Willd. Sp. Pl. v. 1. 1437. Ait. Hort. Kew. v. 2. 146. Lightf. Scot. 1096. t. 35. Engl. Bot. t. 395. Oenanthe millefolii paluſtris foliis; Moriſ. ſect. 9. t. 7. f. 10. Daucus pratenſis; Dalech. Hiſt. 718.)—Leaflets in numerous, capillary, whorl-like ſegments.—Native of wet ſalt-marſhes. Plentiful in the weſtern parts of Scotland and Wales; found at Killarney, and in the county of Kerry, Ireland, in 1805, by Mr. J. T. Mackay. It is alſo reported to grow in France, the Pyrenées, and ſome parts of Germany. Dr. Roth had, unknown to us, foreſtalled us in transferring this curious ſpecies to *Sium,* before the publication of Flor. Brit. though he had never ſeen a ſpecimen. Of the propriety of this alteration we have no doubt, the *umbels* being of numerous rays, with many leaves in their general as well as partial *involucrum,* and the *petals* heart-ſhaped. The plant is perennial, flowering in July and Auguſt. *Root* of ſeveral fleſhy tapering knobs. *Stem* eighteen inches high, erect, ſmooth, ſcarcely branched, and ſlightly leafy. *Leaves* numerous, chiefly radical, pinnate, of many pairs of deeply-cut, radiating, plumoſe *leaflets,* ſpreading, ſo as to ſeem whorled. *Petals* white, uniform, and nearly equal. *Involucral leaves* deflexed, ovate; five or ſix to the general *umbel,* more to each partial one. *Calyx* hardly viſible. *Fruit* roundiſh-ovate, compreſſed.

13. S. *grandiflorum.* Large-flowered Cape Water-parſnep. Thunb. Prodr. 50. Willd. n. 10.—"Leaves doubly pinnate; leaflets roundiſh, with tooth-like ſegments."—Found by Thunberg, at the Cape of Good Hope.

14. S. *paniculatum.* Panicled Cape Water-parſnep.—Thunb. Prodr. 51. Willd. n. 11.—"Leaves doubly pinnate; leaflets linear, pinnatifid."—From the ſame country.

15. S. *patulum.* Diffuſe Cape Water-parſnep. Thunb. Prodr. 51. Willd. n. 12.—"Leaves doubly pinnate; leaflets three-cleft. Branches diffuſe."—From the ſame country.

16. S. *græcum.* Greek Water-parſnep. Linn. Sp. Pl. 362. Willd. n. 13. (Liguſticum græcum, apii folio; Tourn. Cor. 23.)—"Leaves doubly pinnate; leaflets lanceolate, ſerrated; the uppermoſt confluent."—Native of Greece, according to Tournefort; but we have met with nothing referrible to this ſpecies among Dr. Sibthorp's ſpecimens, drawings, or catalogues, nor have we ſeen any ſpecimen of the authentic plant. Willdenow, from whom we have taken the ſpecific character, ſays the *flowers* are yellow.

17. S. *decumbens.* Decumbent Water-parſnep. Thunb. Japon. 118. Willd. n. 14.—"Leaves doubly pinnate; leaflets three-cleft. Stem decumbent."—Gathered by Thunberg in Japan, where it is known by the name of *Jingoſaku,* and flowers in March. The *ſtem* is ſmall, decumbent. *Leaves* radical, on long ſtalks, ſmooth. *Umbel* terminal, ſcarcely compound. *Seeds* ovate, obtuſe, ſtriated, ſmooth, crowned with the permanent ſtyles. *Thunberg.*—By the deſcription, we ſuſpect this may be more properly a ſpecies of *Hydrocotyle,* but without ſeeing a ſpecimen, we dare not determine.

18. S. *ſiculum.* Sicilian Water-parſnep. Linn. Sp. Pl. 362. Willd. n. 15. Ait. n. 8. Jacq. Hort. Vind. v. 2. 62. t. 133. (Dauco ſiciliano, con foglie di paſtinaca; Zanon. Iſt. 78. t. 30.)—Leaves ſtrongly ſerrated, doubly pinnate; the lower and uppermoſt ternate. Umbels terminal, ſtalked; partial ones very unequal.—Native of Sicily. A hardy perennial, flowering in July and Auguſt. The *ſtem* is variouſly branched, erect, leafy, about two feet high, round, ſolid, ſmooth. *Leaves* ſmooth and ſhining; their *leaflets* more or leſs ovate, acute, copiouſly, deeply, and acutely ſerrated, ſeſſile. General and partial *involucrum* of many linear deflexed leaves. *Flowers* yellow; in ſome of the partial umbels very few, perhaps ſolitary. *Germen* oblong. The genus of this ſpecies is rather doubtful, if we attend to its habit; and yet we know not how, by the characters, to refer it elſewhere.

19. S. *aſperum.* Rough Cape Water-parſnep. Thunb. Prodr. 51. Willd. n. 16.—"Leaves triply pinnate. General and partial flower-ſtalks rough."—Found by Thunberg at the Cape, as well as the two following. We have no information concerning any of them, beſides what his *Prodromus* affords.

20. S. *hiſpidum.* Hiſpid Cape Water-parſnep. Thunb. Prodr. 51. Willd. n. 17.—"Leaves triply pinnate. Footſtalks and flower-ſtalks rough."

21. S. *villoſum.* Villous Cape Water-parſnep. Thunb. Prodr. 51. Willd. n. 18.—"Leaves triply pinnatifid; ſegments ovate, deeply ſerrated, villous."

Sium, in *Gardening,* contains a plant of the hardy, herbaceous, eſculent kind, of which the ſpecies cultivated is the ſkirret (S. ſiſarum).

This plant was formerly much cultivated for the roots, which were eaten boiled and ſtewed with butter, pepper, and ſalt; or rolled in flour and fried; or elſe cold, with oil and vinegar, being firſt prepared by boiling.

Method of Culture.—It may be raiſed either by ſeeds or ſlips from the roots, but the firſt is the beſt method, as in the latter mode the roots are apt to become ſticky: the ſeeds ſhould be ſown about the beginning of April, either in broadcaſt over the ſurface, or in drills, the ground being previouſly well dug to a good depth; light and rather moiſt land being choſen for the purpoſe. The plants moſtly appear in five or ſix weeks, and when they can be ſufficiently diſtinguiſhed by their leaves, the ground ſhould be well hoed over, in the ſame manner as for carrots, the plants being properly thinned out to the diſtance of five or ſix inches. The hoeing ſhould be repeated as often as neceſſary, in dry weather. And in the autumn, when the leaves begin to decay, the roots will be fit for uſe, and will continue ſo till the ſpring.

But in the offset method, the old plants ſhould be dug up in the ſpring before they begin to ſhoot, the ſide ſhoots being then ſlipped off with an eye or bud to each, planting them in rows a foot apart, and four or five inches diſtant in the rows: they ſhould afterwards be cultivated as the others.

Theſe roots are prepared, as has been ſeen, by boiling, and eaten in the ſame manner as above, or as carrots and parſneps. They are wholeſome, but not held in ſuch requeſt as formerly was the caſe.

Sium *Nodiflorum*, Procumbent Water-parſnep, in the *Materia Medica*. This plant has been omitted by the London College, in the laſt edition of its Pharmacopeia, and not, it is thought, without reaſon, as its pretenſions even to the character of an antiſcorbutic require confirmation.

SIUMPOUR, in *Geography*, a town of Hindooſtan, in Bahar; 25 miles E.S.E. of Doeſa.

SIUN, a river of China, which runs into the Han river, near Siun-yam, in Chen-ſi.

SIUNDO, a town of Sweden, in the province of Nyland; 25 miles W. of Helſingfors.

SIUNISONG, a town of Corea, near the ſea; 38 miles W.N.W. of Hoang-tcheou.

SIUN-YAM, a town of China, of the third rank, in Chen-ſi; 20 miles E.N.E. of Hing-ngan.

SIUPH, in *Ancient Geography*, a town of Egypt, in the Saitic nome; the native place of king Amaſis, according to Herodotus.

SIUR, a port of Africa Propria, in the gulf of Numidia, between the Leſſer Collops, and near the promontory of Hippus, according to Ptolemy.

SIVRAY, in *Geography*. See Civray.

SIVREY-*ſur-Meuſe*, a town of France, in the department of the Meuſe; 3 miles W. of Verdun.

SIUT, Siout, or, as it is often called, *Aſſiût*, a town or city of Upper Egypt, and now the moſt conſiderable. This character formerly belonged to Girgé, which is ſtill a place of note, but the character of pre-eminence belongs to Aſſiût. It is ſituated within land a few miles W. of the Nile, on an artificial eminence. The ſcite of this ancient city ſeems to have been either Antopolis, as Pococke thinks, or more probably, as Strabo intimates, Lycopolis. It is a large, populous, and well-built town; and the manner in which the water is conducted round it is worthy of notice. A canal, dug probably from an early period, parallel to the Nile, in this part of the country waſhes the foot of the mountains which are near to Aſſiût, and having ſurrounded that city, and the adjacent villages, deſcends again into the river. The water, however, is not admitted into it except at a certain period of its increaſe, and then it overflows all the ſurrounding lands, and Aſſiût only communicates with the Nile by a road artificially raiſed above the common level, which leads down to the port where the boats reſort, and are laden and diſcharged; and alſo by two bridges, the one leading to this road, and the other towards the mountains. This city has increaſed in population within a few years by the good government of Soliman Bey, who has alſo adorned it by planting many trees. Aſſiût was formerly known to the Arabic writers by the name of "Haut-e-Sultan," the king's fiſh, or fiſh-pond. The reaſon of the appellation is not aſcertained, probably it took its riſe from its having been appointed to ſupply the king's table with fiſh. In the mountain above Aſſiût are ſeveral remarkable caverns, very ſpacious, and adorned with hieroglyphics and emblematical figures. Some appear to have been ſepulchral, as they contain fragments of the jars, in which were depoſited not only the ibis, but cats, dogs, and other animals, whether conſidered as ſacred, or ſlain to attend their maſter or miſtreſs in the other world. In one of theſe caverns, beſides the entrance, there are three chambers hewn in the rock, which is free-ſtone, one ſixty feet by thirty; another, ſixty by twenty-ſix; a third, twenty-ſix by twenty-five. Further up the mountains there are caverns more ſpacious even than theſe. Other cavities have been made by removing the ſtone for the purpoſes of building; but they have been afterwards appropriated to various purpoſes; ſome for ſepulture, as we may conclude from the jars, curiouſly ſtopped with bitumen, and others either for religious retirement in a Chriſtian age, or for ſummer retreats, as they are expoſed to the north, and very cool.

Large quantities of fine flax are cultivated in the vicinity of Siout: this commodity and wheat are tranſported from Upper to Lower Egypt. Salt and other articles are brought in return. From Mecca, by way of Coſſeir, are imported Indian goods; and the European articles of broad-cloth, tin, &c. are here rarely ſeen. The Soudan caravans form a chief ſupport of Aſſiût, which ſerves to them as a midway ſtation. They aſſembled in their way to Sennaar, here, and at Manfalout, under the protection of a bey: they then paſſed nearly ſouth-weſt into the ſandy deſart of Libya, to El-wah, the Oaſis Magna of antiquity, and ſo into the great deſart of Selima. Aſſiût is regarded as the capital of Middle Egypt, and its population exceeds that of all the towns to the ſouth of Cairo. Mr. Browne inclines to eſtimate the inhabitants at no leſs than 25,000. The "ſenjiak," or bey of Saïd, divides the year of his office between Aſſiût and Girgé: the internal government conſiſts of the cadi, aſſiſted by other civil officers; and five caſhefs, moſtly appointed by Soliman Bey, conſtantly reſide there. It is the ſeat of a Coptic biſhop, but the Copts are not very numerous; the people being chiefly Mahometans. Proviſions are conſiderably cheaper at Aſſiût than at Cairo. Manfalout is at no great diſtance from Aſſiût: this is a city of conſiderable extent and population. Between theſe two cities ſtands Ben-Ali, a populous town. Theſe three places conſtitute, with Girgé, the chief marts of the trade of Upper Egypt; 162 miles S. of Cairo. N. lat. 27° 25′. E. long. 31° 38′. Savary. Browne. Sonnini.

SIVVENS, in *Medicine*. See Sibbens.

SIWA, Siwah, *Siouah*, or *See-wah*, in *Geography*, a town of Africa, in the country of Tripoli, on the frontiers of Egypt, ſuppoſed by ſome to be the ancient Mareotis, and by others to be the Siropum of Ptolemy. According to Mr. Browne, this place anſwers to the deſcription given of the Oaſis (ſee Oasis), as being a ſmall fertile ſpot, ſurrounded on all ſides by deſart land. A path, encompaſſed with date-trees, leads to the town, which gives name to the diſtrict. About two miles from this place, after paſſing along ſome ſhady paths between the gardens, Mr. Browne arrived at what were called the ruins, or "birbé;" and was ſurpriſed to find himſelf near a building of undoubted antiquity, and which he has particularly deſcribed. It is ſituated in N. lat. 29° 12′. E. long. 26° 35′. This edifice conſiſted of a ſingle apartment, built of maſſy ſtones, of the ſame kind with thoſe which compoſe the pyramids, and covered originally with ſix large and ſolid blocks, that reach from one wall to the other; 32 feet long in the clear, about 18 high, and 15 wide. A gate, at one extremity, forms the principal entrance, and two doors alſo near that extremity open oppoſite to each other. The other end is quite ruinous, but there is reaſon to believe that the whole building has never been much larger than it now is. On the exterior of the walls there is no ſculpture, nor is there any appearance of another edifice having been attached to it. In the interior are three rows of emblematical figures, apparently deſigned to repreſent a proceſſion; and the ſpace between them is filled with hieroglyphic characters: the ſoffit is alſo adorned in the ſame manner; five of the ſix ſtones remain entire, but the other has fallen within, and thus the connection is broken. The ſculpture is ſufficiently diſtinguiſhable; and even the colours in ſome places remain. The ſoil around ſeems to indicate that other buildings have formerly exiſted near this place. In a rock not far diſtant there are apartments, which have the appearance of places of ſepulture. Although they are without ornament or inſcription, they ſeem to have been hewn with ſome labour. They appear to have been all opened, but no circumſtances point out with certainty the uſes to which they have been applied. Nevertheleſs here are many parts of human ſkulls, and other bones, with fragments of ſkin, and even of hair, attached to them. All of them appear to have undergone the action of fire; but whether they are the remains of bodies repoſited there by a people accuſtomed to burn the dead, or whether they have been burned in this their detached ſtate by the preſent inhabitants, it is now difficult to determine. Yet the ſize of the catacombs would induce one to conclude, that they were deſigned for bodies in an unmutilated ſtate; the proportions being twelve feet in length, ſix in width, and about ſix in height. The number of theſe caverns may amount to thirty or more.

The Oaſis, which contains the town of Siwa, is ſtated by Mr. Browne to be about ſix miles long, and four and a half or five wide. Mr. Horneman, who viſited this country ſince Mr. Browne, ſays, that the principal and fertile territory of Siwah is 50 miles in circumference; but unleſs there be a miſtake in numbers, 50 being inſerted inſtead of 15, which is not improbable, he differs from all others; unleſs indeed we ſuppoſe, that he included the whole diſtrict within the ſurrounding mountains, without conſidering that between theſe and the Oaſis are extenſive plains of barren ſand. A large proportion of the ſpace in which Siwa is ſituated is filled with date-trees, and there are alſo pomegranates, figs and olives, apricots and plantains; and the gardens are remarkably flouriſhing. They cultivate a conſiderable quantity of rice, of a reddiſh hue, and different from that of the Delta. The remainder of the cultivable land furniſhes wheat enough for the conſumption of the inhabitants. Here is abundance of water, both ſalt and freſh; but the ſprings which furniſh the latter are moſtly tepid; and ſuch is the nature of the water, air, and other circumſtances, that ſtrangers are often affected with agues and malignant fevers. It is obſerved by the natives concerning one of the ſprings, which riſes near the building above deſcribed, that it is ſometimes cold and ſometimes warm.

The complexion of the people in this diſtrict is generally darker than that of the Egyptians; and their dialect is alſo different. They are not in the habitual uſe either of coffee or tobacco. The dreſs of the lower claſs is very ſimple, as they are almoſt naked; and the coſtume of the inhabitants, as far as it could be diſcerned, approached nearer to that of the Arabs of the deſart than thoſe of the Egyptians or Moors. Their clothing conſiſts of a ſhirt of white cotton, with large ſleeves, and reaching to the feet, a red Tunis cap, without a turban, and ſhoes of the ſame colour. Some earthen ware made by themſelves, and a few mats, form the chief part of their houſehold furniture; none but thoſe of the richer claſs being furniſhed with copper utenſils. They occaſionally purchaſe a few ſlaves from the Murzouk caravan. Their remaining wants are ſupplied from Cairo or Alexandria, whither they tranſport their dates, both in a dry ſtate, and beaten into a maſs, which when good reſemble in ſome degree a ſweet-meat. They eat no large quantity of animal food, and bread of the kind known to us is uncommon. Flat cakes, without leaven, kneaded and then half baked, form part of their nouriſhment. The remainder conſiſts of thin ſheets of paſte, fried in the oil of the palm-tree, rice, milk, dates, &c. They drink, in large quantities, the liquor extracted from the date-tree, which has often the power of inebriating. Their domeſtic animals are the hairy ſheep and goat of Egypt, the aſs, and a very ſmall number of oxen and camels. The women are veiled, as in Egypt. After the rains, the ground in the neighbourhood of Siwa is covered with ſalt for many weeks. Browne's Travels.

SIWA, in *Mythology*, a goddeſs of the Germans, repreſented in her ſtatue naked, with her hair falling down behind as far as her knees, and holding in one hand a bunch of grapes, and in the other an apple. She is taken for Venus, or for the goddeſs of health. Others take her for a rural divinity, the Pomona of Luſatia.

SIWALON, in *Geography*, a rock in the Eaſt Indian ſea, near the north coaſt of Java. S. lat. 6° 36′. E. long. 110° 49′.

SIXAIN, SIXTH, *Sexagena*, in *War*, an ancient order of battle, in which ſix battalions being ranged in one line, the ſecond and fifth were made to advance, to form the vanguard; the firſt and ſixth to retire, to form the rear-guard; the third and fourth remaining on the ſpot, to form the corps, or body of the battle.

The word is French, ſignifying the ſame thing.

SIX-CLERKS, officers in chancery of great account, next in degree below the twelve maſters; whoſe buſineſs is to enrol commiſſions, pardons, patents, warrants, &c. which paſs the great ſeal, and to tranſact and file all proceedings by bill, anſwer, &c.

They were anciently *clerici*, and forfeited their places, if they married; but when the conſtitution of the court began to alter, a law was made to permit them to marry. (Stat. 14 & 15 Hen. VIII. cap. 8.) They are alſo ſolicitors for parties in ſuits depending in the court of chancery.

Under them are ſix deputies and ſixty clerks, who, with the under clerks, do the buſineſs of the office.

SIX-FOUR, in *Geography*, a town of France, in the department of the Var; 9 miles S.W. of Toulon.

SIXHINDEMEN. See SYXHINDEMEN.

SIX-ISLANDS, in *Geography*, ſmall iſlands in the Eaſt Indian ſea. S. lat. 6° 37′. E. long. 71° 26′.

SIX-MEN FORT, a fort of the iſland of Barbadoes; 1 mile N. of Speight's Town.

SIX-MEN's *Bay*, a bay on the north-weſt coaſt of the iſland of Barbadoes.

SIX-MILE BRIDGE, a poſt-town of the county of Limerick, Ireland; 6 miles S. of that city, on the road to Cork, and 102 miles S.W. from Dublin. There is another town of the ſame name weſt of Limerick, on the road to Ennis, and in the county of Clare, which is $102\frac{3}{4}$ miles W.S.W. from Dublin. The latter town is on the river Gearna or Owgarne, (*i. e.* Owin Gearn, river Gearna,) which falls into the Shannon, where Bunratty caſtle ſtood; and had ſome eccleſiaſtical buildings in former days.

SIX-MILE *Creek*, a ſmall ſtream in the ſtate of New York, that enters the head of Canoge lake at Ithecal. A part of the creek is in the north-eaſt part of Tioga county, where it furniſhes excellent mill-ſeats. Its courſe is ſeventeen miles.

Six-mile *Croſs*, a fair-town of the county of Tyrone, Ireland, where there is a church. It is 7 miles S.E. from Omagh.

Six-mile *Water*, a river of the county of Antrim, Ireland, which riſes in Agnew's hill, near Larne, and running ſouth-weſt, falls into Lough Neegh, below the town of Antrim. The valley of this river, containing ſeveral villages, is a fine ſpecimen of the beauty and cultivation of the county, to which the frequent white-thorn hedges contribute not a little; ſhewing, as the plains about Antrim are approached, the increaſing richneſs of the ſoil, by their ſuperior ſize and vigour. Dubourdieu's Antrim.

SIX-NATIONS, a confederacy of American Indians, ſo called by the Britiſh and Americans, and by the French Iroquois. They are Mohawks, Oneidas, Onondagas, Senecas, Cayugas, and Tuſcaroras. In the American war they took part with Great Britain, and in 1770 they were totally defeated by the troops of Congreſs. Many of them have removed to Canada; and in 1796 they amounted to 4058 perſons. In this year a ſociety of Friends or Quakers raiſed a fund, towards promoting the civilization and comforts of theſe poor people.

SIXT, a town of France, in the department of the Ille and Vilaine; 6 miles N. of Redon.

SIXTH, Sesta, Ital., *Sixte*, Fr., in *Muſic*, the ſecond of the two imperfect concords, called by the Greeks Hexachordon, becauſe its interval is formed of ſix ſounds, or five diatonic degrees. The ſixth is only a natural conſonance by combination; for in the order of concords there is no ſimple and direct ſixth.

To conſider ſixths by their intervals, there are four different ſorts; two conſonant, and two diſſonant. The conſonant are, firſt, the *minor* ſixth, compoſed of three tones, and two major ſemitones; as E C: its ratio is 5 to 8. Secondly, the *major* ſixth, compoſed of four tones, and a ſemitone major; as G E: its ratio is 3 to 5.

The diſſonant ſixths are the extreme flat, and the extreme ſharp ſixths; as B♭ and G♯, called by the French the ſuperfluous ſixth; and C♯ and A♭. Neither of theſe intervals can be uſed in melody, and only the firſt in harmony.

Dr. Pepuſch has given eight examples of the allowable uſe of the ſixth in two parts; and Rouſſeau has given a liſt of ſeven chords, in which ſixths are employed. Theſe are, firſt, the ſimple chord of the ſixth to the third of a key, when that third is the ſuppoſed baſe, inſtead of its fundamental. This kind of chord, which is the common chord to the third below the baſe, may be given likewiſe to the ſecond and the ſharp ſeventh of a key. The ſecond uſe of the ſixth is with the fourth, which is ſtill a perfect concord to the fifth below the baſe. The third uſe of the ſixth is in the chord of the $\begin{smallmatrix}6\\4\\3\end{smallmatrix}$, which is the chord of the ſeventh to the fifth below the baſe, with a ſharp third. The fourth uſe of the ſixth is in the chord or harmony of the $\begin{smallmatrix}6\\5\end{smallmatrix}$, which is the chord of the ſeventh to the minor third below the baſe. This harmony is uſually given to the fourth of a key.

The fifth uſe of the ſixth is in what Rameau calls *le double emploi*, or double uſe of the $\begin{smallmatrix}6\\5\end{smallmatrix}$; when either of theſe intervals may be regarded as the diſcord. If the fifth is made a diſcord by the ſixth, it muſt be reſolved by *deſcending* on a concord; but if, as before a cloſe, the ſixth is regarded as the diſcord, it muſt be reſolved by *aſcending* to another ſixth, while the fifth remains for a fourth to the next baſe. See Double *Emploi*, and Resolution.

The ſixth uſe of the ſixth is that of the major ſixth and falſe fifth, which is the chord of the extreme flat ſeventh to the ſecond of a minor key, in which the falſe fifth is taken, inſtead of the fourth.

Laſtly, the ſeventh uſe of the ſixth is in the chord of the extreme ſharp ſixth, uſed only to the ſixth of a minor key; as D♯ to F♮, when the baſe deſcends to E, the fifth of the key, with a ſharp third. This is an original chord, which cannot be inverted. All theſe chords will be given in notation on the muſic plates, in the rules for accompaniment, or thorough-baſe. The major ſixth is nine ſemitones or half notes above the baſe; the minor ſixth, eight.

The ſixths major and minor, being inverſions of the thirds in compoſition and accompaniment, may, in two parts, move in ſucceſſion upwards and downwards at pleaſure. It has, in a regular deſcent, a ſolemn and melancholy effect, more pleaſing than in a regular aſcent. In compoſition and accompaniment, this concord is accompanied by the $\begin{smallmatrix}8\\3\end{smallmatrix}$, or by its octave and a third, or by two thirds. In thorough-baſe, doubling the ſixth or third, when the movement is not very rapid, enriches the chord and the harmony more than the eighth.

Sixth, in the *Military Art*. See Sixain.

Sixth *Pair of Nerves*. See Nerve.

Sixth *Rates*. See Rate.

SIXTUS I., pope, in *Biography*, was by birth a Roman, and ſucceeded Alexander I. about the year 119. Very little is known concerning him; and though there are two decretals aſcribed to him, they are generally regarded as forgeries. He died in the year 128, and has been ranked among the martyrs by the church of Rome, though it is not at all aſcertained that he actually ended his life by martyrdom.

Sixtus II., pope, was a deacon of the Roman church at the time he was elected to the pontificate, in the year 257, or, according to ſome authors, in 260. At the requeſt of Dionyſius, biſhop of Alexandria, he put an end to a diſpute commenced between his predeceſſor, Stephen, and St. Cyprian, concerning baptiſm adminiſtered by heretics. A perſecution was at this time raging againſt the Chriſtians in conſequence of a reſcript of the emperor Valerian, directing that ſearch ſhould be made for all biſhops, prieſts, and deacons, in order to be put to death. Sixtus was one of the firſt victims, being beheaded after he had occupied the papal chair almoſt a year.

Sixtus III., pope, a Roman, was long regarded as one of the principal ornaments of the church of Rome. In 418 he was a favourer and protector of the Pelagians; but when their opinions were condemned by Zoſimus, he was one of the firſt who pronounced an anathema againſt them, and made a public declaration of his orthodoxy. He was raiſed to the pontifical throne in 432, on the death of Celeſtine. It was about this period that the Eaſtern churches were divided concerning the condemnation of Neſtorius; Cyril, with the Egyptian biſhops, maintaining the juſtice of that act; while John of Antioch, and other Oriental biſhops, refuſed to concur in it. By the exertions of Sixtus the parties were reconciled. The Illyrian biſhops made an attempt in the pontificate of Sixtus to free themſelves from the papal juriſdiction, but they were induced by his letters to renounce their purpoſe. The munificence of this pontiff was diſplayed in various repairs and rich decorations of churches in

Rome. He died in 440, after a reign of eight years, and his name has been enrolled among thoſe of the ſaints of the holy Roman ſee.

Sixtus IV., pope, who aſſumed the name of Sixtus, inſtead of Francis della Rovere, was deſcended from a family of the ſame name in Savona, in the ſtate of Genoa. He was born in 1414, and at an early age entered into the Franciſcan order. He ſtudied in the univerſities of Pavia and Bologna, and having taken the degrees of doctor of philoſophy and theology, he gave public lectures in ſeveral of the principal cities of Italy, and acquired great reputation for learning. Having paſſed through ſome honourable offices in his order, he was at length raiſed to the head of it as general; and becoming known to cardinal Beſſarion, through his recommendation, and that of cardinal Gonzaga, he was promoted by pope Paul II., in 1467, to the purple, by the title of St. Peter ad Vincula. On the death of the pope, in 1471, he was raiſed to the pontifical chair; but on his coronation a tumult was excited that had nearly proved fatal to him. Eſcaping from the hands of the mob, he attempted to form a league among the Chriſtian princes againſt the Turks, who had made themſelves maſters of Boſnia, Iſtria, and great part of Dalmatia, and threatened Italy. With this view he ſent ſome of his moſt diſtinguiſhed cardinals as his legates to different courts, with inſtructions to endeavour to compoſe the diſputes exiſting between the ſeveral ſovereigns; but, as uſual in ſuch caſes, with ſmall effect. He procured to be fitted out an allied fleet of gallies, which recovered Smyrna from the Turks, but he did little beſides. He was more ſucceſsful at home, in an attempt to expel a number of petty tyrants who had ſeized upon the cities belonging to the church, and governed them as independent ſovereigns. With the aid of Ferdinand, king of Naples, he effectually cleared the eccleſiaſtical ſtates of theſe uſurpers, and thereby almoſt doubled his revenue. The year 1475 was that of the Jubilee, which was celebrated with great magnificence by Sixtus, and was dignified by an unuſual aſſemblage of crowned heads, though the reſort of pilgrims in general was leſs than on former occaſions.

This pontiff carried the vice of nepotiſm to as great a degree as any of his predeceſſors, and it was one of his firſt objects to make a ſplendid proviſion for his natural children, under the name of nephews, out of the dignities and offices of the church. It is ſaid, that one leading motive for his expelling the independent poſſeſſors of towns in the eccleſiaſtical ſtate was, that he might have territories to form principalities for his nephew; and in purſuance of this plan, he ſent Giulano de Rovere, afterwards Julius II., to take the city of Caſtello from Niccolo Vitelli. Niccolo, having obtained the aſſiſtance of the duke of Milan and the Florentines, made a vigorous reſiſtance, but was at length obliged to capitulate. This produced an alarm in the neighbouring ſtates, and occaſioned a defenſive league between the duke of Milan, the Venetians, and the Florentines. The latter people were under the influence of Lorenzo de Medici, whoſe political conduct could not but be highly diſpleaſing to the pope; and he diſplayed his reſentment by depriving Lorenzo of the office of treaſurer of the holy ſee, which he had conferred upon him in the days of their friendſhip. This, however, was not ſufficient, and he determined upon an attempt entirely to ſubvert the power of the Medici in Florence. In conjunction with his nephew, Girolamo Riario, he formed a moſt deteſtable conſpiracy. By means of the powerful family of the Pazzi, rivals to the Medici in Florence, a revolution was to be effected in the government of that city, commencing with the aſſaſſination of Lorenzo and Giuliano de Medici, when aſſiſting at maſs in one of the churches, and the elevation of the hoſt was to be the ſignal. Fortunately their plans miſcarried, but the pope thundered out an excommunication againſt Lorenzo and the magiſtrates of Florence, and laid the city and its territories under an interdict. Having in vain endeavoured by menace to induce the Florentines to deliver up Lorenzo, he formed a league with the king of Naples, whoſe troops, in conjunction with thoſe of the church, invaded the territory of Florence, and ſpread devaſtation through it. They were, however, encountered by an oppoſite league, and the pope was at length, by the interpoſition of the king of France, and the alarm excited throughout Italy in conſequence of the capture of Otranto by the Turks, obliged to conſent to a peace. Italy did not long remain in peace. In 1482, Sixtus joined with the Venetians in an attempt to diſpoſſeſs the duke of Ferrara of his territories, for which his motive was a hope of veſting the government of that city in one of his own family. The conſequence was an invaſion of the eccleſiaſtical ſtate by the duke of Calabria, ſon of the king of Naples, which however terminated in the duke's total defeat. The ſucceſs of the Venetians rendering them formidable to their neighbours, a league was formed againſt them, which the pope was perſuaded to join, and he iſſued a ſolemn excommunication againſt his allies. The confederates, however, receiving propoſals from the Venetians, concluded a peace without conſulting Sixtus. This affected his holineſs ſo much, that it occaſioned a ſevere fit of the gout, which put an end to his life in 1484, juſt after he had completed his 70th year, and in the 13th of his pontificate. "Sixtus IV." ſays his biographer, "ranks among the moſt unprincipled of the Roman pontiffs with reſpect to political conduct, which ſeems to have been governed by no other motive than the paſſion for aggrandizing his family, and indulging a rapacious diſpoſition. His concurrence in the deteſtable conſpiracy of the Pazzi, and the eagerneſs with which he fermented the wars which diſquieted Italy almoſt through the whole of his reign, ſhew him to have been ſteeled againſt all ſentiments of public juſtice and humanity. He has been taxed with avarice, but the imputation has been refuted by recounting the ſplendid edifices, and the numerous charitable and uſeful eſtabliſhments of which he was the founder. He was, in truth, liberal and magnificent in his expenditure; and having, like many other arbitrary princes of that character, exhauſted his reſources, he ſcrupled no means of repleniſhing them. In no pontificate were the offices and employments about the papal court more ſhameleſsly ſet to ſale, or the exactions in paſſing bulls and other official inſtruments from that court more ſcandalouſly augmented. The moſt favourable light in which he can be viewed, is as a munificent encourager of literature. He may almoſt be regarded as the founder of the Vatican library, for he not only enriched it with books, collected from various parts of the world, but cauſed them to be properly diſpoſed for the convenience of the public, to which he opened the library, placed them under the care of men deeply learned in different languages, with competent ſalaries, and aſſigned funds for the purchaſe of new books. It is, on the other hand, to be mentioned, that he was the firſt who inſtituted inquiſitors of the preſs, without whoſe licence no work was ſuffered to be printed." Sixtus was author of ſome theological pieces: ſeveral of his letters are extant, and he publiſhed ſome decrees, one of which had for its object to put an end to the diſputes then ſubſiſting relative to the conception of the Virgin Mary.

Sixtus V., pope, was born in 1521, in the Marche of Ancona, at La Grotte, a village in the territory of Montalto.

talto. His father, whoſe name was Peretti, was a vine-dreſſer, who not being able to maintain his ſon, placed him, when he was only nine years old, in the ſervice of a farmer, by whom he was, at firſt, chiefly employed in attending to his ſwine. While he was occupied in this low office, a Franciſcan friar paſſing that way, took the lad for his guide on a journey to Aſcoli. Pleaſed with the boy's vivacity, he cauſed him to accompany him to his convent, and introduced him to his father guardian, who admitted him into the convent in the quality of a lay brother. He ſoon manifeſted a great inclination for learning, and was taught the elements of the Latin language. He was ſoon admitted into the order, went through the uſual courſes of philoſophy and theology, was ordained prieſt in 1545, and ſhortly afterwards, being made a doctor in theology, he was appointed to a profeſſorſhip at Sienna, under the name of Montalto. He acquired a high reputation as a preacher in ſeveral Italian cities, and was in a very ſhort time nominated commiſſary-general at Bologna, and inquiſitor at Venice. In the exerciſe of the latter office he quarrelled with the ſenate, always jealous of eccleſiaſtical authority, and thought proper to make his eſcape from Venice by night. Going to Rome, he became one of the council of the congregation, and afterwards procurator-general of his order. He accompanied cardinal Buoncompagno to Spain, in quality of theologian to the ſenate, and counſellor of the holy-office. Thus elevated, he ſuddenly changed his demeanour, which had been harſh and petulant, and put on an appearance of extraordinary gentleneſs and humility. Cardinal Alexandrini, formerly his pupil, being raiſed to the papal dignity by the name of Pius V., ſent him the brief of general of his order, and ſoon after honoured him with the purple, when he took the name of cardinal Montalto. The ſucceſſor of Pius was Gregory XIII., formerly cardinal Buoncompagno.

Montalto, without influence or connections to puſh him forward at the next vacancy, determined to appear entirely void of wiſhes and expectation of farther elevation, in order that he might not become an object of jealouſy to any party. He accordingly withdrew from all public affairs, ſhut himſelf up like one entirely devoted to ſtudy and religious retirement, and ever complained of the infirmities of age hanging heavily upon him. Gregory died in 1585, and the cardinals ſplit into factions. Montalto appeared, but in the character of one bending under the weight of years, and as if ready to expire. In the courſe of the conteſts, which were long and ſevere, he was informed that the choice would probably fall on him; to which he replied by averring his own unfitneſs for the office; that his life would ſcarcely outlive the conclave; and that if he were elected, he ſhould only be pope in name, while all the authorities muſt devolve upon others. This ſort of argument, which he threw out as a bait to his ambitious brethren, was readily ſeized upon by them all, as well with the hope of a ſhort pontificate, as with the expectation that they ſhould all ſtrengthen themſelves againſt a new election. Montalto was choſen on the 24th of April, 1585. Scarcely, however, had the tiara been placed on his head, when he threw away his crutches, which had enabled him to aſſume his former character, walked perfectly erect, and chanted Te Deum with a voice ſo ſtrong, that the roof of the chapel in which the ceremony was performed re-echoed the ſound. He alſo gave his benediction to the people with ſuch an air of vigour, that they could ſcarcely believe him to be the decrepid cardinal Montalto. It was now that he aſſumed the name of Sixtus V., and he ſoon ſhewed them that his mind was as vigorous as his body. The territory of the church was at this time overrun with banditti, who plundered and even murdered the people with impunity; and in the metropolitan city itſelf, a relaxed police had encouraged all kinds of diſorders. The firſt object of Sixtus was to exterminate theſe evils, and no ſovereign ever employed the corrective powers with which he was inveſted with more vigour and effect. It had been uſual, for the ſake of acquiring popularity, on the election of a new pope, to ſet the impriſoned criminals at liberty; but the firſt act of Sixtus was to order four perſons to be hanged, on whom were found, a few days before, prohibited weapons. This ſyſtem of rigour he purſued with the moſt inexorable ſeverity, never, in a ſingle inſtance, pardoning a criminal. There is no doubt that ſignal ſeverity was neceſſary to ſtop the public diſorders, and in that view of the ſubject, Sixtus was certainly a benefactor to the ſtate; but unfortunately for his character as a juſt magiſtrate, in whom compaſſion ſhould be found tempering the rigour of the law, inſtances are recorded on the page of hiſtory which go to prove that he took a real pleaſure in acts of puniſhment, and that his ſoul was inſenſible to all the emotions of tenderneſs and pity; which, ſays a good writer and diligent obſerver of human nature, “ is not an unuſual effect of a monaſtic education.”

A Spaniſh gentleman having been ſtruck by a Swiſs guard with his halberd in a church, retaliated by a blow which proved fatal to the ſoldier. Sixtus, having examined into the affair, gave an order to the governor of Rome to have the offender executed before he ſhould ſit down to table. The Spaniſh ambaſſador, with four cardinals, waited upon his holineſs, not to plead for the criminal's life, but to entreat upon their knees, that, as he was a gentleman by birth, the puniſhment might be commuted to that of decapitation: this ſmall favour he abſolutely refuſed, and ſaid in a tone of anger, bordering on frantic rage, “ he ſhall be hanged; but to alleviate the diſgrace incurred by his family, I will do him the honour to aſſiſt at his execution.” He accordingly ordered the gallows to be erected before his own houſe, and was witneſs to the deed of horror. When the ſentence was executed, he turned with the utmoſt coolneſs to his domeſtics, and ſaid, “ Bring me my dinner; this act of juſtice has given me an additional appetite.” He cauſed the heads of all thoſe who had ſuffered the penalty of death for crimes committed againſt the ſtate, to be placed on the city gates, and on each ſide of the bridge of St. Angelo, and ſometimes went on purpoſe to view them; and a requeſt being made by the conſervators of the health of the city for their removal, when they, by their numbers and decay, became offenſive, he replied, “ You are too delicate; the heads of thoſe that rob the public are ſtill more offenſive.”

Another anecdote is told of him, to ſhew that he was not more rigorous to his own ſubjects, than ſtrenuous in maintaining the rights and authority of the holy ſee, with reſpect to foreign powers. When the ambaſſador of the king of Spain preſented him with a beautiful genet and a purſe of ducats, as a homage due for the kingdom of Naples, and complimented him in his maſter's name, Sixtus, in a tone of raillery, ſaid, that the compliment was very fine, but that it would require a deal of eloquence to perſuade him to take a horſe in exchange for the revenues of a kingdom. At the time of his acceſſion, France was in confuſion on account of the machinations of the Catholic league to exclude from the crown Henry, king of Navarre, its preſumptive heir. Though Sixtus did not approve the attempts of the Guiſes, at the head of the league, to obtain a ſuperiority over the king, Henry III.; yet he thought it became him, as head of the Catholic religion, to promote the excluſion of a Proteſtant heir, and he accordingly launched an excommunication againſt the king of Navarre, depriving him of the right of ſucceſſion. That prince procured an appeal from this ſentence to be fixed on the very gates of the Vatican, which act, Sixtus had the magnanimity to be pleaſed with, on account of the heroiſm which it diſplayed. When Henry III. had cauſed the duke of Guiſe to be aſſaſſinated, and the cardinal of Guiſe to be put to death, and the cardinal of Bourbon and the archbiſhop of Lyons to be impriſoned, the pope, highly incenſed at the violation of the eccleſiaſtical immunities in the perſons of the three laſt mentioned perſons, iſſued a monitory, requiring the king to ſet at liberty the cardinal and archbiſhop within ten days, on pain of excommunication; and he afterwards approved, in an open manner, the aſſaſſination of Henry by the Dominican Clement. He refuſed, however, to renew the excommunication of Henry IV., ſaying, that he would pray for his converſion, and that no prince was more deſerving a crown. He had alſo a high veneration for the character of queen Elizabeth of England, on account of the prudence and vigour of her government, though he was under the neceſſity of treating her as an enemy on account of her enmity to the Catholic religion. It is ſaid, and the fact is ſurely quite in character, that he envied her the good fortune in having had the pleaſure of taking off a crowned head, by the execution of Mary, queen of Scots. After the defeat of the Spaniſh armada, he entertained the deſign of wreſting the kingdom of Naples from Philip, but was prevented by death from making the daring attempt.

It was the ruling paſſion of this pontiff, who, as we have ſeen, was only a peaſant's ſon, to perpetuate his memory, by which he was led to many vain and oſtentatious, and to ſome great and uſeful enterpriſes. He had already, while cardinal, engaged the celebrated architect Fontana, in erecting a ſplendid chapel in the church of St. Maria Maggiore, which he had been obliged to diſcontinue, from the withdrawing of his allowance by Gregory XIII.; and now having the means, as well as the good will, he employed the ſame artiſt in the arduous taſk of ſetting upright the fallen obeliſk of Egyptian granite, which had once decorated the Circus of Nero. This was effected by great ſkill and labour, and the obeliſk was dedicated by Sixtus to the Holy Croſs. He afterwards cauſed three other obeliſks to be dug out of the ruins among which they lay, and placed before different churches. If mere vanity and oſtentation led him to erect uſeleſs buildings at his native place; it was univerſally allowed, that uſe and ornament were united in moſt of the works which he executed at Rome. For the ſupply of water to that metropolis, he directed the collection of a number of ſprings to one reſervoir, at the diſtance of thirteen miles, whence it was conveyed by an aqueduct to the Quirinal mount. He undertook to rebuild the Vatican library upon an enlarged and more magnificent plan, by his favourite architect Fontana, and erected very near it a very fine printing-office, deſtined to give ſplendid as well as correct editions of the fathers, and other works relative to religion. There was not a part of Rome to which he had not given decorations, and perhaps no pope left ſo many monuments of grandeur after a long reign as Sixtus V., after occupying the papal ſee little more than five years. On theſe objects he muſt have expended immenſe ſums, yet at his death he left five millions of crowns in the caſtle of St. Angelo, with an injunction to his ſucceſſor, that they ſhould be expended only for the ſervice of the church, againſt Turks and heretics, or to relieve the people in times of famine and peſtilence. For the ſupply of the great expenditure of his reign, and the accumulation of the ſums left behind him, he muſt have had recourſe to a ſyſtem of heavy taxation, although he managed his finances with great economy. He was not free from the papal vice of nepotiſm. Though never aſhamed of the meanneſs of his origin, which could not be concealed, he was determined to leave his family great. He ſent for a ſiſter, the widow of a poor countryman, and inſtantly gave her the rank of a princeſs, with a ſuitable maintenance; and he raiſed one of her grandſons to the cardinalate, with a very large revenue. He was equally liberal to his other relations. He fixed the number of cardinals to ſeventy, a number which has been adhered to by his ſucceſſors; and he decreed, that four at leaſt of the number ſhould be doctors of divinity, choſen from the religious orders. He is ſaid to have been a decided enemy to the Jeſuits, and was indignant that they ſhould aſſume a name that implied, that their founder was the meek and benevolent Jeſus; hence he propoſed that they ſhould change the name of their order to that of Ignatians. This celebrated pontiff died in Auguſt 1590, having reigned five years and four months. The news of his death was received with every demonſtration of joy at Rome, where his government had been oppreſſive and tyrannical; but the vigour of his adminiſtration, and the mighty works which he effected, have thrown a ſplendour about his name, and gave him rank among the diſtinguiſhed characters of the age. In the year 1590, a new Latin verſion of the Bible was made and printed by his order, of which a corrected edition was given in 1592, by Clement VIII.

SIZADA, in *Geography*, a town of Hindooſtan, in Allahabad; 20 miles S.E. of Corah.

SIZANDRO, a river of Portugal, which runs into the Atlantic, N. lat. 39° 2′. W. long. 9° 19′.

SIZE, the name of an inſtrument uſed to find the bigneſs of fine round pearls.

It conſiſts of thin pieces, or leaves, about two inches long, and half an inch broad; faſtened together at one end by a rivet. In each of theſe are ſeveral round holes drilled, of different diameters. Thoſe in the firſt leaf ſerve for meaſuring pearls from half a grain to ſeven grains. Thoſe of the ſecond, for pearls from eight grains, or two carats, to five carats, &c.: and thoſe of the third, for pearls from ſix and a half to eight and a half.

Size is alſo uſed for a kind of weak glue. (See Glue.) The ſhreds and parings of leather, parchment, or vellum, by being boiled in water and ſtrained, make ſize. Common ſize is made of leather boiled in water till it becomes of a viſcid conſiſtence. If it is wanted in painting for nicer purpoſes, it ſhould be prepared by taking any quantity of the ſhreds or cuttings of glovers' leather, and putting to each pound a gallon of water; let theſe be boiled for ſix or eight hours, ſupplying water, ſo that it may not diminiſh to leſs than two quarts. Then ſtrain the hot fluid through a flannel, and afterwards evaporate it till it is of the conſiſtence of a jelly when cold. The ſize uſed in burniſh gilding, and made of cuttings of parchment, is prepared much after the ſame manner. This ſubſtance is uſeful in many trades. Mr. Boyle mentions, among other uſes, that fine red ſtands, and hanging-ſhelves, are coloured with ground vermilion tempered with ſize, and when dry, are laid over with common varniſh.

Size, *Gold.* See Gold-*ſize.*

SIZE, *Iſinglaſs.* See ICHTHYOCOLLA.

SIZE, *Painting.* See DISTEMPER.

SIZE *for Silvering.* See SILVERING.

SIZE *of Cottage Grounds*, in *Agriculture.* See COTTAGE.

SIZE *of Farms*, the particular dimenſions or extents of them. The advantages of the different ſizes of farms, ſo far as they relate to the occupiers and the community at large, have not yet been by any means aſcertained. See FARM.

SIZE *of Fields or Incloſures.* See FENCE, FIELD, and INCLOSING *of Land.*

SIZEBOLI, in *Geography*, a town of European Turkey, in Romania, on a point of land which projects into the Black ſea, with a good road, in which men of war may moor. It is the ſee of a Greek archbiſhop; 14 miles E. of Burgos. N. lat. 42° 30′. E. long. 27° 44′.

SIZEL, in *Coining*, is uſed where pieces of money are cut out from flat bars of ſilver, after having been drawn through a mill into the reſpective ſizes or dimenſions of the money to be made; the reſidue is called ſizel, and melted down again.

SIZING, in *Mineralogy*, a term uſed by the Corniſh miners for a peculiar method of ſeparating the purer from the impurer parts of an ore, by means of ſieves. When the ore has been powdered, they put it into a wire-ſieve with fine holes, and in this they ſift it, till the fine part goes through: this is properly what is called ſizing. They ſend the larger or coarſer part to be powdered again, and putting the reſt into a ſieve with a cloſe bottom, they let in a ſtream of water from the cock, and by means of continued ſhaking it about, they cauſe the lighter and fouler parts to be waſhed over the rims of the ſieve, and the remaining powder is the black tin.

SIZRAN, in *Geography*, a town of Ruſſia, in the government of Simbirſk, on the Volga; 27 miles S. of Simbirſk. N. lat. 53° 10′. E. long. 48° 14′.

SIZUN, a town of France, in the department of Finiſterre; 6 miles S.E. of Landerneau.

SIZZELA, a town of Iſtria; 9 miles S.S.W. of Cape d'Iſtria.

SIZZING, in *Rural Economy*, a term provincially applied to yeaſt or barm.

SKABOUGAN, in *Geography*, a river of America, which runs into lake Michigan, N. lat. 44° 5′. W. long. 86° 46′.

SKAGAFIORD, a bay on the N. coaſt of Iceland. N. lat. 65° 50′. E. long. 15° 21′. This Fiord receives the waters of two rivers, one of which is large, and is called Kolbeinsdalſaa. On the weſtern ſide of the Skagafiord is ſituated a place of trade, called Hoſſos, with a bad harbour, ſo that only one merchant has ſettled there. At the head of the Skagafiord, not far from Hoſſos, is Hoolum, which, until the cloſe of the laſt century, was the ſeat of one of the biſhops of Iceland. A public ſchool was alſo eſtabliſhed there; but now (1810) the place conſiſts only of a few cottages; and in its preſent ſtate contains nothing particularly worthy of notice.

SKAGAFIORD *Syſſel*, a diſtrict of Iceland, containing 412 farms, 492 families, and a population of 3141 perſons.

SKAGASTRAND, a conſiderable place of trade on the northern coaſt of Iceland; ſituated on the weſtern ſide of the large promontory which bounds the Skagafiord. The harbour is bad; and towards the end of September is particularly unſafe, on account of its being expoſed to the north wind and floating ice. This place formerly furniſhed a cargo for one veſſel every year; but ſince the commencement of the war, the arrival even of one ſhip has not been regular.

SKAGEN, a promontory of Iceland, projecting from the N. coaſt, about 20 miles in length from N. to S. and from 5 to 15 in breadth; the N. point being in N. lat. 66°. E. long. 45° 51′.

SKAGEN. See SCAGEN.

SKAGER, a town of Sweden, in Weſt Gothland; 85 miles E.N.E. of Uddevalla.—Alſo, a lake of Sweden, in Warmeland; 5 miles E. from the Wenner lake.

SKALDA and SKALDS. See EDDA and SCALDS.

SKALE, in *Geography*, a ſmall iſland on the W. coaſt of Scotland, in Loch Fine. N. lat. 55° 54′. W. long. 5° 23′.

SKALEN, a town of Pruſſia, in the palatinate of Culm; 13 miles N. of Straſburg.

SKALEVAD, a town of Sweden, in the province of Angermanland; 50 miles N.N.E. of Hernoſand.

SKALGRUND, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 55° 54′. W. long. 5° 23′.

SKALHOLT, a town of Iceland, the ſee of a biſhop, ſuffragan of Drontheim. N. lat. 64°. W. long. 16°. The ſituation of Skalholt, about 24 miles from *Thingvalla* (which ſee), is beautiful. Towards the ſouth there is a view of a noble river, formed by the junction of that diſcharged from Apa Vatn and the Huitea, bounded by a finely-ſhaped hill in the diſtance; another equally pictureſque hill riſing on the eaſtern bank of the latter, and facing Skalholt. Flat meadow land, gently ſwelling ground, and diſtant mountains towards the eaſt, among which are Eyafialla Jokul, and Hekla, form altogether a magnificent amphitheatre, and compoſe a landſcape which, even without wood, is highly gratifying to the eye. The firſt biſhop of Skalholt was Iſleif, who died in 1080; he was the earlieſt of the Icelandic hiſtorians, and a man of great general learning; but his works are now unfortunately loſt. Paul, another biſhop of Skalholt, as well as Sturleſon, were diſtinguiſhed by their attainments in mathematics and mechanical ſcience. During a period of ſeven centuries, Iceland was divided into two biſhoprics, that of Skalholt comprehending the ſouthern, and that of Hoolum the northern diſtricts of the iſland. The ſees becoming vacant at the ſame time, they were united, in 1797, by the order of the Daniſh government; and the title of biſhop of Iceland was conferred upon the learned and reſpectable Gein Vidalin, the preſent poſſeſſor of this dignity. The duties of his office are important and extenſive. The place of his ſtated reſidence is Reikiavik. His revenue, ſince the union of the ſees, is about 1800 dollars *per annum*, derived chiefly from the public treaſury of the iſland. The appointment of the biſhop is veſted in the crown. The church of Skalholt is a neat ſmall building of wood, erected on the ſcite of the former one, which was taken down about the year 1804. The church, the biſhop's houſe, and a few cottages, conſtitute the ſuppoſed capital of Iceland. The eaſieſt route from the ſouthern to the northern parts of Iceland is by the way of Skalholt. To Skagaſtrand, the neareſt road is by Thingvalla and Kalmanſtunga, which laſt place is ſituated to the N.E. of Reikholt. See Mackenzie's Travels in Iceland in 1810. See ICELAND.

SKALL, a town of Bohemia, in the circle of Boleſlaw; 4 miles N.N.W. of Turnau.

SKALLERUD, a town of Sweden, in the province of Weſt Gothland; 30 miles N.N.E. of Uddevalla.

SKALOE, a ſmall iſland of Denmark, near the N. coaſt of Laaland. N. lat. 55°. E. long. 11° 23′.

SKANANDO Creek, a ſmall water of Oneida creek, which riſes in Auguſta, Oneida county, runs northerly through the ſaid town and Vernon, and enters Oneida creek near the S.W. corner of Vernon. It furniſhes good mill-ſeats in Auguſta and Vernon. Its courſe is about four miles.

SKANDA, in *Hindoo Mythology*, is a name of Kartikya, commander of the celeſtial armies. He is a reputed ſon of Siva, and his hiſtory and exploits fill many volumes of Eaſtern poetry, tranſlated into a variety of languages from the Sanſcrit. He is alſo called Divimatri, having the ſame meaning in Sanſcrit, as Dimeter or Bimater among weſtern mythologiſts. Shanmuka, or ſix-faced, Seſhtimatriya, meaning with ſix mothers, are others of his names; the origin of which will be found under thoſe articles, and Kartikya. (See alſo Siva.) Sir W. Jones informs us that the Perſian poets, in borrowing their romantic hiſtories from thoſe of India, have ridiculouſly confounded the Skanda of the latter with Skander or Iſkander; their name of Alexander the Macedonian, as well as of a hero in their earlier romances.

SKANDERBORG, in *Geography*, a town of Denmark, in North Jutland, where the kings of Denmark have a royal palace: the chief trade of the inhabitants conſiſts in the produce of the country, and agriculture; 10 miles S.S.W. of Aarhuus. N. lat. 56° 55′. E. long. 9° 54′.

SKANEATETES, a lake of New York; 25 miles S.S.E. of lake Ontario.

SKANGERO, a ſmall Grecian iſland below that of Pelagniſi, and near the iſle of Dromi, in which are two rocks, called the "Brothers."

SKANKHEADHAW Lake, a lake of North America. N. lat. 49° 45′. W. long. 90° 45′.

SKANO, a town of Sweden, in Schonen; 20 miles S.S.W. of Lund. N. lat. 55° 24′. E. long. 12° 34′.

SKANTZE, a town of Sweden, in Weſtmanland; 9 miles N. of Stroemſholm.

SKAPTAA-JOKUL, lofty mountains ſituated in the interior of Iceland, and known to the natives themſelves only by the remote view of their ſummits, clad in perpetual ſnows. Theſe were the ſcene of a moſt dreadful volcanic eruption in the year 1783. This is repreſented as the moſt tremendous, perhaps, in its nature and extent, by which Iceland, or any other part of the globe, has been afflicted. The ſudden extinction of a ſubmarine volcano near Cape Reikianes, which, during ſome months, had continued to burn with extreme violence, was ſucceeded by frequent and dreadful earthquakes, and by the burſting out of the volcanic fire, in a tract of country nearly 200 miles diſtant. From this deſolate and unfrequented region vaſt torrents of lava iſſued forth, overwhelming all before them, and filling up the beds of great rivers in their progreſs towards the ſea. For more than a year, a denſe cloud of ſmoke and volcanic aſhes covered the whole of Iceland, obſcuring almoſt entirely the light of the ſun, and extending its effects even to the northern parts of continental Europe: the cattle, ſheep, and horſes of the country were deſtroyed; a famine, with its attendant diſeaſes, broke out among the inhabitants; and the ſmall-pox invaded the iſland at the ſame time with its former virulence and fatal effects. From theſe combined cauſes, more than 11,000 people periſhed during the period of a few years; an extent of calamity which can only be underſtood, by conſidering that this number forms nearly a fourth part of the whole preſent population of the country. The deſtruction of the fiſhery upon the ſouthern coaſts of the iſland, by the volcanic eruptions juſt deſcribed, was another more permanent ſource of diſtreſs, which, even at the preſent time (1810) is not entirely removed. Mackenzie's Travels in Iceland.

SKAPTAFELL, East, a diſtrict of Iceland, on the northern coaſt, containing 53 farms, 126 families, and a population of 911 perſons.

Skaptafell, *Weſt*, a diſtrict of Iceland, on the ſame coaſt, containing 133 farms, 248 families, and 1539 inhabitants.

SKARA, a town of Sweden, in Weſt Gothland, the moſt ancient town of the country, and formerly the capital of the kingdom of Gothland, and the reſidence of many of its kings. It had alſo ſeveral churches and convents, the ruins of which are ſtill viſible. The town was totally deſtroyed by fire in 1719; and the number of its inhabitants does not at preſent exceed 400. Its gymnaſium or ſeminary was eſtabliſhed in 1640, and its cathedral is one of the largeſt edifices of the kind in the whole kingdom. In 1611 the royal palace, built near the town in 1545, together with the whole town, was reduced to aſhes by the Danes. At a diſtance from it ſtands Brunſbo, an epiſcopal ſee; 50 miles E. of Uddevalla. N. lat. 58° 24′. E. long. 13° 30′.

SKARDSA, Biorno *á*, in *Biography*, a learned Icelander, was born at Ingelveſtad in 1574. Having loſt his father at eight years of age, he was placed by a relation under the care of Segurd Jonſen, who being well verſed in the ancient hiſtory of the country, inſpired Biorno with a ſtrong taſte for that kind of ſtudy. On the death of his maſter, in 1602, Biorno married, and having already been elected a magiſtrate, he applied himſelf with great diligence to hiſtory and juriſprudence. In old age he was borne down with heavy and very ſevere afflictions, became blind, and died a martyr to the ſtone in 1655. He collected a variety of documents and curious facts relating to the hiſtory of Iceland, and was, on account of his great knowledge in this department of learning, held in high eſtimation by his countrymen. His chief publication was "The Annals of Biörn à Skardſa, ſive Annales, &c. cum Interpretatione Latina, variantibus Lectionibus, Notis et Indice." He left behind him a great number of manuſcripts, both juridical and hiſtorical, a catalogue of which may be ſeen in the Eccleſiaſtical Hiſtory of Iceland by Johannæus; in Einarus' Literary Hiſtory; and in the preface to the ſecond volume of his Annals. Among his MSS. is one reſpecting Iceland, of which Torfæus made great uſe in his "Grönlandia Antiqua." Gen. Biog.

SKARDUPONEN, in *Geography*, a town of Pruſſian Lithuania; 1 mile N.W. of Stalluponen.

SKARO, a town of Norway; 32 miles N. of Stavanger.

SKARROE, a ſmall iſland of Denmark, near the S. coaſt of Fyen; 6 miles S. of Svenborg. N. lat. 55° 1′. E. long. 10° 29′.

SKARSTA, a town of Sweden, in Weſt Gothland; 40 miles E. of Uddevalla.

SKATE, in *Ichthyology*, the Engliſh name of a ſpecies of ray-fiſh, called by the generality of authors *raia undulata*, and *raia lævis*, and by ſome *rubus*.

It is diſtinguiſhed by Artedi by the name of the variegated ray-fiſh, with the middle of the back ſmooth, and with only one row of ſpines in the tail.

This ſpecies, which is the Raia *Batis* of Linnæus, (ſee Raia,) is the thinneſt, in proportion to its bulk, of any of the genus, and alſo the largeſt, ſome weighing near two hundred pounds. The noſe, though not long, is ſharp-pointed; above the eyes is a ſet of ſhort ſpines; the whole upper part of a pale-brown, and in ſome ſpecies ſtreaked with black; the lower part white, marked with many ſmall black ſpots; the jaws covered with ſmall granulated but ſharp-pointed teeth; the tail is of a moderate length; near the end are two fins; along the top of it is one row of ſpines, and on the edges are irregularly diſperſed a few others. In the males of this ſpecies the fins are full of ſpines. Skates generate in March and April, at which time they ſwim near the ſurface of the water, ſeveral males purſuing one female. The females begin to caſt their purſes, as the fiſhermen call the bags in which the young are included, in May, and continue to do it till September. In October they are very poor and thin, but begin to improve in November, and grow gradually better till May, when they are in the higheſt perfection. The males go ſooner out of ſeaſon than the females. Pennant.

SKAW, in *Geography*. See SKAGEN.

SKAWIN, a town of Poland; 10 miles S. of Cracow.

SKEATTA, or PENNY, in the *Hiſtory of Coinage*, one of the Heptarchic coins; the other being the *ſtyca*, which ſee. Dr. Combe, by cauſing two plates of the ſkeattas, or early pennies, to be engraved, brought them into notice. At firſt they had only rude figures of ſerpents, &c. but latterly they have legends. Theſe ſkeattas were ſtruck in Kent, and the other Heptarchic ſtates, from the ſixth to the eighth century, or from about the year 500 till 700. In 598 Kent was converted to Chriſtianity, and was followed in half a century by the other kingdoms. Moſt of the ſkeattas, as appears from their ſymbols, were ſtruck in the Pagan times. See *Modern* MEDALS and COINS.

SKEDE, in *Geography*, a town of Sweden, in Smaland; 42 miles S.E. of Jonkioping.

SKEEL, in *Agriculture*, provincially a large milking pail, having two handles, formed by two oppoſite ſtaves, which riſe above the reſt. It alſo ſignifies a broad flat creaming or milk-diſh, whether of lead or ſtone.

SKEEN, in *Geography*, a town of Norway, in the province of Chriſtiania; 38 miles S.W. of Chriſtiania.

SKEETS, in the *Sea Language*, narrow oblong ladles, or ſcoops, for wetting the ſails, decks, or ſides of a ſhip.

SKEG, in *Ship-Building*, the after-part of the keel, or that part whereon the ſtern-poſt is fixed.

SKEG-*Shores*, one or two pieces of four-inch plank, put up endways under the ſkeg of the ſhip, to ſteady the after-part a little, when in the act of launching. They are confined to the bottom of the ſlip by a hinge. The upper part is rounded, and they ſhould be ſo carefully fixed as to fall readily when the ſhip ſtarts. Skeg-ſhores are better avoided, as they have been the means of preventing ſhips from launching.

SKEGS, in *Agriculture*, a ſort of oat, ſometimes cultivated as a crop in Nottinghamſhire: the *avena ſtipiformis* of Linnæus. It is panicled, the calyces two-flowered, awns twice as long as the ſeed, culm branchy, and ſtipeform. They are a crop moſtly cultivated, according to the agricultural report of the above diſtrict, on the worſt land, ſometimes on a lea, ſometimes after turnips, often taken as a laſt crop. On bad land they may produce about four quarters *per* acre, which are generally about two-thirds of the price of oats. But they anſwer to ſow on good land, producing fourteen and fifteen quarters *per* acre. The kernel is reckoned remarkably ſweet and good food for horſes. They are ſometimes threſhed, ſometimes cut and uſed in the ſtraw. And they are chiefly grown about Carberton, and will grow where nothing elſe will. In regard to the quantity of ſeed *per* acre, eight ſtrikes are ſaid to be ſown, and yield a crop double that of other oats, in quantity; but not more than equal in weight. They will grow in the pooreſt land, and are reckoned very ſweet food. They are ſeldom brought to market; but eſteemed by farmers for their own uſe, and are often given in the ſtraw by them.

It is ſtated by Mr. Neville in the ſame Report, in a letter to ſir R. Sutton, that ſkegs are remarkably good for horſes, in the ſtraw, or threſhed, and in the ſtraw remarkably ſo for cows. Straw beaſts are alſo very fond of the ſtraw. He can get taking up weak land from the ſwarth, from four to ſix quarters an acre. On the ſame land he ſhould not have been able to get, perhaps, above three ſacks of black, red Frieſland, or what is called ſhort ſmall, or any other kind of corn. If land is in the ſtate in which all our bad land will be, more or leſs, after the ſeeds are quite run out, and as is frequently the caſe, when you cannot conveniently put it again into tillage ſo ſoon as you could wiſh, from either the too great quantity you may have to improve, or other circumſtances; if in this ſtate it were to be taken up with turnips, the moſt eligible way, it would be often impoſſible to provide manure *upon the farm* for any quantity of land ſufficient for the purpoſe; which makes ſkegs a very deſirable crop, and which, for that reaſon alone, he finds a great acquiſition, and feels a pleaſure in having been the firſt to introduce them into this country.

How far this crop may be capable of being grown in other diſtricts as the food of live-ſtock, in the green ſtate, muſt depend upon the trial.

SKEILAY ISLE, in *Geography*, a ſmall iſland of the Hebrides, is ſituated near the weſtern entrance of the ſound of Harris. It is comprehended in the pariſh of Harris and ſhire of Inverneſs.

SKELBOO, a town of Norway, on the Glanmen; 12 miles N.E. of Frederickſtadt.

SKELDNESS, a cape of Scotland, on the S.W. coaſt of the iſland of Shetland. N. lat. 60° 12′. W. long. 1° 48′.

SKELEFTEA, a town of Sweden, in Weſt Bothnia, on a river of the ſame name; 40 miles S. of Pitea.

SKELEFTEA, a river of Swediſh Lapland, which riſes on the borders of Norway, and runs into the gulf of Bothnia, S.E. of Pitea.

SKELETON, in *Anatomy*, from σκελλω, *to dry*, is the aſſemblage and combination of all the bones in the body, excepting the os hyoides: it conſtitutes the baſis or groundwork of the animal frame, being the point of ſupport and union for all the other organs. Its component parts form a ſeries of levers, of which the muſcles are the moving powers: thus the ſkeleton comprehends one diviſion of the moving organs. Its conſtituent pieces in ſome caſes form cavities, as thoſe of the head, cheſt, and pelvis, which contain the important internal organs, and protect them from external force.

The connections of the different pieces of the ſkeleton are called *joints*, and differ very conſiderably from each other; ſome of them admitting no motion, ſome an inconſiderable motion; and others allowing them to move freely, either in certain directions, or in every way. The word *ſkeleton*, denoting the bony fabric in its united ſtate, of courſe includes the joints or media of union; and in this reſpect we diſtinguiſh two kinds of ſkeletons. A *natural* ſkeleton is that in which the bones are all joined by their natural connections; that is, the articular ends are covered by their cartilaginous ſtrata, tied together by ligaments, and enveloped by ſynovial membranes: in this ſenſe the ſkeleton includes, beſides the bony ſyſtem, the acceſſory ſtructures of cartilage, ligament, and ſynovial membranes. When all the ſoft parts have been allowed to putrefy and rot, and the ſeparated bones, after being cleaned and dried, have been joined again by wires, &c. ſo as to be reunited artificially in their former order, an *artificial* ſkeleton is formed. In the ſpine and the ribs, the places of the cartilages, which are loſt in cleaning the bones, are ſupplied by portions of leather, cork, or other materials.

The latter, exhibiting merely the aſſemblage of the dried bones, is applicable to the ſtudy of oſteology only in the mechanical points of figure, ſize, &c.; and although extremely uſeful to the anatomiſt and ſurgeon, by repreſenting the parts in their natural connection and relations, is leſs convenient than the ſeparate bones for the ſtudy of many points, particularly the articular ends of the bones.

For the formation of artificial ſkeletons, the bones are deprived of their ſoft parts, either by boiling, or by maceration in water. The boiling muſt be continued until the tendons, ligaments, perioſteum, &c. are ſo looſened as to admit of being eaſily detached. The bony texture acquires in this method a dirty and greaſy appearance, which cannot be entirely got rid of by any after-proceſs. For the purpoſe of maceration, the bones, with the fleſh, &c. roughly cut off, muſt be left in the ſame water for ſome months; the ſoft parts will then fall off, and leave the bones of a much better colour, and freer from greaſe than when they have been boiled. Expoſure to the air, and frequently wetting them, will make them beautifully white after they have been well macerated. Their colour may be often much improved by expoſure to chlorine (oxymuriatic gas). The bones which poſſeſs large medullary cavities ſhould be bored at the articular ends, to get out the fatty ſubſtance.

Emaciated and particularly anaſarcous ſubjects are the beſt for making ſkeletons; becauſe there is no fat in the bones, and they conſequently continue dry and clean, when they have been originally well prepared. Perſons dying in good health, or from ſudden attacks, have ſo much adipous matter in the interior of their bones, that they continue greaſy, particularly at the articular ends, whatever pains may be taken to clean them.

In natural ſkeletons, the cartilages, ligaments, and ſynovial membranes being all left, the joints poſſeſs their natural mobility. But in order to keep them in this ſtate, they muſt be preſerved in ſpirits, or ſome other fluid capable of preventing the putrefaction of the ſoft parts. This is particularly neceſſary with the ſkeletons of young ſubjects, which are in great part cartilaginous. When a natural ſkeleton is dried, the ſoft parts ſhrink and are ſhrivelled up: the cartilages become contracted, and thus the natural figure is greatly impaired. The contraction of the cartilages diminiſhes the height by an inch or more.

So long as the bones are compoſed of ſeparate pieces, and have more or leſs cartilage in their ſtructure, the oſſeous ſyſtem can only be ſtudied in natural ſkeletons; but when the oſſification is complete, artificial ſkeletons are preferable.

The bones, being the levers by which the motions of the body are performed, have the muſcles or moving powers fixed to them. But as they are ſubſervient, in the conſtruction of our frame, to other purpoſes beſides thoſe of motion, there are ſome bones, though very few, to which no muſcles are attached: ſuch are the incus in the ear, the ethmoid and inferior turbinated bones, and ſome bones of the carpus.

Although the form of the bones is variouſly modified, according to the figure of the parts in which they are placed, or to their deſtinations, they may be claſſed under the three diviſions of broad or flat bones, cylindrical bones, and ſhort bones. The broad bones repreſent flat ſhells, and conſiſt of an inner ſtratum of reticular or ſpongy bony ſubſtance, which is covered on its ſurfaces with thicker or thinner plates of compact bony matter. The cylindrical, or long bones, form long ſhafts, expanded at their extremities into thicker heads, and containing a medullary cavity internally. The ſhort bones are ſuch as are nearly equal in their length, breadth, and thickneſs; variouſly ſhaped, according to their ſituations and offices; and conſiſt of the looſe ſpongy texture, covered by a thin rind of compact bone.

The long bones belong in general to the locomotive apparatus, where they form levers, moved by the muſcles in various directions: they are all placed in the limbs, where they form a central column, moveable in various directions. They diminiſh in length, and increaſe in number, ſucceſſively from above downwards; from the humerus and femur to the phalanges of the fingers and toes. Hence the upper part of the limbs is characteriſed by extent of motion, the lower by multiplicity and variety of movements.

The broad bones have not much to do with locomotion, except as they afford extenſive ſurfaces for the attachment of muſcles. They compoſe cavities, ſuch as thoſe of the cranium and pelvis, for which their form is well adapted. Several are united to form one cavity, and this circumſtance adds to the ſolidity of the ſtructure, as the effect of external force is loſt in the joints. They are generally concave and convex on their two ſurfaces.

The ſhort bones are found in parts which unite mobility and ſolidity, as the vertebral column, the carpus, and tarſus. They are always of inconſiderable ſize, and therefore are found in large number in the parts which they compoſe. Theſe parts are ſtrong, becauſe external force is loſt in the articulations: they are moveable, becauſe the combinations of ſeveral ſmall motions produce a conſiderable effect.

Of the firſt production of the bones, and their gradual developement while the fœtus remains in utero, and of the nouriſhment and growth of bone in general, an account is given in the articles EMBRYO and BONE: in the latter of which, and in EXTREMITIES, there is a deſcription of their external configurations, and of the diſpoſition of the bony ſubſtance. The organization and properties of the ſyſtem are conſidered under the article BONE. Under MEDULLARY *Syſtem* and CARTILAGE the accounts of theſe ſubjects will be found; and the perioſteum is deſcribed under MEMBRANE.

The ſkeleton is divided into the head, trunk, and extremities or limbs. As almoſt all the bones are formed originally of more than one piece, which ſeparate portions of oſſeous matter gradually come together, and are ultimately conſolidated, the number of diſtinct pieces of bone belonging to the ſkeleton is different at different ages. The following is the number of bones, when the oſſification is complete; that is, about the twentieth year.

I. In the HEAD, conſiſting of the *cranium*, and the FACE, the former is made up of

1 or 2 oſſa frontis,
2 oſſa parietalia,
1 os ſphenobaſilare, or ſpheno-occipitale,
2 oſſa temporum,
2 mallei,
2 incudes,
2 ſtapedes,
1 os ethmoideum.

The latter of

2 oſſa maxillaria ſuperiora,
2 oſſa palatina,
2 oſſa malarum, or zygomatica,
2 oſſa naſi,
2 oſſa lacrymalia,
2 oſſa turbinata inferiora,
1 vomer,
1 maxilla inferior,
32 teeth.

The whole amount of bones of the head is 59 or 60. The five pieces of the os hyoides added to theſe, make 64 or 65.

II. The Trunk, comprehending the ſpine, cheſt, and pelvis, conſiſts of

7 cervical
12 dorſal vertebræ,
5 lumbar
2 or 3 bones of the ſternum,
24 ribs,
1 ſacrum,
4 oſſa coccygis,
2 oſſa innominata.
—
57 or 58
—

III. The Extremities.

The upper contain

In the ſhoulders,	2 clavicles, 2 ſcapulæ.
In the arms,	2 humeri.
In the fore-arms,	2 radii, 2 ulnæ.
In the wriſts,	2 oſſa navicularia or ſcaphoidea, 2 oſſa lunaria, 2 oſſa cuneiformia, 2 oſſa piſiformia, or orbicularia, 2 oſſa trapezia, or multangula majora, 2 oſſa trapezoidea, or multangula minora, 2 oſſa capitata, 2 oſſa unciformia, or hamata.
In the metacarpi,	10 oſſa metacarpi.
In the fingers,	10 firſt or metacarpal phalanges, 8 middle or ſecond phalanges, 10 third or unguinal phalanges, 8 ſeſamoid bones.
	72

The lower extremities contain,

In the thighs,	2 femora.
In the legs,	2 tibiæ, 2 patellæ, 2 fibulæ.
In the tarſi,	2 aſtragali, 2 calcanei, or oſſa calcis, 2 oſſa navicularia, 2 oſſa cuneiformia magna, 2 ———————— parva, 2 ———————— media, 2 oſſa cuboidea.
	22
Brought over	22
In the metatarſi,	10 oſſa metatarſi.
In the toes,	10 firſt or metatarſal phalanges, 8 middle or ſecond phalanges, 10 third or unguinal phalanges, 6 ſeſamoid bones.
	66

The whole number of bones will be 259 or 261. There is frequently a ſmall bone of the ſeſamoid kind in the tendon of the external head of the gaſtrocnemius: and a roundiſh bit in the hyo-thyroid ligament. If both theſe ſhould exiſt, we muſt add four to the preceding number.

A complete dry natural ſkeleton of a male ſubject of the middle ſize, weighs from 150 to 200 ounces; that of a female, from 100 to 160 ounces.

Of the bones juſt enumerated, the frontal, ſpheno-occipital, vomer, lower jaw, vertebræ, ſacrum, coccyx, ſternum, and os linguale medium, are ſingle (imparia), and, being placed on the middle line of the body, ſymmetrical; all the others are double, or in pairs (paria); each pair being compoſed of a right and left correſponding bone. Hence the ſtructure of the whole ſkeleton is ſymmetrical; that is, if we imagine a perpendicular line to be drawn through the whole body, from before backwards, it will divide the ſkeleton into two correſponding halves, a right and left; the ſingle bones having their right and left ſides exactly alike.

This obſervation, however, of the ſymmetry of the ſkeleton, is not to be underſtood rigorouſly; ſince the right and left of the double bones, or the right and left ſides of the ſingle ones, are not accurately alike. The right or left bone, or the right or left ſide of a bone, may be longer or ſhorter, broader or narrower, &c. &c. than the other. The vomer is generally bent to one ſide; the internal ſurface of the ſkull ſeldom ſymmetrical. The laſt rib is often an inch longer on one ſide than on the other. The ſternum is ſeldom ſymmetrical; and the cartilages of the ribs are not fixed to it exactly oppoſite to each other. The articulations of the ribs with the ſpine often differ conſiderably on the two ſides. But the ſymmetry of the external form is not diſturbed by theſe differences. If the right ſide of a vertebra is more elevated than the left, the correſponding part of the neighbouring bone, or of the intervertebral cartilage, is accommodated to the deviation; ſo that the perpendicular line of the ſpinal column is not impaired, &c. &c.

The ſingle bones may be regarded as the media of union of the two lateral halves, which conſtitute the ſkeleton: they join together theſe two halves into one ſolid whole. In this reſpect there is a marked difference between the bones and the other organic inſtruments of locomotion, the muſcles. The diaphragm is the only muſcle placed on the median line, and its ſtructure is not ſymmetrical: it belongs in great meaſure to the internal or organic life, and correſponds, in its want of ſymmetry, to the arrangements of the internal organs. The ſkeleton, being the baſis or point of ſupport of the muſcles, as well as of all the other organs, conſtitutes an entire and firm fabric; an attribute which it derives from the ſingle bones, which may be regarded as the key-ſtones of the building. The muſcles, not contributing to the ſolidity of the animal ſtructure, are not united into ſuch a ſingle and firm aſſemblage.

The mode in which the different pieces of the ſkeleton are joined to each other, is conſidered under the article Joint; to which, and to that of Membrane, *Synovial*, we refer for the details regarding the anatomical ſtructure of theſe connections.

The oſteology of the head, including the teeth, is conſidered under CRANIUM; that of the vertebral column under SPINE; of the cheſt under LUNG; of the pelvis under HEAD; and of the limbs under EXTREMITIES. The os hyoides, or linguale, is deſcribed in the article DEGLUTITION. The joints are conſidered together with the bones which they unite; except that the articulation of the lower jaw is deſcribed under DEGLUTITION; and thoſe of the occiput, firſt and ſecond vertebræ, under HEAD.

The obſervation, which we have made of the bones in general, that they influence and determine the form of the ſoft parts, holds good more particularly of the whole ſkeleton. Its form, in all men, and in all ſtages of their life, correſponds ſo entirely to the configuration of their body, that an experienced eye would eaſily determine, from a tolerably preſerved ſkeleton, not only the age and ſex, but the growth and moſt ſtriking characters of bodily formation of the individual to whom it had belonged. Hence it is not enough for an artiſt to know the muſcles: he muſt begin with ſtudying the ſkeleton. However numerous the differences of individual configuration in the human race, ſtill retaining its general character and reſemblance, accurate examination will ſhew us not fewer diverſities in the ſtructure, form, ſize, greater or leſs elegance, and even greater or leſs fineneſs and firmneſs in the grain of the bone, in human ſkeletons, which ſtill preſerve the general character. Beſides theſe endleſs individual traits, diſtinguiſhing each ſkeleton from others, we find very ſtriking differences according to age and ſex.

With reſpect to the former of theſe circumſtances, ſkeletons have been divided into perfect and imperfect; the latter not very well choſen term being applied to fœtuſes, children, and ſubjects in whom the epiphyſes are not yet conſolidated with the bodies of the bones, or converted into true apophyſes; although, in relation to the reſt of the ſtructure, the bones are then as perfect as in the adult. The younger the ſubject, the more cartilage does the ſkeleton contain. Reckoning from the twentieth year backwards, the younger the ſubject the larger is the head, compared to the trunk and limbs; (the head is about one-half of the body, in the ſecond month of utero-geſtation; one-fourth in the ninth month; one-fifth at the age of three years; and one-eighth when the growth is complete:) the ſmaller are the bones of the face, and the larger the organ of hearing, in compariſon to the cranium; the larger are the fontanelles; the flatter is the lower part of the face; the larger the cheſt in relation to the pelvis; the ſhorter the limbs; the larger the clavicles; the ſmoother and flatter the broad bones, and the rounder the cylindrical bones. See Albert Durer on the proportions of the body, particularly at the end of the firſt book; and Sue ſur les Proportions du Squelette de l'Homme examiné depuis l'âge le plus tendre, juſqu'à celui de 25, 60 ans, &c. in les Mémoires préſentés, &c. p. 572.

The male and female ſkeleton differ, not only in the whole combination, or the general impreſſion, from a comparative ſurvey, but alſo in the form and properties of the individual parts. Theſe differences, however, are not clearly perceptible until ſome years have elapſed after birth. The plates of the female ſkeleton in Cheſelden and Sue are not to be compared to the accurate delineations of the male ſkeleton by Albinus. Soemmering has, however, ſupplied the deficiency in his beautiful "Tabula ſceleti feminei juncta deſcriptione," folio. He enumerates the following as the characters of the female. "The female ſkeleton is ſmaller and ſlenderer in all parts than the male. The ratio of the head, including the teeth, to the reſt of the bony ſtructure, is greater than in the male: the numbers are as 1 to 6 in the former, 1 to 8 or 10 in the latter. The circumference of the female ſkull is larger on the firſt view, in ſkeletons of the ſame height. The ſkull is larger in proportion to the face: its foramina, the palatine arch, and the whole cavity of the mouth, are ſmaller. The whole thorax is ſhorter; larger above, as far as the fourth rib, narrower below; more moveable, leſs conical; more convex in front; more diſtant from the pelvis, the interval between the laſt rib and the os innominatum being greater; leſs prominent anteriorly, ſo that when the trunk is ſupine, the ſymphyſis pubis is the higheſt point in the female, the thorax in the male ſubject. Generally, the cartilages of the true ribs are longer in proportion to the bone. The vertebral canal is more capacious, and the lateral openings for the nerves are alſo larger. The ſpinous proceſſes are leſs prominent; the ſternum is ſhorter, ending at the plane of the fourth rib, while it reaches to the plane of the fifth in the male.

"The loins are longer, and the angle between the laſt lumbar vertebra and the ſacrum, conſtituting the promontory, is more acute.

"All the diameters of the pelvis are greater; the criſtæ and tuberoſities of the oſſa innominata further apart; the ſpace between the oſſa pubis wider, and the ligaments of the ſymphyſis conſequently broader, although ſhorter.

"The ſacrum is turned more backwards, ſo that its apex and the coccyx do not project ſo much into the pelvis. The acetabula are farther apart, and hence the unſteady gait of the ſex: they are, however, nearer to the front of the pelvis, ſo that, when in the progreſs of pregnancy the centre of gravity is thrown more forwards, its equilibrium is better preſerved.

"The lower limbs form a more acute angle with the pelvis; the feet are ſmaller.

"The ſhoulders are more ſlanting, and the articulations nearer together; the upper limbs are ſhorter, and the fingers more pointed.

"Female bones are diſtinguiſhed from the male by having fewer aſperities, ſmaller ſpines and protuberances, ſhallower impreſſions, ſmaller articulations, and being on the whole ſmoother and more finely turned. The ſhaft or body of a cylindrical bone is more ſlender, in compariſon to the articular ends; and hence the fact which was ſpecified above, of the greater weight of the head in proportion to the reſt of the ſkeleton.

"The bones are not ſo hard in the female: they have, on the whole, a ſomething peculiar, a feminine character, which is not eaſily deſcribed. Their extremities remain longer cartilaginous.

"The frontal ſinuſes are ſmaller; the interval between them, or the glabella, leſs elevated; and the ſuperciliary arches leſs prominent. All the bones of the face are more ſlender. The figure of the alveolar circle is more elliptical in both jaws; in man more circular. The teeth are ſmaller. The os hyoides more ſlender.

"In the vertebræ, the bodies are longer, and more hollowed at the ſides; the tranſverſe proceſſes are directed more backwards, ſo that the channels on each ſide of the ſpinous proceſſes are deeper. The ſpinous proceſſes are ſharper pointed, ſhorter, and more ſlanting.

"The ribs are more ſlender, and flatter; their margins are conſequently ſharper.

"That the cartilages of the upper ribs are more frequently oſſified; that thoſe of the middle ribs are broader; and thoſe of the lower longer, which has been aſſerted by ſome anatomiſts, does not ſeem clearly made out.

"The firſt bone of the ſternum is longer in compariſon to the ſecond. The latter is more than double the length of the former in the male ſkeleton; but in the female it is often not ſo much as double. It is alſo thicker, in compariſon with the ſecond bone, in the female. Theſe differences are obſervable in the embryo.

“ The lumbar vertebræ are longer and more ſlender; the ſacrum broader and more excavated.

“ The oſſa coccygis are ſmaller, more moveable, and directed more forwards. Some have obſerved, that five of theſe bones are met with more frequently in the female than in the male.

“ The oſſa innominata are broader, flatter, and more expanded horizontally. The angle formed between the deſcending ramus of the pubes and the ſymphyſis is more open. The angle between the oſſa pubis is acute in the male, but of 80° to 90° in the female, where it approaches much more to the figure of an arch.

“ The iſchiatic tuberoſities are larger and ſmoother. The ſpace between the tuberoſity and the acetabulum is ſmaller; the iſchiatic notch more conſiderable; the foramen ovale larger; the notch for the tendon of the obturator externus leſs conſiderable.

“ The clavicles are leſs ſtrongly curved, ſo that the ſcapulæ are thrown backwards; the male clavicles are more arched, and the ſhoulders therefore brought more forwards. In the male ſkeleton, the clavicles are inclined a little downwards, ſo as to form an obtuſe angle with the ſternum; while they form nearly a right angle in the female.

“ The female ſcapulæ are ſmaller, ſlenderer, flatter, and have acuter angles.

“ In the female, the thigh-bones are bent more forwards; the neck forms a greater angle with the body; the internal condyle is larger, more prominent, and longer, in compariſon with the external.”

There are differences in ſome parts of the ſkeleton in the various races of mankind; that is, certain characters by which they can be diſtinguiſhed from each other. The head is the part in which the ſtrongeſt diſtinctive marks are obſervable. We have deſcribed theſe very fully, and entered at length into a conſideration of the way in which they are produced, in the articles Cranium and Man.

The national differences in ſtature, in the ſize, length, and proportion of the limbs, &c. muſt be accompanied with correſponding variations in the bony fabric. But there are no peculiarities of form in the individual bones, no varieties in the configuration of proceſſes, or articular heads and cavities, nor in their mutual adaptation. On this ſubject alſo we refer to the article Man.

The individual diverſities of ſize and form muſt be attended with differences in the ſkeleton. The bones are ſometimes longer, ſometimes thicker. The head may be comparatively large or ſmall; the ſhoulders broad or contracted; the thorax flat or prominent; the vertebral column more or leſs curved; the loins thick or ſlender; the thighs or legs, the fingers and toes, longer or ſhorter, &c.

Food ſeems to have no influence on the ſkeleton.

External cauſes have certainly, in ſome inſtances, influenced particular parts in individuals; as the application of artificial preſſure to the head of the newly born. (See Cranium.) The effect of analogous preſſure in contracting the feet of the Chineſe women, producing anchyloſis of the articulations, and thus rendering theſe inſtruments of locomotion nearly uſeleſs, is well known. Similar effects are produced daily on the feet, in compliance with the prevalent notions of beauty in Europe, under our own eyes.

But a more deſtructive proceſs is that of the tight-laced ſtays of European females, who chooſe to fancy that beauty conſiſts in having the cheſt large above and narrow below, although nature has reverſed theſe proportions. The ribs are contracted; the inferior aperture of the cheſt narrowed; the liver, ſtomach, and other abdominal viſcera, ſubjected to a ſevere and moſt injurious preſſure by this barbarous practice of civilized people. We have ſeen the figure of the thorax quite altered by this practice; the lower ribs being puſhed in on the liver, and having left deep indentations in that organ. See Sömmerring’s German treatiſe on this ſubject: “ Von der Schädlichkeit der Schnurbrüſten.”

The effect of artificial cauſes in modifying the form, has, however, been much exaggerated: the round ſhape of the ſkull in the Turks being aſcribed to their turbans, &c. A change is only to be effected by conſiderable and continued preſſure on the bones in their growing ſtate. Theſe alterations are merely individual; they do not affect the race; as the offspring are born with the ordinary formation and characters of the ſpecies. See Man.

Deſcription of the Plates in which the Anatomy of the Skeleton is repreſented.

Anatomy. *Oſteology.* *Plate* XVIII.—Front view of the ſkeleton.

The Head.

1. Os frontis.
2. Right os parietale or bregmatis.
3. Squamous portion of the right os temporis.
4. Maſtoid proceſs.
5. Meatus auditorius externus.
6. Condyloid proceſs of the inferior maxilla.
7. Coronoid proceſs }
8. Angle } of the inferior maxilla.
9. Symphyſis }
10. Right ſuperior maxilla.
11. Right os malæ or jugale.
12. Left ditto.

The Trunk.

13. Seventh cervical vertebra.
14. Firſt rib.
15. Eighth or firſt falſe rib.
16. Firſt lumbar vertebra.
17. Sacrum.
18. Ileum.
19. Pubes.
20. Iſchium.

Upper Extremities.

21. Clavicle.
22. Scapula.
23. Acromion.
24. Coracoid proceſs.
25. Humerus.
26. Greater tuberoſity.
27. Smaller ditto.
28. Eminence for the radius.
29. Trochlea.
30. Internal condyle.
31. Radius.
32. Tubercle of the radius.
33. Ulna.
34. Coronoid proceſs of the ulna.
35. Os naviculare, or ſcaphoides.
36. Os lunare.
37. Os cuneiforme, or triquetrum.
38. Os piſiforme.
39. Os trapezium, or multangulum majus.

40. Os trapezoides, or multangulum minus.
41. Os capitatum.
42. Os unciforme, or hamatum.
43. Metacarpal bone of the thumb.
44. ———————— fore-finger.
45. ———————— middle-finger.
46. ———————— ring-finger.
47. ———————— little-finger.
48. Firſt phalanx } of the thumb.
49. Second phalanx }
50. Seſamoid bones.
51. Firſt phalanx }
52. Second phalanx } of the fore-finger.
53. Third phalanx }
54. Firſt phalanx }
55. Second phalanx } of the middle-finger.
56. Third phalanx }
57. Firſt phalanx }
58. Second phalanx } of the ring-finger.
59. Third phalanx }
60. Firſt phalanx }
61. Second phalanx } of the little-finger.
62. Third phalanx }

LOWER EXTREMITIES.

63. Thigh-bone.
64. Trochanter major.
65. Trochanter minor.
66. Internal condyle.
67. External condyle.
68. Patella.
* Semilunar cartilage.
69. Tibia.
70. Internal condyle.
71. External condyle.
72. Tuberoſity.
73. Internal malleolus.
74. Fibula.
75. Its head.
76. External malleolus.
77. Aſtragalus.
78. Os calcis.
79. Os naviculare.
80. Os cuneiforme primum.
81. ———— ſecundum.
82. ———— tertium.
83. Os cuboideum.
84. Metatarſal bone of the great toe.
85. ———————— ſecond toe.
86. ———————— third toe.
87. ———————— fourth toe.
88. ———————— fifth toe.
89. Firſt phalanx } of the great toe.
90. Second phalanx }
91. Firſt phalanx }
92. Second phalanx } of the ſecond toe.
93. Third phalanx }
94. Firſt phalanx }
95. Second phalanx } of the third toe.
96. Third phalanx }
97. Firſt phalanx }
98. Second phalanx } of the fourth toe.
99. Third phalanx }
100. Firſt phalanx }
101. Second phalanx } of the fifth toe.
102. Third phalanx }

ANATOMY. *Oſteology*. *Plate* XVI.—Back view of the ſkeleton.

HEAD.

1. Os parietale, or bregmatis.
2. Foramen parietale.
3. Malar proceſs of the os frontis.
4. Os malæ.
5. Zygoma.
6. Squamous portion of the temporal bone.
7. Maſtoid foramen.
8. Maſtoid proceſs.
9. Styloid proceſs.
10. Os occipitis.
11. Lower jaw.

TRUNK.

12. Seventh cervical vertebra.
13. Twelfth dorſal vertebra.
14. Fifth lumbar vertebra.
15. Sacrum.
16. Os coccygis.
17. Ileum.
18. Pubes.
19. Iſchium.
20. Foramen ovale.
21. Firſt rib.
22. Eighth or firſt falſe rib.
23. Twelfth rib.

UPPER EXTREMITIES.

24. Clavicle.
25. Scapula.
26. Spine of the ſcapula.
27. Acromion.
28. Humerus.
29. Greater tuberoſity.
30. External condyle.
31. Internal condyle.
32. Radius.
33. Its head.
34. Ulna.
35. Olecranon.
36. Os naviculare.
37. Os lunare.
38. Os cuneiforme or triquetrum.
39. Os piſiforme.
40. Os multangulum majus.
41. Os multangulum minus.
42. Os capitatum.
43. Os hamatum or unciforme.
44. Metacarpal bone of the thumb.
45. ———————— fore-finger.
46. ———————— middle-finger.
47. ———————— ring-finger.
48. ———————— little-finger.
49. Seſamoid bone.
50. Firſt phalanx } of the thumb.
51. Second phalanx }
52. Firſt phalanx }
53. Second phalanx } of the fore-finger.
54. Third phalanx }
55. Firſt phalanx }
56. Second phalanx } of the middle-finger.
57. Third phalanx }
58. Firſt phalanx }
59. Second phalanx } of the ring-finger.
60. Third phalanx }

61. Firſt phalanx }
62. Second phalanx } of the little-finger.
63. Third phalanx }

LOWER EXTREMITIES.

64. Thigh-bone.
65. Its neck.
66. Trochanter major.
67. Trochanter minor.
68. External condyle.
69. Internal condyle.
* Semilunar cartilage.
70. Tibia.
71. Its external condyle.
72. Its internal condyle.
73. Internal malleolus.
74. Fibula.
75. Its head.
76. External malleolus.
77. Aſtragalus.
78. Os calcis.
79. Os cuboideum.
80. Os naviculare.
81. Os cuneiforme primum.
82. ———— ſecundum.
83. ———— tertium.
84. Metatarſal bone of the great toe.
85. ———— ſecond toe.
86. ———— third toe.
87. ———— fourth toe.
88. ———— fifth toe.
89. }
90. } Seſamoid bones.
91. Firſt phalanx of the great toe.
92. ———— ſecond toe.
93. ———— third toe.
94. Second phalanx of the third toe.
95. Firſt phalanx of the fourth toe.
96. Second phalanx of the fourth toe.
97. Third phalanx of the fourth toe.
98. Firſt phalanx of the fifth toe.
99. Second phalanx of the fifth toe.
100. Third phalanx of the fifth toe.

For the anatomy of the ſkeleton, ſee Cheſelden's Oſteographia, or the Anatomy of the Bones, fol.; Traité d'Oſteologie, traduit de l'Anglois de Mr. Monro, &c. par Mr. Sue, 2 vols. fol.; C. J. Trew, Tabulæ Oſteologiæ, 1767, fol.; Albinus de Oſſibus Corporis Humani, 1726, 8vo.; Albinus de Sceleto Humano, 1762, 4to.; Albinus Tabulæ Sceleti & Muſculorum, 1747, fol.; Albinus Tabulæ Oſſium, 1763, fol.; Albinus Icones Oſſium Fœtus, 1737, 4to.; Albinus Annotationes Academicæ, 4to.; Soemmerring Tabula Sceleti Feminei, juncta Deſcriptione, fol.; Soemmerring de Corporis Fabrica, t. i.; J. G. Walter von trocknen Knochen, 1763, 8vo.; J. F. Blumenbach, Geſchichte und Beſchreibung der Knochen, 1786, 8vo.; Bertin Oſteologie, 4 tom. 8vo.; Boehmer Inſtitutiones Oſteologicæ, 8vo.

We have, in the Philoſophical Tranſactions, an account of a human ſkeleton, all the bones of which were ſo united, as to make but one articulation from the back to the os ſacrum, and downwards a little way. On ſawing ſome of them, where they were unnaturally joined, they were found not to cohere throughout their whole ſubſtance, but only about a ſixth of an inch deep all round. The figure of the trunk was crooked, the ſpine making the convex, and the inſide of the vertebræ the concave part of the ſegment. The whole had been found in a charnel-houſe, and was of the ſize of a full-grown perſon.

SKELETON, *Vegetable.* The preparations of leaves, fruits, roots, &c. called vegetable ſkeletons, are made in this manner. Chooſe for this purpoſe the leaves of trees or plants, which are ſomewhat ſubſtantial and tough, and have woody fibres, ſuch as the leaves of orange, jaſmine, bay, laurel, cherry, apricot, peach, plum, apple, pear, poplar, oak, and the like; but avoid ſuch leaves as have none of the woody fibres, which are to be ſeparated and preſerved by this method; ſuch are the leaves of the vine, lime-tree, and the like. The leaves are to be gathered in the months of June or July, and ſuch to be choſen as are ſound and untouched by caterpillars, or other inſects. Theſe are to be put into an earthen or glaſs veſſel, and a large quantity of rain-water to be poured over them; and after this they are to be left to the open air, and to the heat of the ſun, without covering the veſſel. When the water evaporates, ſo as to leave the leaves dry, more muſt be added in its place: the leaves will by this means putrefy, but they require a different time for this; ſome will be finiſhed in a month, and others will require two months or longer, according to the hardneſs of the parenchyma of them. When they have been in a ſtate of putrefaction ſome time, the two membranes will begin to ſeparate, and the green part of the leaf to become fluid: then the operation of clearing is to be performed. The leaf is then to be put upon a flat white earthen plate, and covered with clear water; and being gently ſqueezed with the finger, the membranes will begin to open, and the green ſubſtance will come out at the edges; the membranes muſt be carefully taken off with a finger, and great caution muſt be uſed in ſeparating them near the middle rib. When once there is an opening towards this ſeparation, the whole membrane always follows eaſily: when both membranes are taken off, the ſkeleton is finiſhed, and it is to be waſhed clean with water, and then preſerved between the leaves of a book.

The fruits are diveſted of their pulp, and made into ſkeletons in a different manner. Take, for inſtance, a fine large pear that is ſoft, and not ſtrong; let it be nicely pared without ſqueezing it, and without hurting either the crown or the ſtalk; then put it into a pot of rain-water, cover it, ſet it over the fire, and let it boil gently till it is perfectly ſoft, then take it out, and lay it in a diſh, filled with cold water; then hold it by the ſtalk with one hand, and with the other hand rub off as much of the pulp as you can with the finger and thumb, beginning at the ſtalk, and rubbing it regularly towards the crown. The fibres are moſt tender toward the extremities, and therefore to be treated with great care there. When the pulp is thus cleared pretty well off, the point of a fine penknife may be of uſe to pick away the pulp ſticking to the core. In order to ſee how the operation advances, the foul water muſt be thrown away from time to time, and clean poured on in its place. When the pulp is in this manner perfectly ſeparated, the clean ſkeleton is to be preſerved in ſpirit of wine.

Skeletons of roots which have woody fibres, ſuch as turnips, and the like, muſt be made by boiling the root, without peeling it, till it be ſoft, that the pulp may be ſqueezed away by the fingers in the ſame manner, in a diſh of water. Many kinds of roots are thus made into elegant ſkeletons, and the ſame method ſucceeds with the barks of ſeveral kinds of trees; which, when thus treated, afford extremely elegant views of their conſtituent fibres. Philoſ. Tranſ. N° 416.

SKELIGS, *The Three*, in *Geography*, iſlands in the Atlantic ocean, about 7 miles W. of Bolus Head, county of

Kerry, Ireland, one only of which, the Great Skelig, is inhabitable. On this there was formerly an abbey; but it was removed to Ballinaſkeligs, as a more convenient ſituation. See BALLINASKELIGS.

SKELL, a river of England, which runs into the Ure, near Rippon, in Yorkſhire.

SKELLENBERG, a mountain of Bavaria, near Donauwert, where the French and Bavarians were defeated by the duke of Marlborough and prince Lewis of Baden.

SKELLFLETE, a river of England, which runs into the Humber, 12 miles W. of Hull.

SKELLINGE, a town of Sweden, in the province of Halland; 20 miles S.S.E. of Konſback.

SKEMLIK. See KEMLIK.

SKENEATELES, a handſome poſt-village of America, in the ſtate of New York, in Marcellus, Onondaga county, at the outſet of the lake of the ſame name; 163 miles N. of W. from Albany. It has 60 houſes, a handſome Preſbyterian church, ſeveral mills, &c. on Skeneateles creek; and it has a briſk trade.

SKENEATELES *Lake*, a lake about fifteen miles long, and from half a mile to a mile and a half wide, principally in Onondaga county; ſix miles at its north end being in the townſhip of Marcellus. Its trout and ſalmon trout are very large. The outlet is at the north end near the village of the ſame name, and the creek runs north, through Marcellus and Camillus, about ten miles to Seneca river, affording many fine ſeats for mills. Skeneateles, in the dialect of the Onondaga Indians, ſignifies long; and hence the name of the lake.

SKENECTADY. See SCHENECTADY.

SKENEK. See SCHENCK.

SKENESBOROUGH, a town of America, in Waſhington county, in the ſtate of New York, ſituated on Wood creek, on the ſouth ſide of lake George; burned by the Americans in 1777, with their baggage and military ſtores, when they were retreating before the Britiſh army under general Burgoyne. See WHITEHALL.

SKEOTISVAY ISLE, one of the Hebrides, in the pariſh of Harris, and ſhire of Inverneſs. It is about a mile long, and till of late years was uninhabited.

SKEP, in *Agriculture*, a coarſe round farm baſket. It is alſo provincially uſed to ſignify a bee-hive.

SKEPLE, or SKUTTLE, a ſort of flat broad baſket for winnowing corn.

SKER POINT, in *Geography*, a cape on the coaſt of South Wales, in the Briſtol Channel. N. lat. 51° 27′. W. long. 3° 42′.

SKERAT, a rock in the Caledonian ſea, near the weſt coaſt of Skye. N. lat. 57° 24′. W. long. 6° 40′.

SKERENIZ, a town of Bohemia, in the circle of Chrudim; 5 miles N. of Hohemaut.

SKERGULE, a rocky iſland near the ſouth-weſt coaſt of Mull. N. lat. 56° 18′. W. long. 6° 21′.

SKERIVORE ISLES, a cluſter of ſmall iſlands, belonging to the Hebrides, Scotland; ſituated about 40 miles weſtward from the point of Mull.

SKERN, a river of England, in the county of Durham, which runs into the Tees.

SKERPING, a town of Sweden, in Upland; 38 miles N. of Upſal.

SKERRIES, a conſiderable fiſhing-town on the eaſt coaſt of Ireland, in the county of Dublin, near which are ſeveral ſeats and villas. Oppoſite to it are ſome rocks, called Skerries, from which much kelp is procured. There are other iſlands of the ſame name off the coaſt of the county of Antrim, near Portruſh.

SKERRIES, *The*, or *The Skerry Iſles*, a cluſter of ſmall iſlands, ſituated to the eaſtward of the Mainland of the Shetland iſles, to which they belong. The principal of them, and the only ones inhabited, are Bruray, Grunay, and Houſay, which united contain about a hundred inhabitants, who are chiefly employed in fiſhing. Theſe iſlands afford good anchorage for ſmall veſſels; but the want of a light-houſe renders the navigation in their vicinity very dangerous, and has been the occaſion of many melancholy ſhipwrecks. Carliſle's Topographical Dictionary of Scotland, 4to. 1813. Sinclair's Statiſtical Account of Scotland, vol. vi. 8vo. 1794.

SKERRIES, *Iſle of*, a ſmall iſland, included in the pariſh of Llan Fair yn Ghornwy, cwmwd of Tâl-y-bolion, cantraef of Cemmaes, (now called the hundred of Tâl-y-bolion,) and county of Angleſea, North Wales, is ſituated at the diſtance of a mile and a half from the Mainland, and affords paſturage for a few ſheep. The foſſile ſtone called *aſbeſtos*, is found here in great abundance; and at one extremity of the iſland is an excellent light-houſe, which is highly ſerviceable to veſſels navigating between Ireland and the ports of Cheſter and Liverpool. The Welſh call this iſland Ynys y Mael Rhoniaid, *i. e.* the Iſle of Seals. Carliſle's Topographical Dictionary of Wales, 4to. 1811.

SKERSTA, a town of Sweden, in Smaland; 10 miles N.N.E. of Jonkioping.

SKESMO, a town of Norway, in the province of Chriſtiania; 14 miles E.N.E. of Chriſtiania.

SKETHYE, a river of North Wales, in the county of Merioneth, which runs into the Iriſh ſea, 3 miles N.N.W. of Barmouth.

SKEUDITZ. See SCHKEUDITZ.

SKEVERI, a town of Hindooſtan, in Viſiapour; 10 miles S.W. of Raibaug.

SKEW, or SKILE, *Facets*, among *Jewellers*. See FACETS.

SKEWRING CHEESE, in *Agriculture*, the practice of thruſting ſtrong iron-wire ſkewers into cheeſes, in order to draw off and diſcharge the whey from them. The ſkewers for this uſe are moſtly about eighteen or twenty inches in length. See DAIRYING.

SKEYL, provincially to lean on one ſide, or throw up, as in unloading a cart.

SKEYL-*Beaſt*, in *Rural Economy*, provincially the partition of cattle-ſtalls.

SKEYLD, provincially parti-coloured, as geeſe, ducks, &c.; or ſhelled.

SKIALFAND'EFIORD, in *Geography*, a river of Iceland, which receives the waters of a large and rapid river called the Skialfandèfliot, and alſo a river called Laxaa, which flows from the lake Myoatn. Huſavik, a commercial ſtation, lies on this river, N.E. of Eyafiord. Here is no good fiſhing; but many ſeals are caught during winter. Eider-ducks are very abundant on the coaſt.

SKIATIC STAY, in *Rigging*, a contrivance for hoiſting and lowering burdens out of or in ſhips, which clinches or makes faſt with two half-hitches, and the ends ſtopt, round the heads of the main and fore-maſts, with a tackle depending from it over the hatchway.

SKIATO, in *Geography*, one of the Grecian iſlands, neareſt to the coaſt of Greece, ſeparated from the iſland of Scopoli only by a channel of about two leagues, and from the main land by one not much wider. Anchorages, rather numerous and ſafe, are to be found along the eaſt coaſt, and between the ſmall iſlets which are on the ſame ſide. To this circumſtance the advantages of this little iſland are nearly reduced.

SKIBBEREEN, a poſt-town of the county of Cork, Ireland, formerly called Stapletown. It is ſituated on the ſouth ſide of the river Ilen, which flows into Baltimore harbour. This river is navigable nearly from Skibbereen for lighters; yet the trade is chiefly carried on by land-carriage, becauſe the general prevalence of weſterly winds renders the communication by ſea always uncertain, and often tedious. Skibbereen, ſays Mr. Townſend, without patronage or encouragement, has, from the mere circumſtance of its ſituation, become populous, thriving, and wealthy. At its markets and fairs, beſides the other uſual articles of merchandize, very large quantities of coarſe linens and yarn are expoſed to ſale. The town is, notwithſtanding, ill built, with a number of wretched cabins, and very dirty. It is 160 miles S.W. from Dublin, and 38 W. by S. from Cork. Townſend's Statiſtical Survey.

SKICIE, a town of European Turkey, in Moldavia; 40 miles W. of Jaſſy.

SKID, in *Rural Economy*, a term applied to the chain by which the wheel of a waggon is faſtened, ſo as to prevent its turning round, upon deſcending a ſteep hill. See Drag.

Skid-*Beams*, in *Ship-Building*, are the beams in the waiſt, which connect the forecaſtle with the quarter-deck.

Skids, *Boat*, ſquare pieces of timber bolted one on each ſide, and projecting over the ſtern, with ſheaves in their outer ends to hoiſt the boat up. Boat-ſkids over the quarters are fixed at the heel, and ſuſpended by a lift at the head; the latter of iron lately in the navy.

Skids, *Whale*, are long ſquare pieces of timber, projecting from the ſides of Greenland ſhips, for the convenience of hoiſting and canting the whale out of the water.

SKIDDAW, in *Geography*, a mountain of Cumberland, England, is remarkable as being claſſed among the greateſt eminences of the iſland. It is alſo diſtinguiſhed for its romantic and grand ſcenery, as well as for the lakes in its different hollows, and near its baſe. Maurice, in his poem of "Netherby," thus characteriſes this auguſt mountain:

"There, tow'ring Skiddaw, wrapt in awful ſhade,
Monarch of mountains, rears his mighty head;
Dark'ning with frowns fair Keſwick's beauteous vale,
He views beneath the gathering tempeſts ſail,
Secure, nor heeds the rolling thunder's rage,
Though Schruffel, trembling, marks the dire preſage."

According to the trigonometrical ſurvey, by colonel Mudge and his aſſiſtants, it is ſtated that the higheſt point of Skiddaw is 3022 feet above the level of the ſea. Seafell, in the ſame county, is 3166 feet in height. Like the generality of mountains in this part of the kingdom, Skiddaw conſiſts of numerous inequalities; deep hollows, and bold crags; irregular fiſſures, and gentle ſlopes. Its ſurface alſo preſents a variety of ſubſtances, colours, and forms. In ſome places are vaſt maſſes of bare rock; in other parts, a ſoft ſhort graſs preſents itſelf; and in others are heath, furze, and brambles. Wildneſs and grandeur are the general features. Mrs. Radcliffe gives a very intereſting deſcription of different parts of this mountain, in her "Journey through Holland," &c. 2 vols. 8vo. 1795. Other accounts are given in the following works: Hutchinſon's Excurſion to the Lakes, 8vo. 1776; Weſt's Guide to the Lakes, 8vo. 1802; Gilpin's Obſervations relative chiefly to pictureſque Beauty on the Mountains and Lakes of Cumberland and Weſtmoreland, 2 vols. 8vo. 1786.

SKIERENDAL, a town of Norway, in the province of Aggerhuus; 20 miles N.W. of Chriſtiania.

SKIERN, a river of Denmark, which runs into the ſea, 12 miles S. of Ringkiobing.

SKIFF, a boat much uſed in the river Thames. It differs from a wherry by being ſhorter and broader in proportion, and having a tranſom abaft.

SKIFFI, in *Geography*, a ſmall iſland in the Grecian Archipelago. N. lat. 38° 44′. E. long. 24° 13′.

SKILI, a town of Aſiatic Turkey, in Natolia; 48 miles E.N.E. of Conſtantinople.

SKILLING, in *Rural Economy*, a term ſignifying an iſle, or bay of a barn; alſo a ſlight addition to a cottage.

SKILLINGE, in *Geography*, a town of Sweden, in the province of Blekingen; 4 miles W. of Carlſcrona.

SKILLINGS, a river of America, in the diſtrict of Maine, which runs into the ſea, 4 miles W. of New Briſtol.

SKILSKIOER, a ſea-port of Denmark, in the iſland of Zealand, in a bay which communicates with the Great Belt; 48 miles S.W. of Copenhagen. N. lat. 55° 16′. E. long. 11° 27′.

SKILUGRUND, a ſmall iſland on the eaſt ſide of the gulf of Bothnia. N. lat. 63° 55′. E. long. 20° 50′.

SKIM-Coulter, in *Agriculture*, a ſort of coulter invented by Mr. Ducket, for paring off the ſurface of coarſe graſs or other lands, and placing it in the bottom of the furrow, ſo as to be fully covered and ſecured. It has been uſed in different diſtricts with the greateſt advantage and ſucceſs. It is ſtated in the Agricultural Report of Hertfordſhire, that Mr. Biggs, near St. Albans, finds it of excellent effect in clover lays, and alſo wherever any rubbiſh is on the land that wants burying, as well as in breaking up old ſaintfoin lays. And it may be beneficially employed on many other occaſions.

Skim-*Coulter Plough*, that ſort of plough which has a ſkim-coulter of ſome kind or other attached to it. See Plough.

Skim-*Milk*, in *Rural Economy*, that ſort of milk which is left, after the cream has been taken away or ſkimmed off from the ſurface of it. This proceſs is moſtly performed by means of a ſlight thin ſkimming-diſh, after the milk has been ſet by for ſome time in ſhallow veſſels, either in its natural ſtate, or when having undergone, in ſome caſes, the operation of ſcalding. Where the latter practice is followed, though it might at firſt be reaſonably ſuppoſed that all the oily unctuous matter of the milk would be brought to the ſurface, yet it is found by experience that that is not the caſe; but that, on the contrary, the ſcalded ſkimmed-milk is much richer, and better even for the purpoſe of ſuckling calves, as well as capable of making far better cheeſe than the raw ſkimmed-milk. In Devonſhire, the ſcalded ſkim or ſkimmed-milk is eſtimated at the value of a penny farthing the quart, either for the uſe of cheeſe-making, or that of feeding hogs.

The ſkim-milk in the county of Eſſex, as well as in many others, eſpecially thoſe more towards the north, is converted to the purpoſe of keeping and fattening porkers, and that of being diſpoſed of, at the rate of about three-pence or four-pence the gallon, to the lower claſſes of the people; or that of taking in pigs to keep, at the price of about from three ſhillings and ſixpence to four ſhillings and ſixpence the week. A hog has been known to be fattened, in the above named diſtrict, in this way, to the weight of ſixty-ſix ſtone, without the offal, at eight pounds to the ſtone, ſkim-milk only being given for the purpoſe.

In other diſtricts, the farmers rear and bring up their calves, and keep their own hogs, on this ſort of milk, as well as prepare cheeſe from it, finding theſe the moſt profitable applications of it.

The reſult of a number of trials has ſhewn, that in forming ſkim-milk, about ten ounces of butter is taken from twelve pints of milk, under the ſcalding practice. See DAIRYING.

SKIM-*Milk Cheeſe*, that ſort of cheeſe which is made from ſkim or ſkimmed-milk. It is moſtly a poor inferior ſort of cheeſe, though much of it is made in different diſtricts of the kingdom. It is, however, frequently a practice to take away the cream from only a certain portion of the milk that is intended for cheeſe, as that of the night meal, &c. In Devonſhire, when cheeſe is to be made, much care is taken that the milk be not heated ſo far as to produce bubbles under the cream, which is firſt to be taken off from it, or when it is to be uſed with it.

SKIMMER, in *Ornithology*. See RYNCHOPS.

SKIMMIA, in *Botany*, a name adopted by Kæmpfer from its Japaneſe vernacular appellation, *Mijanea Skimmi*.—Kæmpf. Amœn. faſc. 5. 779. Thunb. Nov. Gen. 57. Fl. Japon. 4. Schreb. 81. Willd. Sp. Pl. v. 1. 671. Mart. Mill. Dict. v. 4. Juſſ. 425.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Plantæ incertæ ſedis;* Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, very ſmall, permanent, cloven nearly to the baſe into four, ovate, acute ſegments. *Cor.* Petals four, ovate, concave, minute. *Stam.* Filaments four, very ſhort; anthers ...... *Piſt.* Germen ſuperior, roundiſh; ſtyle ſolitary; ſtigma ...... *Peric.* Berry ovate, umbilicated, ſlightly furrowed, ſmooth, full of mealy pulp, and ſplitting imperfectly into four parts. *Seeds* four, nearly triangular or convex externally, oblong, white.

Obſ. The Perianth is occaſionally cloven into five ſegments.

Eſſ. Ch. Petals four, concave. Calyx four-cleft. Berry with four ſeeds.

1. S. *japonica*. Japaneſe Skimmia. Thunb. Japon. 62. Kæmpf. Ic. Select. t. 5.—Native of Japan, near Nagaſaki, ripening its fruit in December. *Stem* ſhrubby, erect, ſmooth. *Branches* alternate, nearly ſquare. *Leaves* at the ſummits of the branches, alternate, ſtalked, numerous, oblong, undulated, entire, ſlightly notched towards the tip, erect, about a finger's length, with a reflexed margin; green and rugoſe above; pale and dotted beneath. *Footſtalks* convex beneath, flat above, thickiſh, ſhort. *Flowers* white, on round, thickened ſtalks, in terminal panicles.

The foliage is evergreen, and has an aromatic flavour.

SKIMMING-DISH, in *Rural Economy*, that ſort of light thin-edged diſh, which is employed in ſkimming the cream off the ſurface of milk, in the practice of the dairy. Diſhes of this kind are made either of hard wood or tin, being formed in a nice, thin, light manner, with fine ſharp edges. See DAIRYING.

SKIMMING-*Spade*, in *Agriculture*, that ſort of ſharp-mouthed ſpade which is employed in ſkimming or paring off the graſſy ſurface, or ſward of land, which is intended to be burnt. See PARING and BURNING.

SKIN, in *Anatomy*, a large thick membrane, ſpread over the whole body, ſerving as the external organ of feeling, and as a covering and ornament of the parts underneath. See INTEGUMENTS.

SKIN, *Diſeaſes of the*. See CUTANEOUS *Diſeaſes;* where an outline of the claſſification of theſe maladies, deviſed by the late ingenious Dr. Willan, by whom the pathology of theſe neglected and undiſtinguiſhed diſorders has been greatly elucidated, will be found. For more particular information, conſult the articles LEPROSY, LICHEN, PSORIASIS, PORRIGO, HERPES, &c. and Dr. Bateman's Pract. Synopſis of Cutaneous Diſeaſes, according to the arrangement of Dr. Willan.

SKIN, in *Rural Economy*, the hide of an animal. The refuſe and waſte of it which are cauſed by the different manufactures, and which ariſe in the various purpoſes to which it is applied, are capable of forming very uſeful manures, when they are in any ſuitable quantity; ſuch as the chips of the ſhoemaker, the dreſſings and trimmings of the currier, the clippings of the farrier, and the waſte offal matters of the tan-yard as well as the glue manufactory.

It has been ſuggeſted by the writer of the work on "Agricultural Chemiſtry," that the gelatine which is contained in every kind of ſkin is in a ſtate fitted for its gradual ſolution or decompoſition; and that when buried in the ſoil, it laſts or continues for a conſiderable time, and conſtantly yields a ſupply of nutritious matter to the plants, which are placed within the neighbouring range of its action. All waſte matters of this nature ſhould therefore be carefully preſerved for the purpoſe of being applied as manures.

SKIN, in *Commerce*, is particularly uſed for this membrane ſtripped off the animal, to be prepared by the tanner, ſkinner, currier, parchment-maker, &c. and converted into leather, &c.

The uſe of ſkins is very ancient; the firſt garments in the world having been made of them. The Danes and other northern nations have a long time dreſſed themſelves in ſkins. Moroccoes are made of the ſkins of a kind of goats. (See MOROCCO.) Parchment is uſually made of ſheep-ſkins; ſometimes of goat-ſkins. (See PARCHMENT.) Velom is a kind of parchment made of the ſkin of an abortive calf, or at leaſt of a ſucking calf. (See VELOM.) The true ſhammy is made of the ſkin of an animal of the ſame name; though frequently it is counterfeited with common goats' and ſheep-ſkins. See SHAMMY.

The Indians in Carolina and Virginia dreſs buck and doe-ſkin in this manner: the felt being taken off, they ſtrain them, with lines or otherwiſe, much like the clothiers' racks, in order only to dry them. When the hunting time is over, the women dreſs the ſkins, by putting them in a pond or hole of water, to ſoak them well; then with an old knife, fixed in a cleft ſtick, they force off the hair whilſt they remain wet. This done, they put them into a kettle, or earthen-pot, and a proportion of deer's brains, dried and preſerved for this purpoſe, is put along with them; this veſſel is ſet on the fire till they are more than blood-warm, which will make them lather and ſcour clean; after this, with ſmall ſticks, they wreſt and twiſt each ſkin, as long as they find any wet to drop from them, letting them remain ſo wreſted for ſome hours, and then they untwiſt and ſtretch each of them in a ſort of rack, ſo that every part is extended, and as the ſkin dries, they take a dull hatchet, or ſome ſuch inſtrument, and rub them well over to force all the water and greaſe out of them, till they become perfectly dry, and then their work is done.

In this manner one woman (for the men never employ themſelves in this work) will dreſs eight or ten ſkins in a day, that is, begin and finiſh them. Phil. Tranſ. No. 194. See BUFF.

For the manner of preparing ſhagreen, ſee SHAGREEN.

SKINS, *lacquering and gilding*. See LACQUER.

SKINK. See SCINCUS.

SKINKER, a cup-bearer, or butler. See ARCH *Butler*.

SKINNER, STEPHEN, in *Biography*, an antiquary, was born about the year 1622, in or near London. He received his academical education at Chriſt-church college, Oxford, in the year 1638, but the civil war cauſed him to leave the univerſity without taking a degree. He thence travelled on the continent, and ſtudied at various univerſities. On his return to his native country, he went to Oxford, and took his degree in arts, and then ſettled as a phyſician at Lincoln, where he died in 1667. He was a man of very extenſive erudition, but is chiefly known by his works in etymology, which, after his death, came into the hands of Mr. Thomas Henſhaw, who digeſted, corrected, and enlarged them, and publiſhed them in 1671, with the title of "Etymologicon Linguæ Anglicanæ;" a work that has always been conſidered as of high authority among the learned, and is ſtill regarded as a moſt uſeful book of reference.

SKINNERA, in *Botany*, Forſt. Gen. t. 29, was ſo named in honour of Mr. Skinner, an Oxford gentleman, whom Forſter terms "a moſt acute and clear-ſighted botaniſt," but we have met with no record of him elſewhere; and the genus thus denominated is in no reſpect different from FUCHSIA; ſee that article. By the ſpecific name, *excorticata*, the author ſeems to have had a punning alluſion in his mind.

SKINNERS, *Company of*. See COMPANY.

SKINNING, in *Ship-Building*, a term often uſed for planking the bottom.

SKINOSA, in *Geography*, a deſart iſland, or rather rock, in the Grecian Archipelago, about 12 miles in circumference; 5 miles S. from the iſland of Naxia. N. lat. 36° 55′. E. long. 25° 32′.

SKINSKATTEBERG, a town of Sweden, in Weſtmanland; 25 miles N.N.W. of Stroemſholm.

SKINTEI, a town of European Turkey, in Moldavia; 10 miles S. of Jaſſi.

SKINUS, σχινος, a name given by the ancient naturaliſts to the lentiſk-tree, and alſo to a peculiar ſpecies of the ſquill, or ſcilla, which was not nauſeous and emetic as the common ſquill, but eſculent and pleaſant to the taſte.

SKIOLDS, in *Geography*, a town of Norway, in the province of Bergen; 32 miles N. of Stavanger.

SKION, a town of Sweden, in Medelpadia, near the coaſt of the gulf of Bothnia. The church was formerly a caſtle, and the ſteeple is full of loop-holes for arms; 30 miles S. of Hernoſand.

SKIPNESS POINT, a cape of Scotland, on the E. coaſt of Kintyre, with a village called Skipneſs; 22 miles N. of Cambletown. N. lat. 55° 49′. W. long. 5° 24′.

SKIPPACH CREEK, a creek of America, in the Delaware, where general Waſhington was encamped before the battle of German Town, in the county of Montgomery.

SKIPPACK, a townſhip of Pennſylvania; 20 miles N. of Philadelphia. Shippack and Perkiomen contain 902 inhabitants.

SKIPPER. See SHIPPER.

SKIPPER, an Engliſh name for the common gar-fiſh. See ACUS.

SKIPPON, in *Geography*, a river of England, in the county of Lancaſter, which runs into the Wyre.

SKIPSILAR, a town of European Turkey, in Romania; 72 miles E. of Emboli.

SKIPTON, or *Skipton in Craven*, a market-town in the eaſt diviſion of the wapentake of Staincliffe and Ewcroſs, Weſt Riding of the county of York, England, is ſituated at the diſtance of 48 miles W. by S. from the city of York, and 216 miles N.N.W. from London. This town, which previouſly was a poor place, has, ſince the incloſure of Knareſborough foreſt, become the chief mart for the diſtrict of Craven. The market-day is Saturday, weekly; when there is always a large ſupply of different ſorts of grain, which is thence diſperſed throughout Craven, and the manufacturing country in the north-eaſt part of Lancaſhire. Brown, in his Agricultural Survey of the Weſt Riding of the County, affirms that upwards of two hundred carts regularly attend this market. The fairs here are numerous, *viz.* on the firſt Saturday after old Twelfth-day, the 13th of March, the Saturday before Palm-Sunday, the Tueſday in Eaſter-week, and every other Tueſday till Whitſuntide, chiefly for lean cattle; Saturday before Whitſun-eve, and Saturday before Trinity Sunday, old St. James, old Martinmas, beſides fortnight fairs every other Tueſday throughout the year for fat cattle, ſheep, &c.

Skipton ſtands cloſe to the Leeds and Liverpool canal, a circumſtance which greatly facilitates its trade. It conſiſts chiefly of one very wide and long ſtreet, where the markets are held, with ſeveral ſtraggling lanes on each ſide of it. The church, which is ſituated at one extremity of the main ſtreet, is a ſpacious ſtructure, with a tower at the weſt end, which appears, from an inſcription thereon, to have been rebuilt, in 1655, by the celebrated Ann Clifford, counteſs of Dorſet, Pembroke, and Montgomery. Here are inſcriptions, on plain ſtones, in memory of the three firſt earls of Cumberland.

Skipton caſtle ſtands at a ſhort diſtance to the eaſtward of the church, and on the left ſide of the road leading to Knareſborough. This ancient ſtructure is ſaid to have been originally erected ſoon after the Conqueſt by Robert de Romeli, then lord of the honour of Skipton, whoſe daughter and heireſs carried it by marriage to William Fitz-Duncan, earl of Murray. From his family it paſſed in the ſame manner to William le Gros, earl of Albemarle, and afterwards ſucceſſively to William de Mandeville, earl of Eſſex, to Baldwin de Betun, and to William de Fortibus. In the reign of Richard I. Avelin, daughter to the ſecond William de Fortibus, a minor, ſucceeded, and became ward to king Henry III., who, in 1269, gave her in marriage to his ſon Edmund, earl of Lancaſter. On the forfeiture of her ſon, earl Thomas, for rebellion againſt king Edward II. the caſtle was granted, in 1309, to Robert de Clifford, a Herefordſhire baron, whoſe deſcendants, earls of Cumberland, continued to enjoy it till the early part of the ſeventeenth century, when it devolved to Richard Sacville, earl of Dorſet, by his marriage with Ann Clifford, the diſtinguiſhed lady above-mentioned. By her daughter and heireſs, Margaret, it was conveyed to John Tufton, ſecond earl of Thanet, in whoſe family it yet remains.

Skipton caſtle, though apparently little calculated for defence againſt the engines of modern warfare, appears to have been of conſiderable importance during the civil wars between king Charles and his parliament. It was firſt garriſoned in the royal cauſe, and is ſaid to have held the ſurrounding country for ſome time in great awe. At length, however, it was vigorouſly beſieged by a detachment of the parliamentary army, to whom it ſurrendered upon honourable terms on the 20th of December, 1645. In the following year, its works and defences were deſtroyed by order of parliament. Lady Clifford, after the death of her ſecond huſband, the earl of Pembroke, repaired this caſtle, in which ſhe was born, and made it occaſionally the place of her reſidence. Though not much elevated above the ſurrounding country, it nevertheleſs commands a pleaſing view over the town and vale of Skipton, which is one of the fineſt and moſt fertile in England, extending about twelve miles in length, and from one and a half to two miles in breadth. It contains little tillage, but diſplays the moſt luxuriant meadows and paſtures that can any where be ſeen.

Skipton, according to the parliamentary returns for 1811, contains 609 houſes, and 2868 inhabitants. The pariſh is of great extent, and is partly comprehended in Claro wapentake. Beauties of England and Wales, vol. xvi. by John Bigland, 1812. Pennant's Tour in Scotland, 4to. 1790. Whitaker's Hiſtory, &c. of Craven, 4to. 1805.

Skipton, a town of America, in Maryland, on the Potomack; 11 miles S.E. of Fort Cumberland.

SKIRINGLASS, a ſmall iſland near the W. coaſt of Scotland. N. lat. 58° 2′. W. long. 5° 10′.

SKIRINTARSAN, a ſmall iſland near the E. coaſt of Skye. N. lat. 57° 19′. W. long. 5° 33′.

SKIRKY, a cluſter of ſmall iſlands in Kenmare river, on the S.E. coaſt of Kerry; 5 miles E. of Lamb's Head.

SKIRMISH, in *War*, a diſorderly kind of combat, or encounter, in preſence of two armies, between ſmall parties, or perſons, who advance from the body for that purpoſe, and introduce to a general, regular fight.

The word ſeems formed from the French, *eſcarmouche*, which ſignifies the ſame, and which Nicod derives from the Greek χαρμη, which ſignifies, at the ſame time, both *light*, *combat*, and *joy*. Menage derives it from the German, *ſchirmen* or *ſhermen*, *to fence* or *defend*: Du Cange, from *ſcarramuccia*, a *light engagement*, of *ſcara* and *muccia*, a body of ſoldiers hid in ambuſh; in regard many ſkirmiſhes are performed by perſons in ambuſcade.

Skirmish *Bay*, in *Geography*, a bay on the E. coaſt of Chatham iſland, ſo called from an unhappy diſpute between captain Vancouver's crew and the natives. S. lat. 43° 49′. E. long. 183° 25′.

SKIRO. See Sciro.

SKIRRET, in *Botany*. See Sium.

SKIRRID Vawr, or *Great Skirrid*, in *Geography*, a mountain of Wales, in the county of Monmouth; 2 miles N. of Abergavenny.

SKIRRIES, a rock in the North ſea, near the E. coaſt of Scotland; 2 miles S. of Peterhead.

SKIRTING, in *Agriculture*, a mode of performing the buſineſs of ſod-burning. See Sod-*Burning*.

SKIT, in *Geography*, a town of Walachia, on the Ribnik; 80 miles N. of Buchareſt.

SKITTIKISS, a bay on the E. ſide of Waſhington's iſlands, near the W. coaſt of North America.

SKITTISH, in the *Manege*. A horſe is ſaid to be ſkittiſh, in French *écouteux*, or *retenu*, that leaps inſtead of going forward; that does not ſet out, or part from the hand freely, nor employ himſelf as he ought to do.

SKIVE, in *Geography*, a town of Denmark, in North Jutland; 15 miles N.W. of Viborg. N. lat. 56° 34′. E. long. 9° 1′.

SKLENO, or *Glaſs Huts*, a town of Hungary, celebrated for its warm baths; 5 miles N. of Cremnitz.

SKOBELEKA, a town of Ruſſia, in the government of Irkutſk; 48 miles S.S.W. of Kirenſk.

SKODNY, a town of Sileſia, in the principality of Oppeln, in which is a royal foundery for the caſting of bombs; 10 miles S. of Oppeln.

SKOFDE, a town of Sweden, in Weſt Gothland; 62 miles E. of Uddevalla.

SKOG, a town of Sweden, in the province of Helſingland; 34 miles W.N.W. of Hudwickſwall.—Alſo, a town of Sweden, in Angermanland, on a lake; 20 miles N. of Hernoſand.

SKOKHAM, *Iſle of*, a ſmall iſland ſituated in St. George's Channel, at the diſtance of five miles from St. Anne's Head, in Pembrokeſhire, South Wales. It contains 200 acres, 2 roods and 2 poles of ground, and is the property of John Lloyd of Mabus, eſq. Its products are barley, oats, rye-graſs, and rabbits. Fenton's Tour in Pembrokeſhire, 4to. 1810.

SKOKI, a town of the duchy of Warſaw; 18 miles N. of Poſen.

SKOLEN, or Schohlen, a town of Saxony, in Thuringia; 8 miles S. of Naumburg.

SKOLOMISI, a town of Poland; 25 miles N.E. of Cracow.

SKOLOSCHIA, a town of Ruſſia, in the government of Irkutſk; 44 miles N.E. of Kirenſk.

SKOMAR, *Iſle of*, a ſmall iſland ſituated on the ſouth ſide of St. Bride's bay, off the coaſt of Pembrokeſhire, North Wales. It is divided from the Mainland by a narrow ſtrait, called Jack's Sound. This iſle contains 700 acres of land, a large portion of which is under cultivation, and is moſt prolific in rabbits, 2000 couple being killed annually for ſale. It is the property of Charles Phillips, eſq. of St. Bride's Hill. Fenton's Tour in Pembrokeſhire, 4to. 1810. Carliſle's Topographical Dictionary of Wales, 4to. 1811.

SKOMPE, a town of the duchy of Warſaw; 16 miles N.E. of Wladiſlaw.

SKON, a town of Sweden, in the province of Medelpadia; 3 miles N. of Hernoſand.

SKONE. See Schonen.

SKONGEN, a town of Norway, on the coaſt of Drontheim bay; 26 miles N.N.E. of Drontheim.

SKOPIA, or Uskup, a town of European Turkey, in Macedonia, on the river Varda, the ſee of an archbiſhop; 54 miles N. of Akrida. N. lat. 42° 40′. E. long. 21° 2′.

SKOPIN, a town of Ruſſia, in the government of Riazan; 44 miles S. of Riazan. N. lat. 54°. E. long. 39° 14′.

SKORBY, a town of Sweden, in Schonen; 22 miles S.E. of Lund.

SKOTGRUND, a ſmall iſland on the eaſt ſide of the gulf of Bothnia. N. lat. 62° 17′. E. long. 21° 3′.—Alſo, a ſmall iſland on the weſt ſide of the gulf of Bothnia. N. lat. 60° 39′. E. long. 17° 28′.

SKOTSCHAU, Scholsch, or Skozow, a town of Sileſia, in the principality of Teſchen; 7 miles E.N.E. of Teſchen. N. lat. 49° 47′. E. long. 18° 45′.

SKOVES, in *Agriculture*, provincially reaps, ſhoves, grips, or bundles of unbound up grain; alſo unbound ſheaves of corn.

SKOUT, in *Ornithology*. See Lomwia.

SKRABBA, in *Ichthyology*, a name given by ſome to a fiſh, called by Jonſton and Schoneveldt the *ſcorpius marinus*, but wholly different from the *ſcorpæna* of other authors. See Father-*Laſher*.

SKREED, in *Agriculture*, provincially a border or narrow ſlip of land.

SKREEN. See Screen.

SKREY, in *Geography*, a town of Bohemia, in the circle of Rakonitz; 8 miles S. of Rakonitz.

SKRUBBAN, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 63° 8′. E. long. 18° 34′.

SKRYNE, a ſmall town of the county of Meath, Ireland, which received its name from being ſuppoſed to contain the ſhrine (*ſcrinium*) of St. Columba. There were a caſtle and two abbeys here, of which ſome ruins remain. Skryne is 19½ miles N. by W. from Dublin.

SKRZIWANE, a town of Bohemia, in the circle of Rakonitz; 4 miles S. of Rakonitz.

SKUA, in *Ornithology*. See Cataracta.

This bird inhabits Norway, the Ferro iſles, Shetland, and the noted rock Foula, a little weſt of them. It is alſo a native of the South ſea. It is the moſt formidable gull; its prey being not only fiſh, but the leſſer ſorts of waterfowl,

fowl, as teal, &c. and it is alſo ſaid to prey on ducks, poultry, and even young lambs; it has all the fierceneſs of the eagle in defending its young; when the inhabitants of the Ferro iſlands viſit the neſt, it attacks them with great force, ſo that they hold a knife erect over their heads, on which the ſkua will transfix itſelf in its fall on the invaders. In Foula it is a privileged bird, becauſe it defends the flocks from the eagle, which it beats and pierces with great fury; and the natives impoſe a fine on any perſon who deſtroys one of theſe birds. Pennant.

SKUFE, in *Agriculture*, provincially a precipice or declivity.

SKULA, in *Geography*, a mountain of Sweden, in Angermanland; 10 miles N. of Hernoſand.

SKULL, in *Anatomy*. See Cranium.

Skull, *Injuries of the*, *&c.* See Injuries *of the Head*.

Skull-*Cap*, in *Botany*. See Scutellaria.

Skull-*Cap, Blue*, in *Agriculture*, the common name of a weed which is often found troubleſome on wet boggy grounds, or near the ſides of ponds. It is perennial in its growth, and of courſe more difficult in its removal from land. There is alſo a leſſer ſort, which has the ſame nature and habits of growth. They ſhould both be eradicated from out of the land as much as poſſible.

SKUNK, in *Zoology*. See *American* Pole-*Cat*.

SKUOE, in *Geography*. See Scuoe.

SKUPOPING, a lake of North Carolina. N. lat. 35° 45′. W. long. 76° 42′.

SKUPPERNONG, a river of North Carolina, which communicates by means of a canal with the lake in Diſmal Swamp.

SKURUP, a town of Sweden, in Schonen; 16 miles S.E. of Lund.

SKUSCH, a town of Bohemia, in the circle of Chrudim; 8 miles S.E. of Chrudim.

SKUTERAD, a town of Norway, in Aggerhuus; 22 miles W. of Chriſtiania.

SKUTTOCK Hills, five eminences in Hancock county, on the coaſt of Maine, that ſerve as landmarks for ſailing into Gouldſborough harbour.

SKWERNIOW, a town of Bohemia, in the circle of Kaurzim; 6 miles S. of Kaurzim.

SKWORETZ, a town of Bohemia, in the circle of Kaurzim; 12 miles W.N.W. of Kaurzim.

SKY, the blue expanſe of air or atmoſphere.

The azure colour of the ſky ſir Iſaac Newton attributes to vapours beginning to condenſe therein, which have got conſiſtence enough to reflect the moſt reflexible rays, *viz.* the violent ones; but not enough to reflect any of the leſs reflexible ones.

M. de la Hire attributes it to our viewing a black object, *viz.* the dark ſpace beyond the regions of the atmoſphere, through a white or lucid one, *viz.* the air illumined by the ſun; a mixture of black and white always appearing blue. But this account is not originally his; it is as old as Leonardo da Vinci. See Blueness and Colour *of the Clouds*.

Sky-*Colour*. To give this colour to glaſs, ſet in the furnace a pot of pure metal of frit from rochetta, or barilla, but the rochetta frit does beſt; as ſoon as the metal is well purified, take for a pot of twenty pounds of metal ſix ounces of braſs calcined by itſelf; put it by degrees, at two or three times, into the metal, ſtirring and mixing it well every time, and diligently ſcumming the metal with a ladle; at the end of two hours the whole will be well mixed, and a proof may be taken; if the colour be found right, let the whole ſtand twenty-four hours longer in the furnace, and it will then be fit to work, and will prove of a moſt beautiful ſky-colour. Neri's Art of Glaſs, p. 40.

Sky-*Flower*, in *Botany*. See Cineraria.

Sky-*Rocket*. See Rocket.

SKYE, in *Geography*, one of the Hebrides, or Weſtern iſlands of Scotland, is ſituated off the coaſt of Inverneſs and Roſs-ſhires, from which it is ſeparated by the ſound of Skye, and a branch of the ſea called Lochalſh, while the Minch channel divides it from Long iſland. From the Point of Sleat in the ſouth-eaſt, to the Aird of Trotterniſh in the north-weſt, it extends 45 miles in length, but its breadth varies from 10 to 24 miles. The whole contents, meaſured carefully from Arrowſmith's map, are ſtated in the General Report of Scotland to amount to 535 ſquare miles, including 336,000 acres of land, and 10 ſquare miles of freſh-water lakes. From the numerous indentations of the ſea, no part of the land is farther diſtant from ſalt-water than four miles and a half.

The general aſpect of this iſland is extremely mountainous, ſo much ſo indeed, that not above twelve parts in a hundred of it are ſuſceptible of arable cultivation; and even theſe are diſpoſed in ſmall patches or ſtrips by the margin of the different bays, except at its north-weſterly extremity, where, for four miles, the land is flat, the ſoil fertile and well cultivated, and the farms incloſed and divided. But notwithſtanding this great proportion of mountain, Skye is far from being ſterile or barren. On the contrary, its hills, ſo widely extended, and towering ſo proudly to the ſkies, are in general of conſiderable value, from the excellent paſture with which they abound. This is particularly the caſe in the central and ſouthern diſtricts, where the hills of Cullin, reſting on a bed of limeſtone, produce very rich herbage, on which are fed a remnant of the ancient herds of deer, for which this iſland was formerly famed, and which continue ſtill to roam at large on theſe verdant heights. Moſt of the hills, in remote times, were clothed with wood; but except on the ſouth coaſt of Sleat, ſcarcely any foreſt-timber now remains in Skye. Here, however, are ſtill ſome good ſtools of natural wood, conſiſting of oak, aſh, elm, and birch, beſides alder and willow.

The crops cultivated in this iſland are beans, oats, potatoes, and ſome flax. Artificial graſſes and turnips are little known; but they are partially introduced, and it ſeems probable will ſoon become more extenſive, as they are ſo very eſſential to the welfare of cattle, which are the ſtaple land commodity of the iſland. In the gardens and "kail yards," moſt of the eſculent vegetables cultivated on the Mainland are raiſed with great ſucceſs, as are alſo the ſmaller fruits.

The live-ſtock of Skye is eſtimated at 4000 horſes, of a ſmall but hardy race; 18,000 head of cattle of an excellent breed, of which about 3800 are exported annually, forming the principal export of the iſland. The ſheep are computed at about 40,000 in number; but this computation is confeſſed by the reporter to the Board of Agriculture to be little more than conjecture. They conſiſt partly of the native yellow-faced kind, partly of Cheviots, and partly of the black-faced Lintons, which are the moſt eſteemed. Several thouſands of this uſeful animal are exported every year. Hogs, goats, and rabbits abound here, but they are all of them ſo wild, and ſo little under controul, as to afford no permanent ſource of revenue. Game of all kinds is abundant, but is thought to decline more and more, in proportion as the country is progreſſively cultivated. There are on the iſland two kinds of ſerpents or vipers, both of which are reckoned very venomous.

In the ſurrounding ſeas, which embrace 750 miles of coaſt, there are myriads of fiſh, particularly herring, mackarel, turbot, ſkate, ling, cod; and ſhell-fiſh, ſuch as oyſters, lobſters, &c.; ſo that combining the ſituation with other facilities, the inhabitants of Skye have an opportunity of enriching themſelves by the fiſheries, beyond any other iſlanders in Scotland, and in fact they apply themſelves to them with conſiderable induſtry, and frequently with great effect. Sometimes, however, they are miſerably tantalized with a profuſion of fiſh, when they cannot procure an ounce of ſalt to cure them, owing to the diſtance from the cuſtom-houſe, and to the complicated ſalt-duty regulations, which ſhut them up completely from either bettering their own circumſtances, or promoting the general proſperity of the nation by this otherwiſe abundant bounty of providence.

Kelp is made annually to the extent of 500 tons; and the manufacture of this article is capable of being greatly increaſed, to the no ſmall emolument of the natives, as well as to the increaſe of proprietors' rents.

The want of good roads has hitherto greatly retarded the internal proſperity of Skye, from the difficulty of conveyance, and this diſadvantage does not admit of being eaſily removed; not merely from the inequality of the ſurface, but from the circumſtance of its being ſo much cut up by brooks and rivulets, which, on every ſhower, ſwell into torrents that would require a great number of bridges.

The number of inhabitants in Skye, which, notwithſtanding continued emigration, is ſtill increaſing, was 17,775 in 1809, the time when the laſt cenſus was made; being at the rate of 33 to the ſquare mile, reckoning the whole iſland, or 275 to the ſame extent, limiting the eſtimate to the cultivated land only. It has been for many ages, and ſtill is, the property of the great clans, Macdonald, Macleod, and, till of late, Mackinnon. From the firſt of theſe has lately ſprung up the kindred clan of Macaliſter. The people, ingenious, ſhrewd, and active, are nearly all of the eſtabliſhed church of Scotland. Among them reſide a number of gentlemen, who have been in the army or navy, cadets of the chief families, whoſe manners have given a poliſh to thoſe of the inhabitants at large, which is obſervable in the behaviour even of the loweſt peaſant. In fact, every man in Skye ſeems to be a gentleman; whilſt the demeanour of the females exhibits an eaſe and an affability that no perſon could expect in a country ſo remote, and having ſo little communication with ſtrangers. Mr. Macdonald, in his Survey, juſtly obſerves, that "it is in truth a ſingular iſland, well deſerving the attention of the geologiſt and natural hiſtorian, and capable, by nature, of one day aſtoniſhing the patriot and political economiſt."

The General Report, &c. of Scotland, drawn up under the directions of ſir John Sinclair, bart. 8vo. 1814. Huſbandry of Scotland, by ſir John Sinclair, 8vo. 1815. Johnſon's Journey to the Weſtern Iſlands of Scotland, 8vo. 1775. Martin's Deſcription of the Weſtern Iſlands, 8vo. 1716. Account of the preſent State of the Hebrides, by James Anderſon, L.L.D. 8vo. 1787. Macdonald's Survey of the Hebrides, 8vo. 1807.

SKYRO. See SCIRO.

SKYTTE, JOHN, in *Biography*, was born at Nyköping in 1577. After being ſome time ſecretary in the Swediſh chancery, he was choſen by the ſtates to be preceptor to prince Guſtavus Adolphus, and at the ſame time by king Charles to ſuperintend the education of John, duke of Oſtrogothia, who was five years older than Guſtavus. It was, therefore, conſidered as a maſter-piece of policy in the king, that he placed the crown-prince and the pretender to the throne under the inſpection of ſo faithful and truſty an inſtructor. In 1622 he was made chancellor of the academy of Upſal, and in 1629 governor-general of Ingria, Livonia, and Carelia. He was held in high eſtimation by the learned of his time, and acquired great celebrity on account of his eloquence, and was employed either as envoy or ambaſſador to many foreign courts. Guſtavus Adolphus entertained for him the higheſt reſpect, and in 1624 the rank of baron was conferred on him. He was a great patron of literature, and rendered eſſential ſervice to the academy of Upſal, by founding a profeſſorſhip for the cultivation of the Latin language, literary criticiſm, and the political ſciences. As a politician, he was a determined enemy of the ariſtocracy, and laboured with great zeal to eſtabliſh royal authority. He died in 1645. Among his works was one, of which the following was the title; "Brief Inſtructions in regard to the Virtues and Arts which a Prince, who wiſhes to rule happily over his Kingdom and States, ought to exerciſe and employ; addreſſed to that exalted Lord and Prince Guſtavus Adolphus."

SKYTTE, BENEDICT, ſon of the preceding, was born in 1614, and ſtudied at Upſal. In 1629 he accompanied the Swediſh ambaſſador, general Spence, to England, where, on taking his leave, he was knighted by king Charles I. After this he continued his ſtudies at Dorpat, and travelled for his improvement, during which queen Chriſtiana gave him a place in her houſehold. He bore the marſhal's ſtaff at the diet in 1648, was appointed chancellor of the academy of Dorpat, and the year after was ſent to Denmark, to be queen Chriſtiana's proxy at the baptiſm of the princeſs Sophia Amelia, daughter of Frederic III. He enjoyed for ſeveral years the favour of his ſovereign, and in 1651, when the queen eſtabliſhed the order of the Amaranth, he was nominated one of the knights. Afterwards he fell into diſgrace, and was brought to trial, but he made ſuch an able defence that he was acquitted, and all the proceedings againſt him were annulled. He was reſtored to his ſeat as ſenator, and in 1665 was appointed governor of Eſthonia. He was employed on an important miſſion from king Charles Guſtavus to the duke of Courland, and he managed the buſineſs ſo well, that he received the approbation and cordial thanks of his ſovereign. In 1663 he was made ſupreme judge in Ingria, preſident of the tribunal of Wiſmar, and at the ſame time envoy in Germany. But his good fortune again deſerted him, he was diſmiſſed from his offices at the diet held in 1664, and declared incapable of ever being employed either at home or abroad. After this he retired to his eſtate, and ſpent his time in literary purſuits till his death, in 1683. He was a man of great learning, and made himſelf known by various works, among which were the following: "Diſſertatiuncula de Argumento quod Fœminæ Officium Legati mandari poſſit," 4to. "Oratio qua probatur Utilitatem pro Juſtitia, in Adminiſtratione Rerum publicarum colendam." Gen. Biog.

SLAA, in *Geography*. See SALLEE.

SLAB, an outſide ſappy plank or board ſawed off from the ſides of a timber-tree: the word is alſo uſed for a flat piece of marble.

SLABS *of Tin*, the leſſer maſſes which the workers at the tin-mines caſt the metal into: theſe are run into moulds made of ſtone.

SLAB-*Line*, in *Sea Language*, a ſmall cord paſſing up behind a ſhip's main-ſail or fore-ſail, and being reeved through a block attached to the lower part of the yard, is then tranſmitted in two branches to the foot of the ſail to which it is faſtened.

It is uſed to truſs up the ſail as occaſion requires, and more particularly for the convenience of the pilot or ſteerſman,

man, that they may look forward beneath it as the ſhip advances. Falconer.

SLABBERING-Bit, in the *Manege.* See Mastigadour.

SLABETZ, in *Geography*, a town of Bohemia, in the circle of Rakonitz; 7 miles S. of Rakonitz.

SLABODA, a town of Poland, in the palatinate of Braclaw; 40 miles N.W. of Braclaw.

SLAB-TOWN, a village of America, in Burlington county, New Jerſey, about half-way between Burlington and Mount Holly, and about four or five miles from each.

SLACK, in *Agriculture*, provincially a valley or ſmall ſhallow dale or dip.

Slack *a Leg*, in the *Manege*, called in French *mollir la jambe*, is ſaid of a horſe when he trips or ſtumbles.

Slack *the Hand*, is to ſlack the bridle, or give a horſe head.

SLACK-CLOTH, in *Sail-Making*, a certain quantity of cloth allowed to be gradually gathered up, in ſewing on the bolt-rope to the ſail, more than the length of the bolt-rope; otherwiſe the rope, by ſtretching in the wearing, might occaſion the ſail to ſplit.

SLACKEN, in *Metallurgy*, a term uſed by the miners to expreſs a ſpongy and ſemivitrified ſubſtance, which they uſe to mix with the ores of metals, to prevent their fuſion. It is the ſcoria, or ſcum, ſeparated from the ſurface of the former fuſions of metals. To this they frequently add a lime-ſtone, and ſometimes a kind of coarſe iron-ore, in the running of the poorer gold-ores.

SLACK-WATER, in *Sea Language*, denotes the interval between the flux and reflux of the tide, or between the laſt of the ebb and the firſt of the flood, during which the current is interrupted, and the water apparently remains in a ſtate of reſt.

SLADE, in *Agriculture*, a term provincially ſignifying a ſledge. See Sledge.

Slade, *Down*, a provincial term ſignifying to draw back part of the mould into the interfurrow with the plough dragging or ſlading upon its ſide.

Slade *Point*, in *Geography*, a cape on the N.E. coaſt of New Holland; 15 miles S.E. of Cape Hillſborough.

SLAG, in *Metallurgy*, &c. denotes vitrified cinder. See Smelting.

Slag is found an uſeful material in repairing the roads in many places.

SLAGE, Slagen, or *Schlagen*, in *Geography*. See Schlawa.

SLAGELSE, a town of Denmark, in the iſland of Zealand; 42 miles W.S.W. of Copenhagen. N. lat. 55° 26′. E. long. 11° 29′.

SLAIGHTWAITE, a townſhip and chapelry in the pariſh of Huddersfield, in Aylrig wapentake, and Weſt Riding of the county of York, England, is four miles from the town of Huddersfield, and 190 from London. According to the population reports of 1811, this townſhip contained 425 houſes and 2277 inhabitants, the greater part of whom are engaged in the manufacture of cotton goods, which is the ſtaple trade of this diſtrict.

SLAKE, in *Agriculture*, a term ſignifying the ſaturating of quick-lime with moiſture, as water, &c.

SLAKED Lime, ſuch as is reduced into a powdery ſtate by the action of water upon it, or the hydrate of lime. In this caſe, the lime is combined with about one-third of its weight of water, that is, about 55 parts of the former abſorb or drink up about 17 parts of the latter. See Lime.

SLAM, the refuſe of alum-works, which is uſed as a manure with ſea-weed and lime, in Yorkſhire.

SLAMMERSDORP, in *Geography*, a town of the duchy of Holſtein; 7 miles N.E. of Segeborg.

SLANDER, in *Law*. See Scandalum *Magnatum*.

SLANE, in *Geography*, a poſt-town of the county of Meath, Ireland, ſituated on the river Boyne. In the time of Hugh de Lacy this was a town of ſome note, being one of the boroughs in his palatinate of Meath. Here were many religious buildings, one of which was ſometimes uſed as the reſidence of a royal prince, and was rebuilt by the lord of Slane in 1512. In the preſent remains of lord Slane's building, there are, according to Mr. Archdale, ſeveral fragments of the ancient abbey, and many of the architraves were evidently cut out of the ornamental parts, particularly one with the appearance of a head crowned. The caſtle that belonged to the lords of Slane, and was forfeited by them in 1641, is now the property of the Conyngham family. It has been much beautified, and is an elegant reſidence. At New Grange, near Slane, is a moſt remarkable mount, barrow, or rath, with a curious chamber in the centre, conſtructed of rude ſtones, and acceſſible only by a long paſſage, low, and very narrow. Governor Pownall has given a minute deſcription of this barrow in the Archæologia, &c. It is alſo deſcribed in the "Collectanea de Rebus Hibernicis." Slane is 24 miles N. by W. from Dublin.

SLANETZ, a river of Ruſſia, which runs into the Tobol; 60 miles S. of Tobolſk.

SLANEY, a river of Ireland, riſing in the Wicklow mountains, near the ſource of the Liffey, and flowing in a ſouthern direction through the counties of Wicklow, Carlow, and Wexford, to the harbour of Wexford. The towns of Stratford on Slaney, Baltinglaſs, Rathvilly, Tullow, Newtown Barry, Enniſcorthy, and Wexford, are ſituated on it, and it receives the waters of the Derry, Bann, Urrie, and ſeveral ſmaller ſtreams. It is navigable for ſmall ſloops to Enniſcorthy.

SLANGE, Nicholas, in *Biography*, a Dutch hiſtorian of conſiderable celebrity, was born at Slagelſe in the year 1657, of which place his father was the miniſter, and he was afterwards biſhop of Viborg. Nicholas travelled at an early period, and in 1679 he paid a viſit to Oxford, and in the year following he went to Cambridge. On his return he became, in 1681, ſecretary to the Daniſh chancery, and after going through various gradations of rank and office, he was ennobled in the year 1731. He died in 1737. He wrote "A Hiſtory of Chriſtian IV." which was publiſhed at Copenhagen in 1749, in two volumes, folio. It was afterwards tranſlated into the German language. Gen. Biog.

SLANGER, in *Geography*. See Tumb.

SLANGERUP, a town of Denmark, in Zealand; 16 miles N.W. of Copenhagen. N. lat. 45° 51′. E. long. 12° 10′.

SLANT, in *Commerce*, a copper coin of Sweden. Here are ſingle and double ſlants, at 1 and 2 ore ſilver, or 3 and 6 ore kopper; and rundſtycken, of 1 ore kopper; and alſo half rundſtycken: 96 double ſlants, 192 ſingle ſlants, or 576 rundſtycken, are to paſs for 1 ſpecie rikſdaler: and this, commonly called the Swediſh dollar, is worth 4*s.* 7½*d.* ſterling.

SLAPANITZ, in *Geography*, a town of Moravia, in the circle of Brunn; 5 miles E.S.E. of Brunn.

SLAPDASH, in *Rural Economy*, provincially rough caſt, or the liquid external coating of buildings.

SLAPER's Bay, in *Geography*, a bay on the W. coaſt of Africa; 10 miles E. of Cape Blanco.

SLARADIA, a town of Aſiatic Turkey, in Natolia; 28 miles N.N.W. of Eſkir-Shehr.

SLASHER, in *Rural Economy*, a term ſometimes applied to a plaſher of hedges.

SLATCH, at *Sea*. When a rope or cable hangs ſlack, the ſeamen call the middle part, which hangs down, *the ſlatch of the cable*, or rope: ſo alſo, after long foul weather, if there come a ſmall interval of fair, they ſay, *this is a ſlatch of fair weather*. But the term is generally applied to the period of a tranſitory breeze of wind.

SLATE, *Argillaceous Schiſtus* and *Argillite* of Kirwan; *Clay-ſlate*, Jameſon; *Thonſchiefer*, Werner; *Schiſte Argileux*, Fr.; in *Mineralogy* and *Geology*, one of the great rock-formations compoſing the cruſt of the globe, of which roof-ſlate is a well-known variety. The ſlaty or ſchiſtoſe ſtructure is common to numerous rocks, which differ from each other, both in their geological poſition and conſtituent parts; hence we have a great variety of ſlate-rocks, amongſt rocks which have been denominated primary, tranſition, and ſecondary. (See Rocks.) The term ſlate appears to have a more appropriate meaning, when reſtricted to thoſe rocks which, in their compoſition and ſtructure, are moſt nearly allied to roof-ſlate or the clay-ſlate of Werner.

The moſt common colours of ſlate are a yellowiſh-grey, a greeniſh-grey, or a dark-blue or purple-grey: ſome varieties incline to a red, and others to a black-grey. Slate of the moſt perfect kind has a gliſtening luſtre. It paſſes by gradation into mica-ſlate in the rocks called primary; and in rocks conſidered as ſecondary, it paſſes into ſlate-clay or ſhale.

The ſtructure of ſlate-rocks *en maſſe* is tabular, the ſmall ſtructure laminar, the cleavage of the laminæ being parallel with the tables; hence ſlate has been repreſented by ſome geologiſts as moſt diſtinctly ſtratified; and the ſlaty cleavage is ſaid to be always parallel with the ſtrata; but this we believe to be a miſtake, ariſing from confounding the diviſions or joints of the tabular maſſes with the inclination of the beds. In the ſlate-quarries of Weſtmoreland and Cumberland, we have invariably obſerved the tables or diviſions of the ſlate riſe at a more elevated angle than the bed of which they form a part; and they are ſometimes perpendicular, when the true dip of the bed is not more than forty degrees.

The ſlaty ſtructure of the ſtone is the reſult of a proceſs analogous to cryſtallization, by which the ſlate is divided into rhomboidal blocks or tables: between the bottom of one block and the top of another, there is frequently a ſeam of clay, which forms, what the workmen call, the foot of the ſlate. The ſlate will divide to this ſeam in a direction nearly at right angles with it; and ſometimes between the upper and the lower block, there will be a thin horizontal ſtratum of ſlate occupying the place of the clay. This proves that the ſlate is not formed by mechanical ſtratification, and that the elevation of the tabular maſſes is unconnected with the elevation of the rock itſelf.

Slate-rocks vary in hardneſs, but they yield to the knife. They conſiſt of an intimate intermixture, in various proportions, of ſiliceous earth, alumine, and iron; and ſometimes contain a portion of lime, magneſia, manganeſe, and bitumen. Slate forms entire mountains, and mountain chains, and ſometimes diſtinct beds, alternating with other rocks. It moſt frequently reſts upon granite, gneiſs, or mica-ſlate.

Slate-rocks are frequently interſected by veins of quartz, and by metallic veins of lead, cobalt, and ſilver: it alſo contains beds of copper pyrites, red copper-ore, copper-green, malachite, iron pyrites, magnetic pyrites, glance cobalt, grey cobalt-ore, arſenical pyrites, blende and galena. The tin-veins in Cornwall ſometimes paſs through the killas, which is a variety of ſlate-rock.

Various rocks frequently occur imbedded in ſlate, particularly whet-ſlate, or hone, chlorite-ſlate, talcous-ſlate, drawing-ſlate, and alum-ſlate. Beds of flinty ſlate occur in this rock, and alternate with as well as graduate into it. Flinty ſlate appears to be ſlate in which a large proportion of ſiliceous earth is combined, until it approaches nearly to the nature of chert or flint. Organic remains are occaſionally found in ſlate, on which account it is not conſidered by many geologiſts as a primary rock, if indeed there be any to which that term is appropriate. The ſlate which contains organic remains has been called by the Germans *the newer clay-ſlate*, and *tranſition-ſlate*; but remains of vegetables have been diſcovered in the ſlate of the Higher Alps in the vicinity of Mont Blanc, which may be ſuppoſed to have a better claim to the rank of primary than any other ſlate-rocks in Europe.

In a very large proportion of ſlate-rocks, the baſis of the ſlate is intermixed with particles or fragments of other rocks; and when theſe are ſufficiently large to be diſcerned without a lens, this kind of rock has received from the Germans the name of *grauwacke ſlate*. It is generally incumbent on the rocks denominated primary, and is ſuppoſed to be of more recent origin than the finer ſlate; but late obſervations have ſhewn that grauwacke is ſometimes covered with granite and mica-ſlate. The killas of Cornwall appears, in many ſituations, to approach the nature of mica-ſlate, having a ſhining luſtre, and a light grey colour, as if compoſed of an intimate intermixture of clay-ſlate with mica-ſlate. In Cornwall and Devonſhire it occupies, in general, the ſame relative poſition with granite, in which mica-ſlate frequently occurs in other diſtricts reſting immediately upon it. The metallic veins which interſect theſe rocks are principally filled with ores of tin and copper, imbedded in a matrix of quartz; but it is obſerved, that the contents of the vein frequently vary as it paſſes through different rocks: if it contain tin-ore in the granite, it will change to copper-ores in the killas; and if tin be moſt abundant in the killas, the vein will change its contents as it paſſes into the granite. Veins of granite are alſo obſerved to ſhoot up into the killas, which is a proof that this kind of ſlate-rock is at leaſt as ancient as the granite. This fact has given riſe to ſome controverſy among geologiſts, the diſciples of Werner contending that the granite in the ſlate or killas was not in veins, but formed ridges or inequalities riſing above the ſurface, which had been incloſed by ſubſequent depoſitions of the ſlate. For this explanation there can be no better reaſon given than its convenience in ſuiting a particular hypotheſis reſpecting the formation of theſe rocks. Among other facts, which might be cited to prove that the granite veins penetrate the ſlate, there is one deſcribed in the "Annals of Philoſophy," May 1814, which appears deciſive. It occurs in Touſchole, in Cornwall. "The ſlate or killas is of a greyiſh dark colour, rather hard, but breaks into large fragments in the direction of the ſtrata. The granite is of a fine grain, and the felſpar is of a light fleſh-colour, and contains but a ſmall portion of mica. At the junction, numerous veins of granite may be traced from the rock of granite into the ſlate. Some of theſe veins may be obſerved upwards of fifty yards, till they are loſt in the ſea; and in point of ſize, vary from a foot and a half to leſs than an inch.

It may deſerve notice, that as the felſpar is of a fleſh-red colour, it is impoſſible for any obſerver to conſider them as quartz veins. One of theſe large veins is diſlocated, and heaved ſeveral yards by a croſs courſe. Another of theſe veins of granite, after proceeding vertically ſome diſtance, ſuddenly forms an angle, and continues in a direction nearly horizontal for ſeveral feet, with ſchiſtus, or ſlate, both above and below it. This appearance moſt completely deſtroys one of the theories ſuggeſted for the explanation of ſimilar veins at St. Michael's Mount; *viz.* that a ridge of projecting granite had been left, and ſlate depoſited afterwards on its ſides." It is, indeed, quite impoſſible to conceive that a narrow vein of granite ſhould ſhoot up into empty ſpace for a conſiderable diſtance, and then aſſume a zig-zag direction, unſupported by any ſolid ſubſtance on the ſides. The ſlate-rock muſt have exiſted when the vein was formed, and from its reſiſtance have given it the form above deſcribed. Slate is one of the moſt abundant rocks in alpine diſtricts, though that variety which ſplits into thin durable laminæ, forming good roof-ſlate, is far from being ſo common. The localities of common ſlate are ſo numerous in mountainous diſtricts, that it were uſeleſs to point them out. Roof-ſlate, the *ſchiſte ardoiſe* of the French, is found on the weſtern ſide of our iſland in the counties of Cornwall and Devon, in various parts of North Wales and Angleſea, on the north-weſt parts of Yorkſhire, near Ingleton, and in Swaledale, alſo in the counties of Cumberland and Weſtmoreland. It occurs in a low range of mountains at Chamwood foreſt, in Leiceſterſhire, near the centre of England. Several geologiſts have ſtated that ſlate is found in Derbyſhire, which is a miſtake, as no rock ſimilar to clay-ſlate or roof-ſlate occurs in that county. The inhabitants of that part of England make uſe of a micaceous ſand-ſtone for roofing, which they denominate ſlate. This ſtone is found in ſtrata among the other ſtrata accompanying coal. Of the quality of the different kinds of Engliſh roof-ſlate, we ſhall offer ſome obſervations at the concluſion of this article. Slate abounds in various parts of Scotland, and in the county of Wicklow, and other mountainous parts of Ireland. France poſſeſſes many valuable beds of roof-ſlate, near Laferriere in Normandy, and in the neighbourhood of Angers. The laſt is the moſt important, as furniſhing ſlate of the moſt perfect quality, and its extent and prodigious thickneſs make it regarded as inexhauſtible. It is further remarkable on account of the very ſingular and intereſting organic remains that occur between ſome of the laminæ of ſlate. It is, perhaps, one of the moſt valuable repoſitories of ſlate at preſent known.

This bed extends for a ſpace of two leagues, paſſing under the town of Angers, which is built, as well as covered, with the ſlate; thoſe blocks being employed in maſonry which are the leaſt diviſible. The quarries which are actually explored, are all in the ſame line from weſt to eaſt, as well as the ancient pits, the bed of the beſt roof-ſlate riſing to the ſurface in this direction. Immediately under the vegetable earth is found a brittle kind of ſlate, which, for four or five feet deep, ſplits into rhomboidal fragments.

A little lower is what is called the building-ſtone, which is a firm ſlate, but ſcarcely diviſible. This is employed in the conſtruction of houſes, after it has been ſufficiently hardened by expoſure to the air. At fourteen or fifteen feet from the ſurface is found the good ſlate, which has been quarried to the perpendicular depth of about three hundred feet; the remaining thickneſs being unknown.

As to the interior ſtructure of this great maſs of ſlate, it is divided by many veins or ſeams of calcareous ſpar and quartz, about two feet thick, by fifteen or ſixteen in height: theſe veins are parallel, and proceed regularly from weſt to eaſt, in a poſition riſing ſeventy degrees to the ſouth; they are interſected by other veins at intervals of a ſimilar kind, but whoſe riſe is ſeventy degrees north; ſo that when they meet the former, they either form rhombs, or half rhombs, which have been compared to the letter V, ſome being upright, and others reverſed.

All the layers, or laminæ, of the ſlate, have a direction ſimilar to thoſe of the veins of quartz, which riſe ſouth ſeventy degrees; and when interſected by veins that have an oppoſite inclination, the direction of the ſlaty laminæ is not changed. The whole maſs is thus divided into immenſe rhomboids, compoſed of plates all parallel among themſelves, and with two of the faces of the rhomboid.

The ſlate of Angers is extracted in blocks of a fixed ſize, which are divided into leaves for roofing-ſlate. It is betwixt theſe leaves that there are frequently found veſtiges of marine animals, and particularly pyritous impreſſions of *pous de mer* (the ſea-louſe, a ſmall univalve ſhell), alſo of ſmall cheviettes (ſhrimps or prawns), and a ſpecies of crab, of which the body is about a foot in breadth, and fourteen or fifteen inches in length, the tail having nine or ten rings. The ſhrimps are ſometimes ſo numerous, that forty have been counted on a ſlate of a foot ſquare.

None of the above animals reſemble any known exiſting ſpecies. But the moſt remarkable circumſtance in theſe impreſſions, particularly in the large crabs, is, that though there be no ſign of the body having been cruſhed, yet it can ſcarcely be ſaid to have any thickneſs whatever. They rather reſemble engravings than figures in relievo, the convexity of theſe crabs above a thin leaf of ſlate not riſing more than the fourth, and ſometimes not more than the tenth part of a line; nor is it perceivable that the body of theſe crabs penetrates into the leaves of ſlate. What adds to the ſurpriſe, is the nearly vertical poſition in which theſe impreſſions are found in the mine.

A ſeries of theſe leaves of ſlate may be compared to a ſet of books placed upon ſhelves; and the impreſſions of crabs, and other marine animals, to engraved plates in the volumes: they do not, in fact, occupy more thickneſs. It is equally difficult to conceive how the bodies of theſe animals, though perfectly defined, could be reduced to a ſimple ſurface, without thickneſs. Theſe ſlates alſo preſent beautiful dendritical pyrites, more than a foot in extent. The pyrites are ſometimes in ſmall grains, diſſeminated, like duſt, upon the ſurface of the ſlates, where may alſo be obſerved many little ſtars of ſelenite.

When the blocks of ſlate have been drawn from the quarry, if they are left expoſed to the ſun, or the open air, for ſome days, they loſe what is called the *quarry-water*, and then become hard and untractable, and can only be employed as building ſtone. Froſt produces a ſingular effect on theſe blocks: while frozen they may be broken with more eaſe than before; but if thawed rather quickly, they are no longer diviſible: yet this quality may be reſtored by expoſing them once more to the froſt; but if the operation be often repeated, it becomes impoſſible to reduce them to leaves.

Some ſmaller beds of ſlate are worked on the northern declivities of the Pyrenées; but we have no account of any ſlate-quarries on the ſouthern ſide, or in any part of Spain: yet it can ſcarcely be doubted that this rock exiſts in ſome of the mountainous parts of that kingdom.

Only one quarry of ſlate is ſaid to be opened in Italy; it is at Lavagna, in the ſtate of Genoa, and furniſhes ſlate of an excellent quality, and ſo impervious, that it ſerves to line the ciſterns in which olive oil is preſerved. The canton of Glaris, in Switzerland, is the only one in which roof-ſlate is procured. Roof-ſlate occurs in Saxony, and in various mountainous diſtricts in the north of Europe; it is found alſo on the continent of North America; and as it is only a modification of clay-ſlate, which is an abundant rock, it is probable that its localities are much more numerous than are at preſent known in alpine diſtricts in every part of the globe.

As this ſubſtance forms the moſt light, elegant, and durable covering for houſes, and is, of courſe, of conſiderable value; it is rather ſurpriſing that ſo much indifference prevails reſpecting the ſearch for it, in thoſe diſtricts where common ſlate, or *clay-ſlate*, abounds. We believe all the roof-ſlate quarries at preſent worked are thoſe which accident has diſcovered. This neglect is the more remarkable, when we conſider the great expence frequently incurred in ſearching for coal, a ſubſtance of much leſs value in proportion to the weight.

All the beſt beds of roof-ſlate with which we are acquainted, improve as they ſink deeper into the earth; and few, if any, are of a good quality near the ſurface, or are indeed ſuitable for the purpoſe of roofing. There cannot be a doubt that many beds of ſlate, which appear ſhattered and unfit for architectural uſe, would be found of a good quality a few yards under the ſurface; for the beſt ſlate, in many quarries, loſes its property of ſplitting into thin laminæ by expoſure to the air. Notwithſtanding the value of ſlate, few quarries are worked to a very great depth, or have ſubterranean galleries, like mines. The quarry or ſlate-mine at Rimagne, four leagues to the weſt of Charleville, on the Meuſe, in France, is an exception. The mouth of the mine is near the ſummit of a hill: the bed inclines forty degrees to the horizon: it is about ſixty feet in thickneſs, but its extent and depth are unknown. It has been purſued, by a principal gallery, to the depth of 400 feet; and they have driven many lateral galleries, which extend about 200 feet on the ſide of the main gallery, where 26 ladders are placed in ſucceſſion, for the paſſage of the workmen and the carriage of the ſlate. In this bed, which is 60 feet in thickneſs, there are only forty feet of good ſlate, the other being mixed with quartz. They cut the ſlate into blocks of about 200lbs., which they call *faix*: every workman, in his turn, carries them on his back to the very mouth of the pit, mounting the 26 ladders, or a part of them, according to the depth of the bed where he is working. When brought to day, theſe blocks are firſt ſplit into thick tables, which are called *repartons*. The workman holds the block between his legs, puts a chiſſel on the ſide, and divides it with a blow of a mallet. The *repartons* are divided in a ſimilar manner into roof-ſlates. Theſe operations muſt be performed ſoon after the blocks are drawn from the quarry; for if the ſtone has time to dry, it would no longer be poſſible to ſplit it. Some of the ſlate-galleries paſs under the river Meuſe.

There are few places in Great Britain where ſlate is worked as a mine under ground; moſt of the quarries are open to the day; and the covering of other rocks, or of coarſe ſlate, which requires removing, greatly increaſes the expence. There is one ſlate-quarry worked as a mine by penetrating the interior of the mountain at Place-Fell, on the head of the lake of Ullſwater, in Cumberland. Slate is alſo worked under ground on the weſtern ſide of Yorkſhire, adjoining Weſtmoreland. In many other ſituations it is probable that ſlate might be worked to advantage, in ſubterranean galleries, ſimilar to thoſe deſcribed in the quarries at Charleville; for as this mineral is generally of a better quality at a conſiderable depth, the expence of procuring it by mining would be much leſs than that of removing the load of upper rocks, and working it in open quarries, as at preſent; at leaſt the moſt valuable ſlate might be purſued to a far greater depth than is practicable in the common method in open quarries.

Slate, to be of a good quality for roofing, ſhould have the property of ſplitting into thin even laminæ: it ſhould reſiſt the abſorption of water; to prove which, it ſhould be kept ſome time immerſed in water, being weighed before and after the immerſion, wiping the ſurface dry; it is obvious, that the ſlate which gains the leaſt weight by this proceſs is the leaſt abſorbent. It ſhould reſiſt the proceſs of natural decompoſition by air and moiſture: this depends on its chemical compoſition and compactneſs, and is ſhewn by its reſiſting the proceſs of vegetation. That ſlate which is the moſt liable to decay, will be the ſooneſt covered with lichens and moſſes. The ſlate from Charnwood foreſt, in Leiceſterſhire, reſembles, in colour and appearance, the Weſtmoreland ſlate, but it will not ſplit ſo thin, nor would this be deſirable, for the vegetation which takes place upon it requires the roofs to be frequently ſcraped; this carries away a portion of the ſurface: a ſecond growth of moſſes produces a further wearing of the ſlate: hence a ſlate of a certain thickneſs from this part of England is not ſo durable as that from North Wales, Cornwall, or Weſtmoreland. This decay is probably owing to the greater quantity of alumine in its compoſition; it does not contain pyrites, nor have any organic remains been diſcovered in it.

Few ſlate-rocks have been accurately analyſed; a reddiſh-purple ſlate from North Wales contained, according to Kirwan, .38 ſilex, .26 alumine, .8 magneſia, .4 lime, and .14 parts iron; but as there is in this analyſis a loſs of 10 *per cent.*, it cannot be conſidered as very accurate. As the hardneſs of ſlate ariſes principally from the ſilex it contains, which is of all the earths the leaſt favourable to vegetation, thoſe ſlates which are the hardeſt when firſt taken from the quarry, and which have the leaſt ſpecific gravity, are to be preferred; for the increaſe of weight in ſlates is owing to the preſence of iron, either in pyrites, or a ſtate of oxyd. To the preſence of iron, many kinds of ſtone and ſlate alſo owe their tendency to decompoſition. The pyrites being decompoſed by moiſture, and the iron admitting a ſtill higher degree of oxygenation, the ſurface of the ſtone ſwells and peels off, or falls into an ochrey powder.

According to Dr. Watſon, (biſhop of Landaff,) the ſpecific gravity of the Weſtmoreland ſlate varies in different quarries, from 2797 to 2732 ounces the cubic foot. The effect of froſt is very ſenſible on tiled houſes, but is ſcarcely felt on ſlated houſes; for good ſlate imbibes very little water. According to an experiment made by Dr. Watſon on Weſtmoreland ſlate, compared with tile, in which two pieces of each, about 30 inches ſquare, were immerſed in water 10 minutes, and then taken out and weighed as ſoon as they ceaſed to drop; the tile had imbibed about $\frac{1}{7}$th of its weight of water, and the ſlate had not abſorbed the $\frac{2}{100}$th part of its weight: indeed the wetting of the ſlate was merely ſuperficial. When placed before the fire, in a quarter of an hour the ſlate was of the ſame weight as it had been before it was put into the water; but the tile had only loſt about 12 grains of its moiſture, which was as near as could be expected to the quantity which had been ſpread over its ſurface; for it was the amount gained by the ſlate, the ſurface of which was equal to that of the tile. The tile was left to dry ſix days, in a room heated to ſixty degrees, but did not loſe all the water it had imbibed till the end of that time.

The ſlate in Weſtmoreland is blaſted from the quarry in large maſſes, and ſplit with proper tools by the workmen. Though the ſpecific gravity of Weſtmoreland ſlate from different quarries is nearly the ſame, yet all the ſorts are not capable of being ſplit into an equal degree of thinneſs. Here alſo the quality varies with the depth of the quarry, that being the beſt which is raiſed from the greateſt depth.

The grey-blue ſlate from Donyball, in Cornwall, weighs only 2512 ounces to the cubic foot, which is conſiderably lighter than that of Weſtmoreland. This ſlate is generally preferred to any other for its lightneſs, and enduring the weather; but Dr. Watſon is of opinion, that in durability it does not excel that of Weſtmoreland. The Donyball ſlate is ſplit into laminæ about one-eighth of an inch thick when it is applied to the covering of a roof; it then weighs rather more than 26 ounces to the ſquare foot. The pale blue ſlate from Ambleſide, in Weſtmoreland, weighs about two ounces more in the ſquare foot than the former. In many inſtances, we believe ſlate of a thinner kind is uſed in ſeveral modern buildings to ſave the expence of timber in the roof, where cheapneſs rather than durability is a principal object with the architect. According to an eſtimate of Dr. Watſon, the relative weights of a covering of the following different materials, for forty-two ſquare yards of roof, are as under:

	Cwt.
Copper - - -	4
Fine ſlate - - -	26
Lead - - - -	27
Coarſe ſlate - - -	36
Tile - - - -	54

A ton of fine ſlate will cover a larger ſurface than a ton of lead; and where there is water-carriage, does not coſt one-fourth of the price. Slate might, therefore, be uſed generally inſtead of lead, with great advantage. Watſon's Chemical Eſſays, vol. iv.

The moſt extenſive ſlate-quarries in Great Britain are the property of lord Penryn, near Bangor, in Caernarvonſhire. There is a rail-road formed from the quarries to the ſea for the conveyance of the ſlate, which is of an excellent quality, and is ſent to various parts of the world. The moſt remarkable ſituation where ſlate is procured in Cumberland, or perhaps in Great Britain, is Hourlton cragg, a lofty mountain near the lake of Buttermere, about 2000 feet above the level of the lake, and nearly perpendicular. On account of the difficulty of acceſs, the workmen take their proviſions for the week, and ſleep in temporary huts on the ſummit. During the winter months they are generally involved in clouds, and not unfrequently blocked up by the ſnow. The ſlate is conveyed down a zigzag path cut in the rock on ſledges, one man attending to prevent the acceleration of the deſcent. When the ſlate is emptied at the bottom, the ſledge is carried back on his ſhoulders to the ſummit.

There are conſiderable ſlate-quarries near Ulverſtone, in Lancaſhire. A coarſe ſlate is got near Ingleton, in Yorkſhire, and alſo in the vicinity of Settle in that county. The Ingleton ſlate frequently contains cubical pyrites, and is ſometimes covered with dendritical pyrites.

Alum-ſlate, *ampellite* of Haüy, is ſometimes imbedded in clay-ſlate, but more frequently in ſtratified ſecondary rocks, and is not eſſentially different from ſome of the coal-ſhales. (See ALUM.) The alum-ſlate, or alum-ſhale of Whitby, is of vaſt and unknown thickneſs, forming the baſe of the Cleveland Hills in the North Riding of Yorkſhire, extending about thirty miles eaſt and weſt from Robinhood's bay, to Ginſborough, Stokeſly, and Oſmotherly. On the ſouth ſide of the Cleveland Hills the alum-ſlate is principally covered by ſand-ſtone and marle. On the north-eaſt, the alum-rock extends along the coaſt, about thirty miles from Robinhood's bay to Huntcliff. The height of the alum-cliffs, which are perpendicular from the ſea, varies from 100 to 140 yards. Whitby abbey ſtands near an awful precipice of alum-ſlate or rock, which is undermined by every returning tide. At low water the alum-rock may be ſeen extending far to the eaſt, forming a flat pavement, on which the obſerver may walk ſecure, treading at almoſt every ſtep on the organic remains of the inhabitants of a former world, which are abundantly diſſeminated through the whole maſs beneath, and projecting from the ſides of the black and frowning cliffs above. The alum-ſlate has been perforated near the ſea to the depth of 130 yards, without diſcovering the ſubjacent rock, to which we may add the height of the cliffs above, which will make a total thickneſs exceeding 220 yards. The upper parts of the bed are found more productive of alum than the lower. From the quantity of pyrites contained in this rock, it ſometimes takes fire ſpontaneouſly, when a heap of it which has fallen from the cliffs becomes moiſtened with ſea-water.

The animal remains are ſcattered through every part of the rock. They conſiſt principally of numerous ammonites, nautilites, belemnites, foſſile vertebræ (ſuppoſed to belong to the ſhark), with bivalve ſhells, foſſile wood, and jet. Mr. Bakewell conſiders the alum-ſhale or ſlate, and the ſtrata which cover it, as a peculiar local formation ſubjacent to the roe-ſtone, but above the coal-formation of Yorkſhire or Durham. The alum-ſlate is in fact a thin bed of indurated pyritous ſlate-clay, differing little, except in geological poſition and its organic remains, from ſome of the coal-ſhales.

The alum-ſlate of Whitby has a very dark grey colour, a ſlaty ſtructure, and rather a ſilky luſtre; it ſplits, by expoſure to the atmoſphere, into very thin laminæ; it varies in hardneſs, but is all ſofter than roof-ſlate. The particular advantage which the country near Whitby poſſeſſes for the manufacture of alum, is derived from the alum-ſlate riſing in precipitous cliffs, which afford facilities for working and burning the ſtone. Though many of the coal-ſhales might yield an equal quantity of alum, the difficulty of raiſing them to the ſurface would in moſt ſituations be too great to repay the expence. The alum-ſlate is piled in vaſt heaps and ſet fire to; a ſlow combuſtion is continued for ſeveral months, by the inflammable matter combined with the ſtone. The ſaline contents are extracted by ſolution, a ſmall quantity of potaſh is added, and the alum is cryſtallized by evaporation. (Bakewell's Introduction to Geology.) From the alum-rock of Yorkſhire, nearly all the alum of commerce in England is produced.

According to the analyſis of Klaproth, alum-ſlate contains

Sulphur - - - - -	0.28
Carbon - - - - -	1.96
Alumine - - - - -	1.60
Silex - - - - - -	4.00
Black oxyd of iron - - -	64
Sulphate of iron, lime, and potaſh, each	15
Water - - - - - -	70

M. Klaproth remarks, that the ſulphur in the alum-ſlate which he analyſed was not united to the iron but to the carbon, in a manner at preſent unknown. In the alum-ſlate of Whitby, we believe the ſulphur is combined both with the iron and carbon.

Drawing-ſlate frequently accompanies alum-ſlate; it is much ſofter than common ſlate, and contains, like alum-ſlate, a conſiderable portion of carbon: its colour is a greyiſh-black: it is known by the property which it poſſeſſes of leaving a dark line when rubbed on paper. It is ſoft, and ſometimes rather unctuous: ſome varieties have a ſmall degree of luſtre. The fracture, in ſmall fragments, is ſcarcely ſlaty, and ſometimes approaches the conchoidal. Drawing-ſlate is eaſily cut with the knife. Under the blowpipe it turns white or yellow. It ſometimes effloreſces like alum-ſlate. According to Wiegleb, it contains

Silex	64
Alumine	21.25
Carbon	11
Oxyd of iron	2.75
Water	7.50

Drawing-ſlate is employed by maſons, carpenters, &c. to mark with. When fine and pure, it is uſed by artiſts for deſigns. In France it is called *pierre d'Italie*, in England, *French chalk.* It is found in France, near Séer, in the department of l'Orne, and in the environs of Cherbourgh. It is found alſo in Spain and Italy.

Whet-ſlate, or hone, the *novaculite* of Kirwan, occurs imbedded in clay-ſlate: its moſt common colour is greeniſh-grey, inclining to yellow: it is much harder than common ſlate: its texture is fine-grained, nearly compact, and the fracture of the ſmall pieces ſplintery or conchoidal, reſembling flinty ſlate. Its ſpecific gravity is about 2.72. Whet-ſlate is tranſlucent on the edges; it does not efferveſce with acids, and it melts into a brown enamel under the blowpipe. From its green colour, and rather greaſy feel, it may be conſidered as intermediate between hard talcous-ſlate and clay-ſlate. Though it yields to the point of a knife, or even of a copper tool, it acts upon the flattened or round ſurfaces of metals, and is uſed for ſharpening and poliſhing the finer kinds of cutlery. It is of conſiderable value on account of this property, and was firſt brought from the Levant. We have no whet-ſlate of a fine quality in England. An inferior kind is procured from Chamwood foreſt, in Leiceſterſhire. It exiſts of a finer quality in the promontory of Howth, near Dublin. The common whet-ſlate of commerce is procured from Saxony.

SLATE-*Spar, Schiefer-ſpath*, Werner, occurs in lime-ſtone beds, in mountains called primitive. Its colour is milk-white, or greeniſh and reddiſh-white, its luſtre ſhining and pearly. Slate-ſpar is tranſlucent and ſoft, its ſtructure coarſely lamellar, paſſing into ſlaty, and ſometimes curved or undulating: it is infuſible, and efferveſces with violence in acids.

SLATE, in *Rural Economy*, a well-known, neat, convenient, and durable material, for the covering of the roofs of buildings. There are great varieties of this ſubſtance; and it likewiſe differs very greatly in its qualities and colours. In ſome places it is found in thick laminæ, or flakes; while in others it is thin and light. The colours are white, brown, and blue.

It is ſo durable, in ſome caſes, as to have been known to continue ſound and good for centuries. However, unleſs it ſhould be brought from a quarry of well reputed goodneſs, it is neceſſary to try its properties, which may be done by ſtriking the ſlate ſharply againſt a large ſtone, and if it produce a complete ſound, it is a mark of goodneſs; but if in hewing it does not ſhatter before the edge of the *ſect*, or inſtrument commonly uſed for that purpoſe, the criterion is deciſive. The goodneſs of ſlate may be farther eſtimated by its colour: the deep black-blue is apt to imbibe moiſture, but the lighter blue is always the leaſt penetrable: the touch alſo may be in ſome degree a guide, for a good firm ſtone feels ſomewhat hard and rough, whereas an open ſlate feels very ſmooth, and as it were greaſy. And another method of trying the goodneſs of ſlate, is to place the ſlate-ſtone lengthwiſe, and perpendicularly in a tub of water, about half a foot deep, care being taken that the upper or unimmerſed part of the ſlate be not accidentally wetted by the hand, or otherwiſe; let it remain in this ſtate twenty-four hours; if good and firm ſtone, it will not draw water more than half an inch above the ſurface of the water, and that perhaps at the edges only, thoſe parts having been a little looſened in the hewing; but a ſpongy defective ſtone will draw water to the very top. There is ſtill another mode, held to be infallible. Firſt, weigh two or three of the moſt ſuſpected ſlates, noting the weight; then immerge them in a veſſel of water twelve hours; take them out, and wipe them as clean as poſſible with a linen cloth; and if they weigh more than at firſt, it denotes that quality of ſlate which imbibes water: a drachm is allowable in a dozen pounds, and no more.

It may be noticed, that in laying of this material, a buſhel and a half of lime, and three buſhels of freſh-water ſand, will be ſufficient for a ſquare of work; but if it be pin plaſtered, it will take above as much more: but good ſlate, well laid and plaſtered to the pin, will lie an hundred years; and on good timber a much longer time. It has been common to lay the ſlates dry, or on moſs only, but they are much better when laid with plaſter. When they are to be plaſtered to the pin, then about the firſt quantity of lime and ſand will be ſufficient for the purpoſe, when well mixed and blended together, by properly working them.

Slates differ very much in thickneſs as well as colour, which ſuits them for different ſituations and purpoſes. A great deal of good ſlate of various kinds is raiſed in different parts of Wales, and much excellent blue and other coloured ſorts is procured from the northern parts of Lancaſhire, and other neighbouring places, as well as from different other counties throughout the kingdom. In ſome parts the ſlate is diſtributed into three kinds, as the beſt, the middling, and the waſte or common ſort. See QUARRY.

SLATE-*Axe*, provincially a mattock with a ſhort axe-end, uſed in ſlating, &c.

SLATE *Mount*, in *Geography*, a mountain of Virginia; 6 miles W. of Richmond. N. lat. 37° 35′. W. long. 72°.

SLATE *River*, a river of Virginia, which runs into James river, N. lat. 37° 40′. E. long. 78° 34′.

SLATEE, an African appellation of free black merchants, often traders in ſlaves.

SLATERS, in *Entomology*. See MILLEPEDES and ONISCUS.

SLATERS *and Tilers*, are thoſe artificers who are employed in ſlating or tiling houſes. In calculating and eſtimating the value of their work, they find the content of a roof by multiplying the length of the ridge by the girt over from eaves to eaves; making allowance in this girt for the double row of ſlates at the bottom, or for the quantity or ſpace by which one row of ſlates or tiles is laid over another. In angles formed in a roof, running from the ridge to the eaves, when the angle bends inwards, it is called a valley; but when outwards, it is called a hip. And in tiling and ſlating, it is common to add the length of the valley or hip to the content in feet. Deductions are ſeldom made for chimney-ſhafts, or ſmall window-holes. *E. gr.* Required the content of a ſlated roof, the length being 45 feet 9 inches, and whole girt 34 feet 3 inches.

By Decimals.	By Duodecimals.
45.75	45 9
34¼	34 3
18300	205 6
13725	135
114375	11 5 3
9)1566.9375 feet.	9)1566 11 3
174.104 yards.	174′ 11′ 3″ Anſwer.

E. gr. What is the amount of the tiling of a houſe, at 25*s.* 6*d. per* ſquare; the length being 43 feet 10 inches, and the breadth on the flat 27 feet 5 inches, and the eaves alſo projecting 16 inches on each ſide. Anſ. 24*l.* 9*s.* 5½*d.*

SLATINA, in *Geography*, a town of Bohemia, in the circle of Schlan; 6 miles E. of Schlan.—Alſo, a town of Walachia, on the E. ſide of the river Alaut; 2 miles N.E. of Brancovani.—Alſo, a town of European Turkey, in Moldavia; 18 miles N.W. of Niemecz.

SLATTBOG, a town of Sweden, in the province of Smaland; 15 miles N.W. of Wexio.

SLATY ROCK, or *Schiſtus*, in *Agriculture*, a ſubſtance of a mouldering, enriching nature, which is ſometimes blended up with other matters as a compoſt for land. The ſort of material of this kind which forms the under-ſoil in many parts of Cornwall, and ſome other diſtricts, is of an argillaceous, unctuous, ſoapy quality; which in ſome caſes is ploughed up with a ſtrong plough; and after being well expoſed to the ſummer ſun and winter froſt, is mixed with lime or ſand; in which ſtate it is ſaid to become a very capital thickener and fertilizer of thin poor worn-out ſoils, and by which much improvement is afforded at little trouble or expence.

SLAVANESS, in *Geography*, a cape on the E. coaſt of the iſland of Shetland. N. lat. 60° 31′. W. long. 1° 13′.

SLAVE, a perſon in the abſolute power of a maſter, with regard to his life, liberty, and fortune. See SERVANT.

Menage and Voſſius derive the word from *Sclavus*, the name of a Scythian people, whom Charlemagne condemned to perpetual impriſonment. See SCLAVONIC.

The Romans called their ſlaves, *ſervi*, from *ſervare, to keep*, or *ſave*; as being ſuch as were not killed, but ſaved to yield money, either by ſale, or by their work. Though other authors are of opinion, that the Roman name *ſervi* might come from that of *ſerbi*; as that of ſlaves from *Sclavi, a people.*

The term for a ſlave born and bred in the family, was *verna*; equivalent to *ſcurra*, denoting the petulance and impudence of theſe ſlaves. They ſeem to have been entitled by cuſtom to privileges and indulgences beyond others.

Among the Romans, when a ſlave was ſet at liberty, he changed his name into a ſurname; he took the nomen or prenomen of his maſter, to which he added the cognomen he had been called by when a ſlave. See NAME.

Among thoſe who were denominated ſlaves in the more lax and general uſe of the term, we may reckon thoſe who were diſtinguiſhed among the Romans by the appellation of "mercenarii," ſo called from the circumſtance of their *hire.* Theſe were free-born citizens, mentioned in the law-books by the name of *liberi*, and thus contradiſtinguiſhed from the *alieni*, or foreigners, who, from the various contingencies of fortune, were under a neceſſity of recurring for ſupport to the ſervice of the rich. To this claſs belonged thoſe who, both among the Jews and Egyptians, are recorded in the ſacred writings. (Gen. ch. xlvii. Levit. xxv. 39, 40.) The Grecian *Thetes* (θητες, ſee Hom. Odyſſ. Δ. 642.) were alſo of this deſcription. The ſituation of theſe perſons reſembled that of our ſervants; a contract ſubſiſting between the parties, and moſt of the ſubordinate dependants having a right to demand and obtain their diſcharge if they were ill uſed by their maſters.

Among the ancients there was another claſs of ſervants, which conſiſted wholly of thoſe who had ſuffered the loſs of liberty from their own imprudence. Such were the Grecian *prodigals*, who were detained in the ſervice of their creditors, till the fruits of their labour were equivalent to their debts; the *delinquents*, who were ſentenced to the oar; and the German *enthuſiaſts*, mentioned by Tacitus, who were ſo addicted to gaming, that when they had parted with every thing, alſo ſtaked their liberty and their perſons. "The loſer," ſays the hiſtorian, "goes into a voluntary ſervitude; and though younger and ſtronger than the perſon with whom he played, patiently ſuffers himſelf to be bound and ſold. Their perſeverance in ſo bad a cuſtom is ſtyled *honour.* The ſlaves thus obtained are immediately exchanged away in commerce, that the winner may get rid of the ſcandal of his victory." The two claſſes now enumerated comprehend thoſe that may be called *voluntary* ſlaves, and they are diſtinguiſhed from thoſe denominated *involuntary* ſlaves; who are forced, without any previous condition or choice, into a ſituation, which, as it tended to degrade a part of the human ſpecies, and to claſs it with the brutal, muſt have been, of all ſituations to which a human being can be reduced, the moſt wretched and inſupportable.

We find no mention of ſlaves before the Deluge, but immediately after, *viz.* in the curſe of Canaan, Gen. ix. 25; whence it is eaſily inferred, that ſervitude commenced ſoon after that time; for in Abraham's days we find it generally eſtabliſhed. Some will have it to have commenced under Nimrod, becauſe it was he who firſt began to make war, and of conſequence to make captives; and to bring ſuch as he took, either in his battles or irruptions, into ſlavery.

"Proud Nimrod firſt the bloody chace began,
Almighty hunter, and his prey was man." Pope.

Hence probably aroſe the connection between victory and ſervitude, an idea of which has prevailed among the nations of antiquity, and which has uniformly exiſted, in one country or another, to the preſent day. Accordingly, the firſt claſs of *involuntary* ſlaves, included thoſe who were "priſoners of war;" and theſe were more ancient than the *voluntary* ſlaves, who are firſt mentioned in the time of Pharaoh. The practice of reducing priſoners of war to the condition of ſlaves, ſubſiſted both among the eaſtern nations and the people of the Weſt; for as the Helots became the ſlaves of the Spartans, merely from the right of conqueſt, ſo priſoners of war were reduced to the ſame ſituation by the other inhabitants of Greece. The Romans, alſo, were actuated by the ſame principle; and all thoſe nations which contributed to overturn the empire, adopted a ſimilar cuſtom; ſo that it was a general maxim in their polity, that thoſe who fell under their power as priſoners of war, ſhould immediately be reduced to the condition of ſlaves. See PRISONERS *of War.*

The ſlaves of the Greeks were generally, or very commonly, barbarians, and imported from foreign countries.

By the civil law, the power of making ſlaves is eſteemed a right of nations, and follows, *jure gentium*, as a natural conſequence of captivity in war. "Jure gentium ſervi noſtri ſunt, qui ab hoſtibus capiuntur." Juſtinian, l. i. 5. 5. 1.

This is the firſt origin of the right of ſlavery aſſigned by

Juſtinian, Inſt. i. 3, 4. whence ſlaves are called *mancipia quaſi manu capti*.

The conqueror, ſay the civilians, had a right to the life of his captive; and having ſpared that, has a right to deal with him as he pleaſes. But this poſition, taken generally, is denied by judge Blackſtone; who obſerves, that a man has a right to kill his enemy only in caſes of abſolute neceſſity, for ſelf-defence: and, it is plain, this abſolute neceſſity did not ſubſiſt, ſince the victor did not kill him, but made him priſoner. Since, therefore, the right of making ſlaves by captivity depends on a ſuppoſed right of ſlaughter, that foundation failing, the conſequence drawn from it muſt fail likewiſe. Farther, it is ſaid that ſlavery may begin "jure civili," when one man ſells himſelf to another: but this, when applied to ſtrict ſlavery, in the ſenſe of the laws of old Rome or modern Barbary, is alſo impoſſible. Every ſale implies a price, a *quid pro quo*, an equivalent given to the ſeller in lieu of what he transfers to the buyer; but what equivalent can be given for life and liberty, both of which, in abſolute ſlavery, are held to be at the maſter's diſpoſal? His property, alſo, the very price he ſeems to receive, devolves *ipſo facto* to his maſter the inſtant he becomes his ſlave: and beſides, if it be not lawful for a man to kill himſelf, becauſe he robs his country of his perſon, for the ſame reaſon he is not allowed to barter his freedom: the freedom of every citizen conſtitutes a part of the public liberty. In this caſe, therefore, the buyer gives nothing, and the ſeller receives nothing; of what validity then can a ſale be, which deſtroys the very principles upon which all ſales are founded? Laſtly, we are told, that beſides theſe two ways by which ſlaves "fiunt," or are acquired, they may alſo be hereditary, "ſervi naſcuntur;" the children of acquired ſlaves are, *jure naturæ*, by a negative kind of birthright, ſlaves alſo; but this being founded on the two former rights, muſt fall together with them. If neither captivity, nor the ſale of one's ſelf, can, by the law of nature and reaſon, reduce the parent to ſlavery, much leſs can they reduce the offspring. Blackſt. Comm. b. i. c. 14. Monteſquieu's Spirit of Laws, b. 15. c. 2, &c.

The Lacedæmonians, ſay ſome, or, as others ſay, the Aſſyrians, firſt introduced the practice; which the Romans not only approved of, but they even invented new manners of making ſlaves; for inſtance, a man born free among them might ſell his freedom, and become a ſlave. This voluntary ſlavery was firſt introduced by a decree of the ſenate, in the time of the emperor Claudius, and at length was abrogated by Leo.

The Romans had power of life and death over their ſlaves, which no other nations had; but this ſeverity was afterwards moderated by the laws of the emperors; and by one of Adrian it was made capital to kill a ſlave without a cauſe.

The ſlaves were eſteemed the proper goods of their maſters, and all they got belonged to them: but if the maſter were too cruel in his domeſtic corrections, he was obliged to ſell his ſlave at a moderate price.

The cuſtom of expoſing old, uſeleſs, or ſick ſlaves in an iſland of the Tyber, there to ſtarve, ſeems to have been pretty common in Rome; and whoever recovered, after having been ſo expoſed, had his liberty given him, by an edict of the emperor Claudius, in which it was likewiſe forbidden to kill any ſlave merely for old age or ſickneſs. (Suet. in Claud.) Neverthleſs, it was the profeſſed maxim of the elder Cato, to ſell his ſuperannuated ſlaves for any price, rather than maintain what he deemed an uſeleſs burden. (Plut. in Caton.) The ergaſtula, or dungeons, where ſlaves in chains were forced to work, were very common all over Italy. Columella (l. i. c. 6.) adviſes that they be always built under ground; and recommends it as the duty of a careful overſeer, to call over every day the names of theſe ſlaves, in order to know when any of them had deſerted. Sicily was full of ergaſtula, and was cultivated by labourers in chains. Eunus and Athenio excited the ſervile war, by breaking up theſe monſtrous priſons, and giving liberty to 60,000 ſlaves.

In the ancient and uncivilized ages of the world, "piracy" was regarded as an honourable practice; and this was ſuppoſed to give a right of making ſlaves. "The Grecians," ſays Thucydides (l. i.) "in their primitive ſtate, as well as the contemporary barbarians, who inhabited the ſea-coaſts and iſlands, addicted themſelves wholly to it: it was, in ſhort, their only profeſſion and ſupport." The writings of Homer are ſufficient to eſtabliſh this account; as they ſhew that this was a common practice at ſo early a period as that of the Trojan war. The reputation which piracy ſeems to have acquired among the ancients, was owing to the ſkill, ſtrength, agility, and valour, which were neceſſary for conducting it with ſucceſs; and the erroneous notions that were thus entertained concerning it led to other conſequences, immediately connected with the ſlavery of the human ſpecies. Avarice and ambition availed themſelves of theſe miſtaken notions; and people were robbed, ſtolen, and even murdered, under the pretended idea that theſe were reputable adventures. But in proportion as men's ſentiments and manners became more refined, the practice of piracy loſt its reputation, and began gradually to diſappear. The practice, however, was found to be lucrative; and it was continued, with a view to the emolument attending it, long after it ceaſed to be thought honourable, and when it was ſinking into diſgrace. The profits ariſing from the ſale of ſlaves preſented a temptation which avarice and intereſt could not reſiſt; many were ſtolen by their own countrymen, and ſold for ſlaves; and merchants traded on the different coaſts in order to facilitate the diſpoſal of this article of commerce. The merchants of Theſſaly, if we may credit Ariſtophanes, (Plut. Act ii. Sc. 5.) who never ſpared the vices of the times, were particularly infamous for this latter kind of depredation; the Athenians were notorious for the former; for they had practiſed theſe robberies to ſuch an alarming degree of danger to individuals, that it was found neceſſary to enact a law, which puniſhed kidnappers with death. From the above ſtatement it appears, that among the ancients there were two claſſes of involuntary ſlaves; one conſiſting of thoſe who were taken publicly in a ſtate of war; and another compoſed of thoſe who were privately ſtolen in a ſtate of peace. To which might be added a third claſs, comprehending the children and deſcendants of the former.

The condition of ſlaves, and their perſonal treatment, were ſufficiently humiliating and grievous; and may well excite our pity and abhorrence. They were beaten, ſtarved, tortured, and murdered at diſcretion; they were dead in a civil ſenſe; they had neither name nor tribe; they were incapable of judicial proceſs; and they were, in ſhort, without appeal. To this cruel treatment, however, there were ſome exceptions. The Egyptian ſlave, though perhaps a greater drudge than any other, yet if he had time to reach the temple of Hercules (Herodotus, l. ii. 143.), found a certain retreat from the perſecution of his maſter; and he derived additional comfort from the reflection that his life could not be taken with impunity. But no place was ſo favourable to ſlaves as Athens. Here they were allowed a greater liberty of ſpeech; they had their convivial meetings, their amours, their hours of relaxation, pleaſantry, and mirth; they were treated in ſuch a manner as to warrant the obſervation of Demoſthenes, in his ſecond Philippic, " that the condition of a ſlave at Athens was preferable to that of a free citizen in many other countries." And here, if perſecution exceeded the bounds of lenity, they had their temple, like the Egyptian, for refuge; where the legiſlature was ſo attentive, as to examine their complaints, and to order them, if they were founded in juſtice, to be ſold to another maſter. Beſides, they were allowed an opportunity of working for themſelves; and if their diligence had procured them a ſum equivalent to their ranſom, they could immediately, on paying it down, demand their freedom for ever. To this privilege Plautus alludes, in his " Caſina," where he introduces a ſlave, ſpeaking in the following manner:

> " Quid tu me vero libertate territas?
> Quod ſi tu nolis, filiuſque etiam tuus
> Vobis *invitis*, atque amborum *ingratiis*,
> *Una libella liber poſſum fieri.*"

Thus we find, to the eternal honour of Egypt and Athens, that they were the only places, if we except the cities of the Jews, where ſlaves were conſidered with any humanity at all. The inhabitants of all other parts of the world ſeemed to vie with each other in the debaſement and oppreſſion of theſe unfortunate people.

The writer, of whoſe valuable publication we are now availing ourſelves, and to whom the cauſe of humanity is under inexpreſſible obligations, proceeds to inquire by what circumſtances the barbarous and inhuman treatment of ſlaves was produced?

The firſt of theſe circumſtances, which he mentions, was " commerce;" for if men could be conſidered as " poſſeſſions;" if, like " cattle," they might be *bought* and *ſold*, it will be natural to ſuppoſe, that they would be regarded and treated in the ſame manner. This kind of commerce, which began in the primitive ages of the world, depreſſed the human ſpecies in the general eſtimation; and they were tamed, like brutes, by the ſtings of hunger and the laſh, and their education was ſo conducted, as to render them commodious inſtruments of labour for their poſſeſſors. This degradation of courſe depreſſed their minds, reſtricted the expanſion of their faculties, ſtifled almoſt every effort of genius, and exhibited them to the world, as beings endued with inferior capacities to the reſt of mankind. But for this opinion there ſeems to have been no foundation in truth or juſtice. Equal to their fellow-men in natural talents, and alike capable of improvement, any apparent or even real difference between them and ſome others muſt have been owing to the mode of their education, to the rank they were doomed to occupy, and to the treatment they were appointed to endure.

This commerce of the human ſpecies, which produced ſo pernicious an effect on the nature and ſtate of man, commenced at a very early period. The hiſtory of Joſeph, recorded in the book of Geneſis, leads us to a very remote era for the introduction of this nefarious traffic. In his time it ſeems to have been prevalent, and to have been carried on in a manner, that ſufficiently indicated its having been long before eſtabliſhed. Egypt ſeems to have been at this time the principal, as it was probably the firſt, market for the ſale of the human ſpecies. It was, indeed, ſo famous, as to have been known, within a few centuries from the time of Pharaoh, both to the Grecian colonies in Aſia, and the Grecian iſlands. Homer mentions Cyprus and Egypt as the common markets for ſlaves, about the time of the Trojan war. (Odyſſ. l. xvii. 448. l. xxvi.) Egypt is alſo repreſented, as we have already intimated, in the book of Geneſis, as a market for ſlaves, and in Exodus (ch. i.) as famous for the ſeverity of its ſervitude. Homer alſo, in the place above cited, points out to us Egypt as a market for the human ſpecies, and by the epithet of " *bitter* Egypt," alludes in the ſtrongeſt manner to that ſeverity and rigour, of which the ſacred hiſtorian tranſmitted to us the firſt account. The Odyſſey of Homer ſhews farther, that this ſpecies of traffic was practiſed in many of the iſlands of the Ægean ſea; and the Iliad informs us, that it had taken place among thoſe Grecians on the continent of Europe, who had embarked from thence on the Trojan expedition. To this purpoſe, at the end of the ſeventh book, a fleet is deſcribed, as having juſt arrived from Lemnos, with a ſupply of wine for the Grecian camp. The merchants are deſcribed alſo, as immediately expoſing it to ſale, and as receiving in exchange, among other articles of barter, " a number of ſlaves." Tyre and Sidon, as we learn from the book of Joel, ch. iii. 3, 4, 6, were notorious for the proſecution of this trade. This cuſtom appears alſo to have exiſted among other ſtates; it travelled all over Aſia; it ſpread through the Grecian and Roman world; it was in uſe among the barbarous nations, which overturned the Roman empire; and was therefore practiſed, at the ſame period, throughout the whole of Europe. However, as the northern nations were ſettled in their conqueſts, the ſlavery and commerce of the human ſpecies began to decline, and on their full eſtabliſhment they were aboliſhed. Some writers have aſcribed their decline and abolition to the prevalence of the feudal ſyſtem; whilſt others, much more numerous, and with greater ſtrength of argument, have maintained, that they were the natural effects of Chriſtianity. The advocates of the former opinion allege, that " the multitude of little ſtates, which ſprung up from one great one at this era, occaſioned infinite bickerings and matter for contention. There was not a ſtate or ſeigniory, which did not want all the hands they could muſter, either to defend their own right, or to diſpute that of their neighbours. Thus every man was taken into the ſervice: whom they armed they muſt truſt: and there could be no truſt but in free men. Thus the barrier between the two natures was thrown down, and ſlavery was no more heard of in the weſt."

That this was not the neceſſary conſequence of ſuch a ſituation, is apparent. The political ſtate of Greece, in its early hiſtory, was the ſame as that of Europe, when divided by the feudal ſyſtem into an infinite number of ſmall and independent kingdoms. There was the ſame matter, therefore, for contention, and the ſame call for all the hands that could be muſtered: the Grecians, in ſhort, in the heroic, were in the ſame ſituation, in theſe reſpects, as the feudal barons in the Gothic times.

It muſt be allowed, on the ſlighteſt conſideration of the ſubject, that Chriſtianity was admirably adapted to this purpoſe. It taught, " that all men were originally equal; that the Deity was no reſpecter of perſons; and that, as all men were to give an account of their actions hereafter, it was neceſſary that they ſhould be free." Theſe doctrines could not fail of having their proper influence on thoſe who firſt embraced Chriſtianity, from a conviction of its truth; and on thoſe of their deſcendants afterwards, who, by engaging in the cruſades, and hazarding their lives and fortunes there, ſhewed at leaſt an attachment to that religion. We find them accordingly actuated by theſe principles. We have a poſitive proof, that the feudal ſyſtem had no ſhare in the honour of ſuppreſſing ſlavery, but that Chriſtianity was the only cauſe; for the greateſt part of the charters, which were granted for the freedom of ſlaves in thoſe times (many of which are ſtill extant), were granted "pro amore Dei, pro mercede animæ." They were founded, in ſhort, on religious conſiderations, "that they might procure the favour of the Deity, which they conceived themſelves to have forfeited, by the ſubjugation of thoſe, whom they found to be the objects of the divine benevolence and attention equally with themſelves."

Theſe conſiderations, which had thus their firſt origin in Chriſtianity, began to produce their effects, as the different nations were converted; and procured that general liberty at laſt, which, at the cloſe of the twelfth century, was conſpicuous in the weſt of Europe.

Within two centuries after the ſuppreſſion of ſlavery in Europe, the Portugueſe, in imitation of thoſe piracies which exiſted in the uncivilized ages of the world, made their deſcents on Africa, and committing depredations on the coaſt, firſt carried the wretched inhabitants into ſlavery. This practice, thus inconſiderable at its commencement, became general; and our own anceſtors, together with the Spaniards, French, and moſt of the maritime powers of Europe, ſoon followed the piratical example: and thus did the Europeans, to their eternal infamy, revive a cuſtom, which their own anceſtors had ſo lately exploded, from a conſciouſneſs of its impiety. The unfortunate Africans fled from the coaſt, and ſought, in the interior part of the country, a retreat from the perſecution of their invaders; but the Europeans ſtill purſued them; they entered their rivers, ſailed up into the heart of the country, ſurpriſed the Africans in their receſſes, and carried them into ſlavery. The next ſtep, which the Europeans found it neceſſary to take, was that of ſettling in the country; of ſecuring themſelves by fortified poſts; of changing their ſyſtem of force into that of pretended liberality; and of opening, by every ſpecies of bribery and corruption, a communication with the natives. Accordingly they erected their forts and factories; landed their merchandize; and endeavoured, by a peaceable deportment, by preſents, and by every appearance of munificence, to allure the attachment and confidence of the Africans.

The Portugueſe erected their firſt fort at D'Elmina, in the year 1481, about 40 years after Alonzo Gonzales had pointed out to his countrymen the ſouthern Africans as articles of commerce.

The ſcheme ſucceeded: an intercourſe took place between the Europeans and Africans, attended with a confidence highly favourable to the views of ambition and avarice. In order to render this intercourſe permanent as well as lucrative, the Europeans having diſcovered the chiefs of the American tribes, paid their court to theſe; and at length a treaty of peace and commerce was concluded; in which it was agreed, that the kings, on their part, ſhould, from this period, ſentence *priſoners of war* and *convicts* to European ſervitude; and that the Europeans ſhould ſupply them, in return, with the luxuries of the north. This agreement immediately took place, and laid the foundation of that commerce, of which the following articles contain a brief hiſtory.

Slavery is abſolutely aboliſhed in England and France as to perſonal ſervitude; our ſervants are not ſlaves, but only are ſubject to certain determinate ſervices. It is ſaid, that the moment a ſlave ſteps on Engliſh ground, he by law becomes free. See NEGRO.

When an attempt was made to introduce ſlavery within this nation, by ſtat. 1 Edw. VI. c. 3. which ordained, that all idle vagabonds ſhould be made ſlaves, and fed upon bread, water or ſmall drink, and refuſe of meat; ſhould wear a ring of iron round their necks, arms, or legs; and ſhould be compelled, by beating, chaining, or otherwiſe, to perform the work aſſigned them, were it ever ſo vile; the ſpirit of the nation could not brook this condition, even in the moſt abandoned rogues; and, therefore, this ſtatute was repealed in two years afterwards. 3 & 4 Edw. VI. c. 16.

For the cuſtom of marking or ſtigmatizing ſlaves, ſee STIGMATIZING.

SLAVE-TRADE. At the cloſe of the preceding article we have ſtated the manner in which this ſpecies of commerce commenced; nor is it neceſſary to mention one oſtenſible reaſon that was alleged for introducing the Africans, in particular, as labourers into the newly diſcovered parts of the weſtern world, and placing them under European maſters, *viz. the duty of converting the heathen;* becauſe this was but an idle pretence. It was ſoon found that a uſage, different from that which Chriſtianity would have dictated, was neceſſary, where people were tranſported, and made to labour againſt their will. A ſyſtem, therefore, of ſeverity ſprung up, as it related to their treatment, which became by degrees ſtill more cruel and degrading; ſo that when in after-times the ſituation of maſter and ſlave came to be viewed, as it exiſted in practice between the two, the maſters ſeemed to have attained the rank of monarchs, and the ſlaves to have gone down to the condition of brutes. Hence, very early after the commencement of the ſlave-trade, the objects of it began to be conſidered as an inferior ſpecies, and even their very colour as a mark of it; and under this latter notion they continued to be tranſported for years and years, till different perſons, taking an intereſt in their ſufferings, produced ſuch an union of public ſentiment in their favour in England, that the parliament there were obliged, as it were, to conſider their caſe, by hearing evidence upon it. It is from this evidence, as from the higheſt authority, which was heard in the years 1791 and 1792, that we ſhall chiefly give our account of the trade in queſtion.

The treaty to which we have referred, ſtipulated to ſupply the Europeans with captives and convicts; but theſe were not ſufficient for their demand, on the eſtabliſhment of their weſtern colonies. In order, therefore, to augment the number, not only thoſe who were fairly convicted of offences were now ſentenced to ſervitude, but even thoſe who were ſuſpected; and with regard to priſoners of war, they delivered into ſlavery not only thoſe who were taken in a ſtate of public enmity and injuſtice, but thoſe alſo who, conſcious of no injury whatever, were taken in the arbitrary ſkirmiſhes of the venal ſovereigns of Africa. Wars were made, not as formerly, from motives of retaliation and defence, but for the ſake of obtaining priſoners alone, and the advantages reſulting from the ſale of them. When an European ſhip came in ſight, this was conſidered as a motive for war, and a ſignal for the commencement of hoſtilities. The deſpotic ſovereigns of Africa, influenced by the venal motives of European traffic, firſt made war upon the neighbouring tribes, in the violation of every principle of juſtice; and if they did not thus ſucceed in their main object, they turned their arms againſt their own ſubjects. The firſt villages at which they arrived were immediately ſurrounded, and afterwards ſet on fire; and the wretched inhabitants ſeized, as they were eſcaping from the flames. Theſe, conſiſting of whole families, fathers, brothers, huſbands, wives, and children, were inſtantly driven in chains to the merchants, and conſigned to ſlavery. Many other perſons were kidnapped, in order to glut the avarice of their own countrymen, who lay in wait for them; and they were afterwards ſold to the European merchants:

while the ſeamen of the different ſhips, by every poſſible artifice, enticed others on board, and tranſported them to the regions of ſervitude.

The collectors of ſlaves were diſtributed into ſeveral claſſes. The firſt conſiſted of ſuch black traders as preſerved a regular chain of traffic, and a regular communication with each other, from the interior parts of the country to the ſea-ſhore. Many of the ſlaves, thus driven down, are reported to have travelled at leaſt 1200 miles from the place where they were firſt purchaſed. A piſtol or a ſword may have been the full value of one of theſe ſlaves, at the firſt coſt; but his price advances, as he travels towards the ſea-ſhore. The ſecond claſs of ſlave-traders is compoſed of ſuch as travel inland, but have no chain of commerce or communication with the ſhore. At a certain diſtance they ſtrike off in a line parallel to the ſhore, and viſiting the fairs and villages in their way, drop down occaſionally to the coaſt, as they have procured ſlaves. The third claſs conſiſts of ſuch as travel by water up the great rivers, in their canoes, which are very long, well-armed, and carry from 50 to 70 hands. Theſe often proceed to the diſtance of 1000 miles, and bring down from 60 to 120 ſlaves at a time. The fourth claſs includes thoſe who, living near the banks of the rivers, or the ſea-ſhore, ſcarcely travel at all, but coming by ſome means or other into the poſſeſſion of ſlaves, either drive them, or ſend them immediately to the ſhips and factories. Moſt of the traders now deſcribed traffic on their own account; but there are ſome of the poorer ſort, who travel for the ſhips. The different ſorts of goods, with which the traders deal for ſlaves in the inland country, may be divided into three ſorts, *viz.* Eaſt Indian, home-made or colonial, and Venetian. The firſt conſiſts of cowries, or ſmall ſhells, which paſs for money on ſome parts of the coaſt; blue and white baffs, romals, bandanoes, and other cloths and productions of the Eaſt. The ſecond conſiſts of bar-iron, muſkets, powder, ſwords, pans, and other hardware; cottons, linen, ſpirits in great abundance, with other articles of leſs note. The third conſiſts totally of beads. Almoſt every ſhip carries the three ſorts of articles now ſtated, but more or leſs of one than of the other, according to the place of her deſtination; every different part of the coaſt requiring a different aſſortment, and the Africans, like the Europeans, repeatedly changing their taſte. This is particularly the caſe with reſpect to beads. The ſame kind of beads, which finds a market one year in one part of the coaſt, will probably not be ſaleable there the next. At one time the green are preferred to the yellow, at another the opaque to the tranſparent, and at another the oval to the round.

The ſlave-trade, at the time of its ſubſiſtence, may be ſaid to have begun at the great river Senegal, and to extend to the farther limits of Angola, a diſtance of many thouſand miles. On the rivers Senegal and Gambia, the Europeans proceed in their ſhips till they come to a proper ſtation, and then ſend out their boats armed to different villages; and on their approach to them, fire a muſket, or beat a drum, to appriſe the inhabitants that they are in want of ſlaves. The country people ſupply them in part, and they alſo procure them from the large canoes above-mentioned.

The Moors, who inhabit the left bank of the river Senegal, are notorious for depredations of this ſort. They croſs the river without any previous provocation, and make war upon thoſe on the other ſide of it, and bring them in as priſoners, and ſell them at Fort St. Louis for ſlaves. Mr. Kiernan has ſeen the remains of villages, which they had broken up in ſuch expeditions.

Captains Hills and Wilſon, and Mr. Wadſtrom, and lieutenant Dalrymple, inform us, that the kings in this part of the country do not heſitate to make war upon their own ſubjects, when in want of money. They ſend out their ſoldiers in the night, who lying before, or attacking or burning a village, ſeize ſuch as come out of it, and return with them as ſlaves.

On the river Sierra Leona there are ſeveral private factories, belonging to the merchants of Europe, in which their agents, being white people, reſided. Theſe agents kept a number of boats, which were ſent up the river for ſlaves; and thus they procured for the factories a regular ſupply.

On the Windward Coaſt, which reaches from Cape Mount to Cape Palmas, the natives, when they have any ſlaves to ſell, generally ſignify it by fires. Practices ſimilar to thoſe already recited prevail from the river Gambia to the end of the Windward Coaſt. Lieutenant Storey ſays, that public robbery is here called war. Mr. Bowman, another evidence, ſays, that when parties of robbers were ſetting fire to villages, war was ſaid to be carrying on. This account is confirmed by Mr. Town and ſir George Young, and all of them concur in ſtating, that theſe parties go out at night, break up villages, and carry off the inhabitants as ſlaves. Meſſrs. Town, Bowman, and Storey, have ſeen them ſet out upon ſuch expeditions; and the latter, to ſatisfy himſelf, accompanied them on one occaſion. Theſe came to a town in the dead of the night, ſet fire to it, and took away many of the inhabitants. The above practice is ſo common, that both up the river Scaſſus, Sierra Leona, and Junk, and at Cape Mount and Baſſau, the remains of burnt and deſerted villages are to be ſeen, on which ſuch attacks have been made, and that the natives are found to be conſtantly armed. In one of the towns, two or three houſes only are deſcribed to have been left ſtanding, and two plantations of rice, which were ready for cutting down, but which the inhabitants, by being carried off, had been deprived of enjoying. Lieutenant Simpſon, of the royal marines, another evidence, underſtood that the villages on the Windward Coaſt were always at war; and the reaſon given was, that the kings were in want of ſlaves. Mr. Morley, another evidence, ſpeaks in the ſame language. Slaves, he ſays, are generally made by robbers going from village to village in the night.

The Gold Coaſt, which is next to the Windward Coaſt, preſents us with the ſame melancholy ſcene. The Rev. Mr. Quakoo, who had reſided as chaplain to one of the factories there for many years, informed lieutenant Simpſon that wars were often made for the ſole purpoſe of making ſlaves. Dr. Trotter ſays, by priſoners of war, the traders mean ſuch as are carried off by robbers, who ravage the country for that purpoſe; the Buſh-men making war to make trade, being a common way of ſpeaking among them; and in a large cargo of ſlaves, he could only recollect three who had not been ſo obtained. Surgeon Falconbridge defines the term war, when uſed by the ſlave-dealers on this part of the coaſt, to mean a piratical expedition for making ſlaves. Mr. Morley ſays, what they call war, is putting the villages in confuſion, and catching the inhabitants, whom they carry down to the coaſt and ſell, where, it is well known, no queſtions are aſked how they had been obtained. Indeed a ſlave-captain, when examined by the houſe of commons, acknowledged, that he believed a captain would be reckoned a fool by any trading man, to whom he ſhould put ſuch a queſtion. And Mr. Marſh, the reſident at Cape Coaſt caſtle, told Mr. How, that he did not care how the ſlaves he purchaſed had been obtained; and ſhewed him inſtruments which were put into the ſlaves' mouths, to prevent

vent their crying out for aſſiſtance, while the robbers were conveying them through the country.

From the end of the Gold Coaſt to the extremity of Angola, which is the boundary of the ſlave-trade, and which vaſt diſtrict comprehends many navigable rivers, we are ſhocked by the repetition of the ſame atrocious practices. Here, as before, going to towns in the night, ſetting them on fire, and ſeizing the people, or putting the villages in confuſion, and catching the inhabitants, are called *war*. Theſe piratical expeditions are frequently made by water in theſe parts. Mr. Douglaſs ſays, when a ſlave-ſhip arrives, the king ſends his war-canoes up the river, where they ſurpriſe and ſeize all they can. Surgeon Falconbridge, Mr. Morley, and Mr. Iſaac Parker, confirm the account. Up the great rivers Bonny and Calabar the king ſends fleets of canoes, with armed men, which return with ſlaves. Mr. I. Parker was twice up the river Calabar in one of theſe fleets, and perhaps the only white perſon who was ever permitted to go with them. In the day-time, he ſays, when they approached a village, they lay under the buſhes; but at night flew up to it, and ſeized every one they could catch. In this way they proceeded up the river, till they had gotten forty-five perſons, which they brought back to New Town, and ſold to the European ſhips. About a fortnight afterwards, he was allowed to accompany them on another expedition. Here, he ſays, they plundered other villages higher up the river than before, taking men, women, and children, as they could catch them in their huts. They ſeized on much the ſame number, and brought them to New Town, as before.

On the Gold Coaſt, a veſſel ſeeking ſlaves, generally anchors at Annamaboe. A certain quantity of gold muſt be included in the articles deſigned for purchaſing ſlaves, or elſe none can be obtained. At Whidah, Bonny, Calabar, Benin, and Angola, gold is not demanded in exchange; and boats are unneceſſary, except for reaching the ſhore, wooding and watering, and ſervices of a ſimilar kind. This is particularly the caſe at Calabar and Bonny, which have been the greateſt markets for ſlaves. The traders of the firſt claſs, after an abſence of about nine days, have returned frequently with 1500 or 2000 ſlaves at a time.

The number of ſlaves that have been annually tranſported from the African coaſt has fluctuated according to circumſtances. In the year 1768, 104,000 natives of Africa were taken from their own continent; and it continued much the ſame for the next five years. During the American war it was diminiſhed. In the year 1786 the numbers may be ſtated at 100,000, and the ſhips that conveyed them to the colonies at 350. The trade, before the abolition, was confined to the Engliſh, Dutch, Danes, Portugueſe, and French. England, in 1786, employed 130 ſhips, and carried off about 42,000 ſlaves. Theſe were fitted out from the ports of London, Briſtol, and Liverpool; the latter of which alone ſent out 90 veſſels.

The unhappy ſlaves are divided by Mr. Clarkſon into ſeven claſſes. The moſt conſiderable, and that which contains at leaſt half of the whole number tranſported, conſiſts of kidnapped people. This mode of procuring them includes every ſpecies of treachery. Mr. Wadſtrom tells us, that at Dakard lived one Ganna, who was a notorious man-ſtealer, and employed as ſuch by the merchants there. He ſaw a boy and a woman there in confinement, both of whom had been ſtolen. The boy had been privately taken from his parents, in the interior part above Cape Rouge; and the woman from her huſband and children at Ruffſque. He ſaw afterwards many of the natives, who had been thus taken, brought to Goree. At Sallum the king ſent for a poor woman, under pretence of buying her millet, and then ſeized and ſold her. General Rooke, who was governor of Goree, detected three young perſons who had been ſtolen and brought there; and at their requeſt, he ſent them back to their friends. The ſame governor was applied to by three ſlave-captains, to kidnap one hundred and fifty men, women, and children, the king of Cayor's ſubjects, who had come to Goree in conſequence of the friendly intercourſe which had ſubſiſted between him and that king. He refuſed, and was much ſhocked by the propoſition; but the captains ſaid, ſuch things had been done by a former governor of the place. Captain Wilſon ſays, that in his time, when he commanded the Racehorſe ſhip of war, ſuch private robberies were frequent on the continent, oppoſite to Goree. His predeceſſor, captain Lacy, had ſent one of the natives into the country with diſpatches on his Britannic majeſty's account; but the poor man was ſoon way-laid, ſeized, and ſold. Captain Wilſon reſcued him afterwards from the hold of a ſlave-veſſel, where his life had been endangered by the inhumanity of the French captain. So generally prevalent were theſe robberies, that they were acknowledged by all. It was the firſt principle of the natives, never to go out unarmed while a ſlave-veſſel was upon the coaſt, for fear of being ſtolen. When he has met them armed, and enquired the reaſon, they have pointed to a ſhip of this deſcription then lying at Portudal, and ſaid, their fears aroſe from that quarter. Captain Hills, when he commanded the Zephyr ſloop of war on the ſame part of the coaſt, came to the knowledge of facts ſimilar to thoſe related. He tells us, he knew the ſame Ganna mentioned by Mr. Wadſtrom, and that this very Ganna offered him a young man for ſale, whom he had kidnapped; and that all the natives went armed, for fear of being ſo taken. Captain Hills, while lying in the river Gambia, expreſſed a wiſh, in the hearing of the black pilot, to obtain a few black volunteers for his ſhip. Upon this the black pilot called to two boys, who were on the ſhore carrying baſkets of ſhallots, and aſked captain Hills if he thought the boys would ſuit him; in which caſe, he would take them off, and bring them on board. The captain declined taking them. The black pilot appeared much mortified, and ſaid that the merchantmen would not have refuſed ſuch an offer. On the Windward Coaſt, robbery of this kind was ſo notorious, that, according to ſir George Young and captain Thompſon, it went by a diſtinct name. It was there called *panyaring*. Many are the inſtances teſtified in the evidence of this kind of depredation, and this all over the coaſt. Let the following ſuffice. At Sierra Leona a beautiful boy is ſtolen. Off Galenas a trader, returning home with goods, is ſeized by the way, and ſold. Lower down a young man is ſurpriſed on the beach, and diſpoſed of in the ſame manner. Off Piccanini Seſtus not only a young girl is kidnapped, but her kidnapper is ſeized in turn, and ſold to the ſame veſſel. To the right of Piccanini Seſtus a young man is invited to a feaſt, and then betrayed and enſlaved. A little farther on, a countryman, having occaſion to go to a black trader's houſe, the trader aſks him if he had ſeen a ſhip: the other replying, no; he then engages to ſhew him one. Taking him on board a veſſel, he receives the money for him, and leaves him there. A young woman comes out of the woods at Bonny Point to bathe: robbers watch her, and then ſeize her, and ſell her. Three perſons, croſſing the river Benin, are overtaken by a black trader and his people in one of their large canoes, and carried to a ſhip, and ſold. On the other ſide of the river Benin, a woman is kidnapped, as ſhe is returning from a viſit; and a father and his ſon, as they are planting yams for food; and all of them paſſed down to the ſhore, and diſpoſed of in the ſame manner.

The ſecond order of ſlaves, and that not inconſiderable, conſiſts of thoſe whoſe villages have been depopulated for obtaining them. The third claſs conſiſts of ſuch as have been ſaid to be convicted of crimes. Captain Wilſon ſays, that ſuch as are ſold on this account are ſold for the benefit of their kings or judges. On aſking king Damel's officer, who had brought down a culprit for ſale, whether the man was guilty of the crime imputed to him, he was anſwered by the officer, that this was of no conſequence. Mr. Town ſays, it is not uncommon to impute crimes falſely, or to bring on palavers, that is, accuſations or trials, in order to make ſlaves. Mr. Morley remembers a woman ſold on pretence of adultery at Old Calabar; and in the river Ambris, ſays Mr. Falconbridge, a king's officer wanting brandy and other goods, but having no ſlave with which to purchaſe them, accuſes a man of extortion in the ſale of his fiſh, and after a ſummary trial on the ſpot, procures him to be condemned and ſold.

The fourth claſs includes priſoners of war; being either ſuch as are the produce of wars that have originated in common cauſes; or ſuch as have been ſupplied by wars made ſolely for the purpoſe of obtaining them. The fifth claſs comprehends thoſe who are ſlaves by birth. Some traders on the coaſt, it is ſaid, who have ſlaves in their poſſeſſion, make a practice of breeding from thoſe, for the purpoſe of ſelling to others. After having been brought up to a certain age, they are reckoned ſaleable. The ſixth claſs is compoſed of thoſe, who have ſacrified their liberty to gaming. The ſeventh and laſt claſs conſiſts of thoſe, who having run into debt, are ſeized according to the laws of the country, and ſold to their creditors. The two laſt claſſes are very inconſiderable, and ſcarcely deſerve mention.

Having loſt their liberty in one or other of the ways now deſcribed, they are conveyed to the banks of the rivers, or to the ſea-coaſt. Some are found to have belonged to the neighbourhood; others to have lived farther up the country; and others in very diſtant parts. It has been calculated, that ſome of the latter have been brought 1000 miles from their homes. Of thoſe who come from a diſtance, many have travelled by water, many have been made to walk alſo over land. Theſe march in droves, or cauffles, as they are called. They are ſecured from riſing or running away, by pieces of wood, which attach the necks of two and two together; or by other pieces, which are faſtened by ſtaples to their arms. They are made to carry their own water and proviſions, and ſome of them elephants' teeth, and other commodities, which their maſters may have picked up on their route. They are watched and followed by drivers, who make the weak keep up with the ſtrong. As they paſs through different places, others, who have been reduced to ſlavery in a ſimilar manner, are purchaſed, and added to the cauffle. Many in theſe cauffles ſpeak different languages, and cannot at all underſtand one another.

When they reach the banks of the rivers on the coaſt, they are offered for ſale: ſome to land factories, or depots kept for that purpoſe by the Europeans; others, where the rivers are ſmall and ſhallow, to ſhips' boats and tenders, which are conſtantly plying about to purchaſe them; and others immediately to the ſhips themſelves. In the rivers Senegal and Gambia, from ten to forty are brought down at a time; in the rivers Bonny and Calabar, from a thouſand to fifteen hundred; and on the Windward Coaſt, perhaps a ſolitary individual, or only two or three at a time; ſo that ſlaving, as it is called, is very tedious in that quarter. All thoſe, who are thus offered for ſale, undergo previous examination by a ſurgeon; and none are taken but ſuch as are free from diſorder, and in the prime of life. Indeed 25 years of age is the ſtandard, beyond which the purchaſers do not like to take them. In making their bargains, the goods as well as the ſlaves are valued by a medium, which is known to the parties concerned. From Senegal to the end of the Windward Coaſt, this medium is called a bar both by African and European brokers; on the Gold Coaſt and at Whidah, an ounce; at Calabar, a copper; at Benin, a pawn; and at Angola, a piece. Thus every ſlave is valued at ſo many bars, ounces, &c. Every piece of goods, every barrel of powder, every knife and cutlaſs, is valued in like manner. One article is marked half a bar or ounce; another a whole bar or ounce; another five, ten, twenty, and ſo on. By means of this arrangement, the bill is eaſily made out on both ſides. The Europeans reckon the amount by pen and ink; the Africans by ſmall ſtones or beads. Some of the latter, however, reckon entirely by their heads, and are found to be correct.

When the ſlaves are conveyed to the ſhore, they are carried in boats to the different ſhips whoſe captains have purchaſed them. The men are immediately confined two and two together, either by the neck, leg, or arm, with fetters of ſolid iron. They are then put into their apartments; the men occupying the fore-part, the women the after-part, and the boys the middle of the veſſel. The tops of theſe apartments are grated for the admiſſion of light and air, and they are ſtowed like any other lumber, occupying ſuch quantity of room as has been allotted to them. Many of them, whilſt the ſhips are waiting for their full lading, and whilſt they are near their native ſhore, from which they are to be ſeparated for ever, have manifeſted great appearance of oppreſſion and diſtreſs; and in ſome caſes have recurred, for apprehended relief, to ſuicide; others have been affected with delirium and madneſs; others, again, have been actuated by a ſpirit of revenge, and have reſolved on puniſhing their oppreſſors at the hazard of their own lives. In the day-time, if the weather be fine, they are brought upon deck for air. They are placed in a long row of two and two together, on each ſide of the ſhip; a long chain is then made to paſs through the ſhackles of each pair, by which means each row is at once ſecured to the deck. In this ſtate they take their meals, which conſiſt chiefly of horſe-beans, rice, and yams, with a little palm-oil and pepper. Captain Hall informs us, that they are made, after meals, to jump as high as their fetters will let them, on beating a drum. If they refuſe, they are whipped till they comply. This the ſlave-merchants call dancing. Surgeon Falconbridge explains to us the reaſon of this cuſtom, by ſtating that the ſlaves are compelled to jump for exerciſe; and ſurgeon Claxton ſays, that the parts on which the ſhackles are faſtened, are often excoriated by the violent exerciſe they are forced to take: and of this they made many grievous complaints to him. In the ſame manner the ſong is ſaid to be promoted among them; whereas all their ſongs, ſays ſurgeon Falconbridge, Mr. Morley, ſurgeon Claxton, Mr. Elliſon, and others, are of a melancholy nature, conſiſting of lamentations for the loſs of their country and of their friends.

When the number of ſlaves is completed, the ſhips weigh anchor, and begin what is termed the *Middle* paſſage, to carry them to their reſpective colonies. The veſſels in which they are tranſported are of different dimenſions, from 11 to 800 tons, and they carry from 30 to 1500 ſlaves at a time. The height of the apartments is different, according to the ſize of the veſſel, but may be ſtated to be from ſix feet to leſs than three; ſo that it is impoſſible to ſtand erect in moſt of the veſſels that tranſport them, and in ſome ſcarcely to ſit down in the ſame poſture.

When the veſſel is full, their ſituation is truly pitiable. A grown-up perſon is allowed, in the beſt regulated ſhips, but ſixteen Engliſh inches each in width, two (Engliſh) feet eight inches in height, and five feet eleven inches in length; or, as ſurgeon Falconbridge expreſſes himſelf, not ſo much room as a man has in his coffin. Surgeon Wilſon deſcribes the ſlaves as much crowded below. He generally took off his ſhoes before he went down among them, and was obliged to be very cautious how he walked, leſt he ſhould tread upon them. Captain Knox admits, that they had not room to lie on their backs. It alſo appears, that if they are the leaſt dilatory or reluctant in packing themſelves, they are quickened by the application of the whip. Dr. Trotter ſays, they are ſo crowded below, that it is impoſſible to walk through them without treading on them; and alſo, that it is the firſt mate's duty to ſee them ſtowed or packed together. Thoſe who do not get quickly into their places, are compelled by a cat-o'-nine-tails. But now their ſituation becomes too wretched to be deſcribed. No language has words to explain it properly. Captain Hall has often heard them cry out from below for want of air. The ſpace between decks was ſo hot, that often, after he has been there but a few minutes among them, he found his ſhirt ſo wetted by perſpiration, that he could have wrung it. Mr. Elliſon ſays, that the ſteam from their confined bodies below comes up through the gratings like a furnace. Surgeon Wilſon has often heard them complain of heat. The bad effects, which reſulted from this and their confinement, were weakneſs and fainting. He has ſeen ſome die a few minutes after being brought up, which proceeded from corrupted air and heat jointly. He has ſeen others go down apparently well at night, and found them dead in the morning. He had an hoſpital on board, but the ſick ſlaves were obliged to lie on the bare boards, ſo that the motion of the veſſel often occaſioned excoriations from the prominent parts of their bodies. Surgeon Falconbridge declares, that he has known ſlaves go down apparently in health, and brought up dead in the morning. He once opened one of them ſurgically, to diſcover with certainty what was the cauſe of his death; and found, from the appearance of the thorax and abdomen, that it was from ſuffocation. He ſays, that once on going below, he found that twenty of the ſlaves had fainted. He got them inſtantly hauled up on deck; but notwithſtanding the quickneſs of his movements on this occaſion, two or three of them died. And once, though he was only fifteen minutes in their room below, he became ſo ill himſelf, that he could not get up again to the deck without help; and he never was below many minutes together, but his ſhirt was as wet as if it had been dipt in water. He ſays alſo, that as the ſlaves, whether well or ill, always lie on the bare planks, the motion of the ſhip rubs the fleſh from the prominent parts of their body, and leaves the bones almoſt bare. And when the ſlaves have the flux, which is frequently the caſe, the whole place becomes covered with blood and mucus, like a ſlaughter-houſe; and as they are fettered and wedged cloſe together, the utmoſt diſorder ariſes from endeavours to get to three or four tubs, which are placed among them for neceſſary purpoſes: and this diſorder is ſtill further increaſed, by the healthy being not unfrequently chained to the diſeaſed, the dying, and the dead. Dr. Trotter, ſpeaking on the ſame ſubject, gives us an equal melancholy account. When the ſcuttles, ſays he, in the ſhip's ſides, are obliged to be ſhut in bad weather, the gratings are not ſufficient for airing the rooms. He never himſelf could breathe freely below, unleſs immediately under the hatchway. He has ſeen the ſlaves drawing their breath with all that laborious and anxious effort for life, which are obſerved in expiring animals, ſubjected by experiment to foul air, or in the exhauſted receiver of an air-pump. He has alſo ſeen them, when the tarpaulings have been thrown over the gratings, attempting to heave them up, crying out, in their own language, *Kickeraboo, kickeraboo*, that is, “We are dying.” Moſt of them have been recovered, by being brought upon deck; but ſome have periſhed, and this entirely by ſuffocation, as they had no previous ſigns of indiſpoſition.

The ſlaves, after having been ſtowed, ſoon begin to experience the effects that might be naturally expected from their ſituation. The peſtilential breath of many in ſo confined a ſtate renders them ſickly, and the viciſſitude of heat and cold generates a flux. Several die, and others are induced to deſtroy themſelves, or to revenge themſelves on their oppreſſors. The ſhips, having completed the middle paſſage, anchor in their deſtined ports; and the unhappy Africans on board are prepared for ſale. Some are conſigned to brokers, who ſell them for the ſhips. With this view they are examined by labourers, who want them for their farms; and in the ſelection of them, friends and relations are parted without any conſideration; and when they part with mutual embraces, they are ſevered by a laſh. Another mode of ſale is by vendue; in which caſe, they are carried to a tavern, or other public place, where, being put up to ſale, they become the property of the higheſt bidder. Theſe are uſually ſuch as are in a ſick and emaciated ſtate, and are generally ſold for a few dollars. The third mode of ſelling them is by the “ſcramble.” In this caſe, the main and quarter-decks of the ſhip are darkened by ſails, which are hung over them at a convenient height. The ſlaves are then brought out of the hold, and are made to ſtand in the darkened area. The purchaſers, who are furniſhed with long ropes, ruſh, as ſoon as the ſignal is given, within the awning, and endeavour to encircle as many of them as they can.

Theſe ſcrambles, however, are by no means confined to the ſhips. They are made frequently on the ſhore. When the latter happens to be the caſe, the unhappy objects of them are ſhut up in an apartment, or court-yard, the doors of which being thrown open, the purchaſers ruſh in, with their ropes in their hands, as before deſcribed.

Nothing can exceed the terror which the wretched Africans exhibit on theſe occaſions. An univerſal ſhriek is immediately heard. All is conſternation and diſmay. The men tremble. The women cling together in each other's arms. Some of them faint away, and others have been known to expire. If any thing can exceed the horror of ſuch a ſcene, it muſt be the iniquity of valuing a part of the rational creation in ſo debaſed a light, and of ſcrambling for human fleſh and blood.

During the time that elapſes from the ſlaves being put on board, on the African coaſt, to the time when the receivers leave the colonies, after having diſpoſed of their cargoes, about 25,000 lives are deſtroyed, *i. e.* one-fifth, or nearer one-fourth of the number put on board. About 20,000 of thoſe who are annually imported die during the “ſeaſoning;” which ſeaſoning is ſaid to expire, when the firſt two years of ſervitude are completed. This is the time which an African muſt take to be ſo accuſtomed to the colony, as to be able to endure the common labour of a plantation, and to be put into the *gang*. From the period when their ſeaſoning terminates, their ſituation is as follows. They are ſummoned at five in the morning to begin their work. This work may be divided into two kinds, the culture of the

the fields, and the collection of graſs for cattle. The laſt is the moſt laborious and intolerable employment; as the graſs can only be collected blade by blade, and is to be fetched frequently twice a day at a conſiderable diſtance from the plantation. In theſe two occupations they are jointly taken up, with no other intermiſſion than that of taking their ſubſiſtence twice, till nine at night. They then ſeparate for their reſpective huts, when they gather ſticks, prepare their ſupper, and attend their families. This employs them till midnight, when they go to reſt. Such is their daily way of life for rather more than half the year. They are ſixteen hours, including two intervals at meals, in the ſervice of their maſters: they are employed three afterwards in their own neceſſary concerns; five only remain for ſleep, and their day is finiſhed.

During the remaining portion of the year, or the time of crop, the nature, as well as the time, of their employment is conſiderably changed. The whole gang is generally divided into two or three bodies. One of theſe, beſides the ordinary labour of the day, is kept in turn at the mills, that are conſtantly going, during the whole of the night. This is a dreadful encroachment upon their time of reſt, which was before too ſhort to permit them perfectly to refreſh their wearied limbs, and actually reduces their ſleep, as long as this ſeaſon laſts, to about three hours and an half a night, upon a moderate computation. Thoſe who can keep their eyes open during their nightly labour, and are willing to reſiſt the drowſineſs that is continually coming upon them, are preſently worn out; while ſome of thoſe, who are overcome, and who feed the mill between ſleeping and being awake, ſuffer, for thus obeying the calls of nature, by the loſs of a limb; a hand or arm being frequently ground off. In this manner they go on, with little or no reſpite from their work, till the crop ſeaſon is over, when the year (from the time of our firſt deſcription) is completed. They are badly clothed, and very ſcantily fed; and on ſome plantations treated with great ſeverity.

The condition and treatment of the Africans are juſtified by the aſſertion, that they are an inferior link of the chain of nature, and made for ſlavery. Accordingly the inferiority of their capacities has been urged, and alſo their inability for any mental exertions and attainments. But inſtances of genius and of improvement, and of ſkill in the mechanical arts, have been adduced, both among the ancients and moderns, ſufficient to refute this objection. Some have inferred their inferiority in the ſcale of nature, from their colour. We refer thoſe, who wiſh to ſee this argument diſcuſſed, to Mr. Hume's Eſſays, Eſſ. xxi. p. 222, note M; Dr. Beattie's Eſſay on Truth; and Clarkſon's Eſſay, &c.

Sir George Young and captain Thompſon, both of the royal navy, and the reverend Mr. Newton, and ſurgeons Falconbridge and Wilſon, who were ſeverally called upon for their public teſtimony on this ſubject, all declare, that the capacities of the Africans are good; and that they would be equal, under equal advantages, to thoſe of the Europeans.

Mr. Wadſtrom, another of thoſe examined, who travelled on diſcovery in Africa, by order of the king of Sweden, aſſerts the ſame thing; for he ſays, they are as capable of improvement as the whites. He found among them perſons who could manufacture gold and iron. Others made cloth and leather with neatneſs, dyeing the former, and tanning the latter. Others made indigo, ſalt, ſoap, and earthenware, with conſiderable ſkill. He offered to produce different ſpecimens of their work.

This account of their capacity and manufacture is corroborated by captain Wilſon of the royal navy, lieutenant Dalrymple of the army, and Mr. Kiernan, three other witneſſes, all of whom viſited the ſame part of the coaſt.

Of their ſenſibility, ſeveral inſtances occur in the evidence. Mr. Wadſtrom is convinced that they ſurpaſs in affection ſuch of the Europeans as he has known, and that they are honeſt and hoſpitable. He has been among them without fear, though alone, and was always treated by them with civility and kindneſs. Captain Wilſon ſays, that they are grateful and affectionate; that when he was many miles up their country, alone and unprotected, they treated him moſt kindly, vying with each other in entertaining him, and ſhedding tears at his departure. Captain Thomſon, before mentioned, lieutenant Storey of the royal navy, lieutenant Dalrymple, Mr. How, the botaniſt, Mr. Towne, and captain Hall of the merchants' ſervice, concur in deſcribing them as harmleſs, friendly, hoſpitable, juſt and punctual in their dealings, and as capable of virtuous actions as the reſt of mankind. Mr. Bowman, who reſided among them as a trader, found them good and honeſt, friendly and hoſpitable, induſtrious, diſpoſed to trade, raiſing rice for ſale. They ſaid, they ſhould like to trade with good white men, and would ſoon raiſe more plantations of rice. Captain Hills of the royal navy has ſeen them raiſing proviſions, and dreſſing their corn. They appeared to him to poſſeſs great ſenſibility. Several of them ſpoke good French and Engliſh.

This is the character given of them by the witneſſes now mentioned. It is melancholy, however, to obſerve, that as they become acquainted with the European ſlave-traders, their diſpoſition ſeems to be changed; and that they are beſt, where they have the leaſt intercourſe with the latter. Lieutenant Storey tells us, they are more honeſt inland than upon the coaſt. Mr. Towne, who was three or four hundred miles up the country, ſays, the natives are hoſpitable, kind, and ready at learning languages; that in the inland country they are innocent, but, on the coaſt, their intercourſe with Europeans has made them adepts in roguery, and taught them to plunder, and pick up one another to ſell. Dr. Trotter, phyſician, ſays, that they are ſuſceptible of all the ſocial virtues. He has known inſtances of feeling equal to thoſe of any civilized people whatever, and has ſeen no bad habits but among thoſe engaged in trade with white men. Captain Hall found cultivation in the higheſt ſtate at Fernandipo, where they had no trade in ſlaves. Mr. How, the botaniſt, had been upon almoſt every Britiſh ſettlement, and always found the culture in a higher degree, where there was but a little of the ſlave-trade; and juſt the reverſe, where it prevailed. The reverend Mr. Newton ſays, the beſt people were thoſe who had the leaſt intercourſe with the Europeans; and they were worſe, in proportion to their acquaintance with us; and when charged with a crime, would ſay, "Do you think I am a white man?" He lived alone among the Sherbro people in ſafety, who were friendly and civilized. Lieutenant Dalrymple ſtates, that in natural capacity the Africans equal any people whatever. They are humane, hoſpitable, and well diſpoſed. He apprehends, that if they had a proper market for their produce, they would be as induſtrious as any Europeans; for where there was no ſlave-trade, they were very induſtrious, manufacturing cotton-cloth, working in gold, ſilver, and iron, and alſo in wood and leather, making ſaddles, bow-caſes, ſcabbards, and other articles.

It appears from the above account, that the Africans are perſons of the like feelings as ourſelves; that they have the ſame intellectual powers, and the ſame capability of improvement; the ſame ſocial diſpoſitions, and the ſame moral qualifications; but that they are more or leſs innocent,

nocent, as they have more or leſs connection with the Europeans.

To one argument that has been alleged in favour of ſlavery, we wiſh to direct the attention of our readers, before we cloſe this article. It has been ſaid, that ſlavery was not formally aboliſhed by the goſpel, and that it therefore continued for a long time after the introduction of Chriſtianity. It has been ſaid, that St. Paul, having converted Oneſimus to the Chriſtian faith, who was a fugitive ſlave of Philemon, ſent him back to his maſter. This circumſtance has furniſhed the receivers with a plea, that Chriſtianity encourages ſlavery. But they have not only ſtrained the paſſages which they produce in ſupport of their aſſertions, but are ignorant of hiſtorical facts. The benevolent apoſtle, in the letter which he wrote to Philemon, the maſter of Oneſimus, addreſſes him to the following effect: "I ſend him back to you, but not in his former capacity, not now as a ſervant, but above a ſervant, a brother beloved. In this manner I beſeech you to receive him, for though I could enjoin you to do it, yet I had rather it ſhould be a matter of your own will, than of neceſſity."

It appears that the ſame Oneſimus, when he was ſent back, was no longer a ſlave, that he was a miniſter of the goſpel, that he was joined with Tychicus in an eccleſiaſtical commiſſion to the church of the Coloſſians, and was afterwards biſhop of Epheſus. If language, therefore, has any meaning, and if hiſtory has recorded a fact which may be believed, there is no caſe more oppoſite to the doctrine of the receivers, than this which they produce in its ſupport.

It is ſaid again, that Chriſtianity, among the many important precepts which it contains, does not furniſh us with one for the abolition of ſlavery. But the reaſon is obvious. Slavery, at the time of the introduction of the goſpel, was univerſally prevalent, and if Chriſtianity had abruptly declared, that the millions of ſlaves ſhould have been made free, who were then in the world, it would have been univerſally rejected, as containing doctrines that were dangerous, if not deſtructive, to ſociety. In order, therefore, that it might be univerſally received, it never meddled, by any poſitive precept, with the civil inſtitutions of the times: but though it does not expreſsly ſay, that "you ſhall neither buy, nor ſell, nor poſſeſs a ſlave," it is evident that, in its general tenor, it ſufficiently militates againſt the cuſtom.

The firſt doctrine which it inculcates is that of brotherly love. It commands good will towards men. It enjoins us to love our neighbour as ourſelves, and to do unto all men, as we would that they ſhould do unto us. And how can any man fulfil this ſcheme of univerſal benevolence, who reduces an unfortunate perſon, againſt his will, to the moſt inſupportable of all human conditions; who conſiders him as his private property; and treats him, not as a brother, nor as one of the ſame parentage with himſelf, but an animal of the brute creation?

But the moſt important doctrine is that, by which we are aſſured that mankind are to exiſt in a future ſtate, and to give an account of thoſe actions which they have ſeverally done in the fleſh. This ſtrikes at the very root of ſlavery. For how can any man be juſtly called to an account for his actions, whoſe actions are not at his own diſpoſal? This is the caſe with the *proper* ſlave. His liberty is abſolutely bought and appropriated; and if the purchaſe is juſt and equitable, he is under the neceſſity of perpetrating any crime, which the purchaſer may order him to commit; or, in other words, of ceaſing to be accountable for his actions.

Theſe doctrines, therefore, are ſufficient to ſhew, that ſlavery is incompatible with the Chriſtian ſyſtem. The Europeans conſidered them as ſuch, when, at the cloſe of the twelfth century, they reſiſted their hereditary prejudices, and occaſioned its abolition. Hence one, among many other proofs, that Chriſtianity was the production of infinite wiſdom; that though it did not take ſuch expreſs cognizance of the wicked national inſtitutions of the times, as ſhould hinder its reception, it ſhould yet contain ſuch doctrines, as, when it ſhould be fully eſtabliſhed, would be ſufficient for the abolition of them all. See Clarkſon's Eſſay on the Slavery and Commerce of the human Species, paſſim.

SLAVE-TRADE, *Abolition of the.* It is a circumſtance favourable to the hiſtorian, that this great work was never regularly attempted till our own times; becauſe the facts relating to it being freſh in every one's memory, an opportunity has been afforded him of examining them, and of eſtimating their truth: hence poſterity will have the advantage of having more than uſually accurate ſtatements on the ſubject. Mr. Thomas Clarkſon, a gentleman now living, who was among the warmeſt patrons of this ſacred cauſe, has publiſhed an account of the different meaſures purſued to promote it. Theſe were regiſtered at the time, either by himſelf, or the eſtimable committee which acted in concert with him. His hiſtory, in two volumes octavo, has been now more than ſix years before the public, and not the ſhadow of a doubt has been expreſſed as to the authenticity of any thing aſſerted therein; we cannot, therefore, we conceive, hand down information on this great ſubject in a more ſatisfactory manner, than by giving to the reader a conciſe abridgment of the work itſelf.

The great work of the abolition, according to Mr. Clarkſon, was not the entire produce of his own day. It was too mighty to have been accompliſhed, either by a few individuals, or in a ſhort period of time: it was neceſſary that men's minds ſhould have been previouſly inſtructed and prepared: hence, from the very beginning of the infamous traffic, to the time when he became a public actor in the ſcene of its ſuppreſſion, which was in the year 1787, there had not been wanting good men to lift up their voices againſt it: and as the ſentiments of theſe, who were moſt of them authors, had been given to the public in their reſpective works, either in poetry or proſe, for a long ſucceſſion of years, hundreds of perſons had been then taught in England to condemn it. Theſe, that is, the good men juſt alluded to, Mr. Clarkſon conſiders as ſo many neceſſary forerunners (indeed he gives them that title); and conſiders them alſo, though moſt of them lived before his own time, as ſo many coadjutors in the work. The firſt mentioned are cardinal Ximenes, the emperor Charles V., pope Leo X., queen Elizabeth of England, and Louis XIII. of France; concerning all of whom he gives anecdotes in ſupport of the title thus given them.

Having ſpoken firſt of the men in power, Mr. Clarkſon divides the forerunners who walked in humbler life into four claſſes. The firſt conſiſts principally of perſons in England, of various religious deſcriptions, who bore their teſtimony againſt the trade in their ſucceſſive writings up to the year 1787. Among the poets were Pope, Thomſon, Shenſtone, and Cowper; among the divines, biſhop Warburton, Rd. Baxter, Beattie, Weſley, Whitfield, Wakefield, and Paley; among the others, were Monteſquieu, Hutchinſon, Wallis, Burke, Poſtlethwaite, Day, Hartley, Millar, and Granville Sharp. The latter, however, is to be particularly diſtinguiſhed from the reſt, and alſo to be borne in mind; for whereas the others had only handed down the traffic in queſtion as infamous, by the mention made of it in their reſpective works, this good man ſpent whole years in bringing the cruelty and wickedneſs of it into public notice. He tried, at his own expence, the famous caſe of Somerſet, and ſeveral others, in our courts of law. He was, in fact, the firſt labourer in the cauſe. He began to be the public advocate of the oppreſſed Africans in 1765, and was waiting for opportunities for farther exertion in 1787, the particular epoch before-mentioned.

The ſecond claſs conſiſts of the Quakers in England. This eſtimable ſociety paſſed a public cenſure upon the traffic at their yearly meeting in London, in 1727. This they followed up, by other reſolutions as a body, in 1758, 1761, 1763, and 1772, when they had become principalled againſt it as againſt a crime of the deepeſt dye. In 1783 they petitioned parliament againſt its continuance. In this year certain members of the ſociety thought it their duty to make their fellow countrymen at large acquainted with the horrible nature of it: theſe were, Thomas Knowles, George Harriſon, Samuel Hoare, John Lloyd, Joſeph Woods, and William Dillwyn. They formed themſelves into a committee in London for this purpoſe; they wrote and circulated books; they conveyed alſo information on the ſubject through the London and country newſpapers. It was not known, however, from whom the information came, as their names were concealed from the public. In this manner they continued to work their way from 1783 to 1787.

The third claſs conſiſts of the Quakers and others in North America. The Quakers there entertained the ſame opinion as their brethren in England on this ſubject. In 1696 and in 1711, they condemned, as a religious body, this cruel traffic; and in 1754, 1755, 1774, 1776, and 1778, they not only paſſed reſolutions againſt it, as far as their own members were concerned, but alſo againſt ſlavery itſelf. In proceſs of time, however, individuals roſe up out of this benevolent body, and became public labourers in the cauſe of the unhappy Africans. The two principal of theſe were John Woolman and Anthony Benezet. The former travelled many hundred miles on foot, to converſe with planters, and others, on the iniquity of holding their fellow creatures in bondage; and the latter laboured for years in collecting information concerning Africa and the ſlave-trade, and in handing it to the world. At this time other people, of other religious denominations, came forward in North America, and contributed to increaſe the odium which the Quakers had been the firſt to excite there againſt the traffic; when, in 1774, James Pemberton, a pious Quaker in Pennſylvania, and Dr. Ruſh, an eminent phyſician, and a man of weight among the Preſbyterians in the ſame province, formed a committee, in which perſons of different religious ſects joined for the purpoſe of aboliſhing both the ſlave-trade and ſlavery on their own continent. This committee was obliged to ſuſpend its operations during the war with Great Britain, but afterwards reſumed its functions. In 1787 it added conſiderably to its numbers, and took in, among others, the celebrated Dr. Franklin, who was its firſt preſident in its renovated ſtate.

It will be proper to ſtop here, and to interrupt the thread of the hiſtory for a moment. It has appeared, from what has been ſaid above, firſt, that Mr. Granville Sharp, the moſt conſpicuous member of the firſt of the claſſes now mentioned, was alive in 1787, and then waiting for an opportunity of exerting himſelf farther in behalf of the injured Africans; ſecondly, that of the ſecond claſs, William Dillwyn was one of a committee for the ſame object in the ſame year; and, thirdly, that James Pemberton was alſo alive in the very ſame year, and a very conſpicuous member of the third. Now it happened that William Dillwyn, who had been born and long reſident in America, had been in habits of intimate friendſhip with James Pemberton; and that in conſequence of his acquaintance alſo with the venerable Anthony Benezet, he had been introduced, by means of a letter from him, upon coming to England, to Mr. Granville Sharp. Here then we find that a member of the ſecond claſs was accidentally known to a member of the firſt, and alſo to a member of the third: thus we ſee how eaſily William Dillwyn might be made the medium through whom the members of all the claſſes might be eaſily united, if a fit occaſion ſhould offer.

To return, we come now to the fourth claſs of forerunners. The firſt in this claſs was Dr. Peckard, maſter of Magdalen college, in the univerſity of Cambridge. This gentleman had not only cenſured the ſlave-trade in the ſevereſt manner, in a ſermon preached before the univerſity itſelf; but when he became vice-chancellor of it, in 1785, he gave out the following ſubject for one of the bachelors' prizes, "Anne liceat invitos in ſervitutem dare?" or, "Is it right to make ſlaves of others againſt their will?" At this time Mr. Thomas Clarkſon, before-mentioned, who had obtained the bachelor's prize of the former year, determined to become a candidate for that of the preſent. He took prodigious pains to make himſelf maſter of the ſubject, as far as the time would allow, both by procuring proper books, and by ſeeing as many perſons as he could of thoſe who had been in Africa, and who had become in any degree acquainted with the nature of the ſlave-trade. Having thus gained a conſiderable ſtock of neceſſary information, he wrote his Latin eſſay, and having ſent it in to the vice-chancellor, he ſoon found himſelf honoured with the firſt prize. After this, being then in London, he went down to Cambridge at the time of the commencement, in order to read it publicly, as is uſual, in the ſenate-houſe. The next day he returned towards London: he was then on horſeback; but while upon the road the ſubject of the eſſay entirely engroſſed his thoughts; he became at times ſeriouſly affected as he travelled on. He once ſtopped his horſe, and diſmounted and ſat down on a bank by the roadſide. Here he tried to perſuade himſelf, that the contents of the eſſay which he had read in the ſenate-houſe the day before, were not true. The more, however, he reflected upon the authorities on which he knew them to be founded, the more he gave them credit; and the more he gave them credit, the more he was convinced that it was an imperious duty in ſome one to endeavour to ſee the ſufferings of the unhappy Africans to an end. Agitated in this manner, he reached London. This was in the ſummer of 1785. In the autumn of the ſame year, he found himſelf often ſimilarly exerciſed; till at length he began to have ſerious thoughts of devoting his life to the cauſe of injured Africa. Being then but twenty-four years of age, he conſidered his youth and his want of knowledge of the world as a great obſtacle. Many other circumſtances occurred to diſcourage him. He thought, however, that there was one way, in which he might begin to be uſeful to the cauſe; namely, by tranſlating his Latin eſſay, and publiſhing it in Engliſh. Accordingly he began the work, and having finiſhed it, he was looking out for a publiſher, when he accidentally met an old friend of his family, who belonged to the religious ſociety of the Quakers. This gentleman, of his own accord, aſked him why he had not publiſhed his prize eſſay in Engliſh. Many of his brethren (the Quakers), he ſaid, were anxiouſly expecting it. Upon farther converſation, this gentleman introduced Mr. Clarkſon to Mr. Phillips, a bookſeller in George-yard, Lombard-ſtreet, and who was alſo of the religious ſociety before-mentioned; at which interview it was agreed that the latter ſhould immediately publiſh the work. In a ſhort time after this, Mr. Phillips introduced Mr. Clarkſon to Mr. Dillwyn of Walthamſtow, one of the ſecond claſs of coadjutors before-mentioned, with whom he ſpent the day. Here it was that he heard for the firſt time of the labours of Mr. Granville Sharp. But how ſurpriſed was he to learn that Mr. Dillwyn had two years before aſſociated himſelf with five others (as has been already mentioned), for the purpoſe of enlightening the public mind in England on this great ſubject. How aſtoniſhed was he to find that a ſociety had been formed in North America for the ſame purpoſe, with ſome of the principal of which Mr. Dillwyn was himſelf acquainted. He was almoſt overwhelmed with the thoughts, which darted upon him on this occaſion. He could not but conſider that he had been providentially led to Mr. Dillwyn's houſe; that the day-ſtar of African liberty was riſing; and that probably he himſelf might be now permitted to have the honour of becoming an humble inſtrument in promoting it. Soon after this he was introduced to the venerable Mr. Sharp, the laſt and moſt eminent of the ſecond claſs of coadjutors, and ſoon after this his work came out under the title of "An Eſſay on the Slavery and Commerce of the human Species, particularly the African, which was honoured with the firſt Prize in the Univerſity of Cambridge, for the Year 1785." The work having been now uſhered into the world, (this was in June 1786,) Mr. Clarkſon reſolved upon the diſtribution of it in the moſt ſelect manner he could, in order that the caſe of the unhappy Africans might be known by thoſe who had in ſome degree the power of relieving them. Accordingly, at his requeſt, Dr. Baker, a moſt exemplary clergyman in London, lord and lady Scarſdale, ſir Charles and lady Middleton, and Mr. Bennet Langton, the intimate friend of Dr. Johnſon, of Jonas Hanway, of ſir Joſhua Reynolds, of Edmund Burke, and of other celebrated perſons, undertook to diſtribute copies of it perſonally among their own friends, in the higher ranks of life, and to uſe their intereſt in procuring a peruſal of them. Under their auſpices the book was firſt introduced into the polite world. The mind, however, of the author became daily more and more agitated on the ſubject of it. He was not ſatisfied that what he was then doing was all that was neceſſary to be done; or that it was all that was required of him. To make the caſe of the unhappy Africans known, was deſirable as a firſt ſtep; but would this of itſelf put a ſtop to the horrors of the trade? He believed not: he believed there would be no hope of ſucceſs, unleſs ſome one would reſolve to make it the buſineſs of his life. The queſtion then was, was he himſelf called upon to do it? His own peace of mind required that he ſhould give a final anſwer to this queſtion. To do this he retired frequently into ſolitude. The reſult was, after the moſt mature deliberation, and the moſt painful ſtruggle, that he determined to devote his whole life, ſhould it be neceſſary, to the cauſe. This determination was made about the latter end of December, 1786; in the beginning of 1787 the diſtribution of the eſſay went on, but by additional hands. Mr. Sheldon, ſir Herbert Mackworth, lord Balgonie (now lord Leven), each took a part on the occaſion. The Quakers joined in the diſtribution alſo, among whom, Mr. Richard Phillips (now living) is to be particularly noticed. This arrangement having been made, Mr. Clarkſon was now able to devote all his time to qualify himſelf for the arduous ſituation to which he had devoted himſelf. He gained introductions to perſons who had been in Africa and the Weſt Indies, and obtained ſtill farther information on the ſubject in its different branches. He viſited ſlave-ſhips lying in the Thames, either as they came in or ſailed out of port, that he might know their conſtruction and other particulars. He went frequently to the cuſtom-houſe in London, where he learnt the nature of the articles which conſtituted the traffic, the loſs of ſeamen employed in it, and other matters which he found it eſſential to know. He kept up a correſpondence with perſons in Liverpool for the ſame purpoſe. He viſited alſo members of parliament, and this almoſt daily, to intereſt them in his cauſe; to give them information; to anſwer queſtions; and to explain doubts, if they had any, on any part of the ſubject. Among thoſe who appeared moſt affected by his viſits, and moſt anxious to co-operate with him, was Mr. Wilberforce, the member for the county of York. This gentleman not only read the evidence which Mr. Clarkſon ſent him on the ſubject, as he collected it freſh from day to day, but actually ſent for, and took the pains to examine, at his own houſe, thoſe perſons who had given it, that he might judge for himſelf, from their own mouths, of the truth or falſehood of the enormities which had been charged upon the ſlave-trade. The ſame gentleman appointed alſo a meeting once a week, at his own houſe, of a few ſelect friends, to deliberate on the propriety, and, if this were reſolved upon, on the proper method of taking up the cauſe. Theſe meetings continued for ſome time, when at length, at a dinner at the houſe of Mr. Bennet Langton, who has been before-mentioned, where ſeveral perſons of conſequence were invited for the purpoſe of talking over the matter, and of coming to a final determination upon it, Mr. Wilberforce pledged himſelf to bring forward the great queſtion of the abolition of the ſlave-trade in parliament, as ſoon as ever he ſhould feel himſelf prepared for ſo tremendous a taſk. Here then the matter began to aſſume a ſhape. A parliamentary leader had been ſecured, and one whoſe virtuous life correſponded with the ſacredneſs of the cauſe which he was to advocate. Mr. Clarkſon, who was preſent at this dinner, carried directly the news of what had taken place to ſeveral of his friends, but particularly to Mr. Granville Sharp, Mr. Dillwyn, and three or four others of the religious ſociety of the Quakers, all of whom he had previouſly taught to expect ſuch a reſult. The conſequence was, that the following perſons met the next day, and without loſs of time formed themſelves into a committee, "for procuring ſuch information and evidence, and publiſhing the ſame, as may tend to the abolition of the ſlave-trade, and for directing the application of ſuch monies as may be collected for the above purpoſe," *viz.* Granville Sharp, Samuel Hoare, George Harriſon, John Lloyd, Joſeph Woods, William Dillwyn, Thomas Clarkſon, Richard Phillips, James Phillips, Philip Sanſom, John Barton, and Joſeph Hooper. Mr. Granville Sharp, the firſt mentioned, may be conſidered, from what has been before ſaid, as repreſenting the firſt of the claſſes which have been deſcribed. The four next were the real repreſentatives of the ſecond. The third claſs, or that of the Quakers in America, may be conſidered as repreſented in the perſon of William Dillwyn, by whom, indeed, it was afterwards united to the committee now formed; and Mr. Clarkſon and Mr. R. Phillips as repreſenting the fourth, moſt of the members of which they had been the means of raiſing. "Thus," ſays the hiſtorian, "on the 22d of May, 1787, the repreſentatives of all the four claſſes, of which I have been giving a hiſtory from the year 1516, met together, and were united in that committee, to which I have been all along directing the attention of the reader; a committee, which, labouring afterwards with Mr. Wilberforce as a parliamentary head, did, under Providence, in the ſpace of twenty years, contribute to put an end to a trade, which, meaſuring its magnitude by its crimes and ſufferings, was the greateſt practical evil that ever afflicted the human race. After the formation of the committee, notice was ſent to Mr. Wilberforce of the event; and a friendſhip began, which has continued uninterruptedly between them from that to the preſent day." In the following month, that is, in June 1787, the committee ſimplified its former title, and was uſhered into the world. It profeſſed to have nothing to do with the emancipation of ſlaves already in bondage. Its only object was the abolition of the African ſlave-trade. From this period we ſhall give a hiſtory of its proceedings, year by year.

The committee was no ſooner formed, than Mr. Clarkſon drew up "A Summary View of the Slave-Trade, and of the probable Conſequences of its Abolition." It conſiſted only of about a dozen pages. It detailed the different methods of making ſlaves in Africa, their treatment, ſufferings, and mortality in the paſſage; and alſo the treatment of the ſurvivors in the colonies to which they were carried; and it promiſed the publication of an Eſſay on the Impolicy of the Slave-trade. This ſummary the committee determined to print, and to circulate all over the kingdom. In the mean time Mr. Clarkſon was to take a journey to the different ſlave-ports, to increaſe his own knowledge of the ſubject. Such knowledge was abſolutely neceſſary in caſe parliament ſhould call for evidence: and if there was any one time more fit than another for procuring ſuch evidence, it was the preſent; for men's minds had not then been heated by talking upon the ſubject, nor had intereſt hitherto felt itſelf biaſſed to conceal the truth; but as ſoon as ever it ſhould get abroad that parliament was to look into the ſubject, all avenues to farther information would be ſhut againſt him. The firſt place he viſited was Briſtol, where he reſided for ſome weeks. Here he obtained a knowledge of ſeveral articles of African produce, ſuch as rice, indigo, cotton, ſpices, and woods, and collected ſpecimens of them. He obtained ſpecimens alſo of the different manufactures of the natives of Africa, both in wood, cotton, leather, iron, and gold. He examined the conſtruction of ſlave-ſhips, and took the dimenſions of ſeveral. He obtained hiſtories of their former voyages. He collected chains, handcuffs, thumbſcrews, and other horrid inſtruments uſed in this execrable traffic. He diſcovered the ſcandalous modes of procuring and paying thoſe ſeamen who were employed in it, the ſad ratio of their mortality on the voyage, and the prodigious difference between the mortality of theſe and of thoſe employed in other trades, of which he was enabled to take a comprehenſive view, from procuring the muſter-rolls of almoſt every ſhip belonging to the port. But that which hurt his feelings the moſt, and which kept him indeed in a ſtate of conſtant miſery while in Briſtol, was the barbarous uſage, and this almoſt without an exception, of the ſeamen employed in this traffic. He took many out of the ſlave-veſſels there. He took up the cauſe of ſome of theſe, and obtained damages for them in the courts of law. He ſent a chief mate to priſon for the murder of one of the crew acting under him. While at Briſtol, he formed a committee to act in union with that of London, and obtained promiſes of petitions to parliament againſt the continuance of the inhuman traffic from that city, and from Bath, Monmouth, and Bridgewater. On his journey from Briſtol to Liverpool, he procured the promiſe of ſimilar petitions from Glouceſter, Worceſter, and Cheſter, and ſecured the provincial newſpapers as he travelled on in behalf of his cauſe. On his arrival at Liverpool, he followed the ſame line of enquiry as at Briſtol, for ſix weeks, after which period (ſo incenſed were merchants, captains of ſhips, and others connected with the trade, againſt him) it would have been dangerous to ſtay. From thence he viſited Lancaſter, the laſt of the ſlave-ports, and at length returned to London, after an abſence of five months, in the December of 1787. The committee, in the mean while, that is, during his abſence, had been equally well employed, and had been equally indefatigable. The firſt thing they did was to make known, by public advertiſement, their exiſtence as a committee, and the great object they had in view. They ordered a ſeal to be engraved for their correſpondence. The device upon it was a negro in chains, kneeling, and in a ſupplicating manner lifting up his hands to heaven. The motto round the device conſiſted of theſe words, "Am I not a man and a brother?" They then added to their committee, to increaſe their labourers; and having done ſo, they directly opened a correſpondence throughout England, Wales, and Scotland, which they extended afterwards to America. This gave them an opportunity of making their cauſe known in the moſt extenſive manner. Accordingly, when things had been thus prepared, they circulated many thouſands of the ſummary views before-mentioned, and, at the ſame time, addreſſed by letter all the corporate bodies in the kingdom. Theſe efforts ſoon convinced them, that there were thouſands of kindred ſouls in their own country, who felt with them on the great ſubject of their inſtitution. The Quakers were the firſt, as a body, to acknowledge and approve it; the general Baptiſts the next: then followed letters of approbation, and promiſes of ſupport from people of all religious denominations. Among theſe were, the famous Dr. Price and John Weſley; Mr. Roſcoe, the hiſtorian and poet; Dr. Porteus, biſhop of Cheſter; Dr. Woodward, biſhop of Cloyne; Dr. Hinchliffe, biſhop of Peterborough; Dr. Horne, afterwards biſhop of Norwich; Dr. Bathurſt, now biſhop of the ſame; archdeacons Paley and Plymley (now Corbett); the celebrated marquis de la Fayette, now alive, who was ſoon afterwards conſpicuous in the French revolution; and Briſſot and Claviere, afterwards two diſtinguiſhed members of the national convention in France, and who ſuffered under the tyranny of Robeſpierre. This good feeling continued to ſpread, when, in the month of February, 1788, there appeared to be among the people of England a general feeling in behalf of the injured Africans. By this time thirty-five petitions had been preſented to parliament from different places, praying for the abolition of the ſlave-trade, and ſeveral others had been reſolved upon. Theſe proceedings produced ſuch an effect upon the government, that the king was adviſed to order a committee of privy-council to inquire into the nature of the ſlave-trade. This order was dated February 11. An inquiry was of courſe immediately ſet on foot. The firſt witneſſes examined, were perſons ſent expreſsly as delegates from Liverpool, who had not only been themſelves in the trade, but who were then intereſted in its continuance. Theſe endeavoured to ſhew, that none of the enormities with which it had been charged belonged to it; and that it was even attended with circumſtances favourable to the unhappy victims of it. A great prejudice therefore was excited, in the very beginning of the inquiry, in the minds of ſome of the privy-council againſt the abolitioniſts; whom they conſidered as miſinforming the public mind with reſpect to a traffic, which appeared to be ſo vitally connected with the manufacturing and commercial intereſts of the country, that it would be almoſt national ruin to aboliſh it. Happy was it for the cauſe, at this moment, that Mr. Clarkſon had taken his journey to Briſtol and other places, as before-mentioned; for he had become acquainted, in the courſe of it, with perſons who had witneſſed the horrors of the trade; but who, having then quitted it, had no intereſt in concealing the truth. Theſe, though few, were highly reſpectable; and their evidence, when called before the council, contributed to counteract that of the Liverpool delegates, and others, and to turn the tide, which had run ſo ſtrong againſt the abolitioniſts, in their favour. The inquiry which had been thus ſet on foot, continued through February, March, April, and a part of May. During this time the petitions from the people to parliament had increaſed to one hundred and three. The committee alſo had circulated many new books throughout the kingdom, written by eye-witneſſes of the ſeveral facts they contained, and all contributing to give new information, and to add new horror to the trade. Mr. Wilberforce alſo had been preparing to introduce the ſubject into parliament; but at the time when his motion was expected, he was too ill to make it. Indeed his life was deſpaired of. Under theſe circumſtances, his friend, Mr. Pitt, then chancellor of the exchequer and prime miniſter, undertook to ſupply his place. On the 9th of May he opened the buſineſs in the houſe of commons, and concluded by a motion, "that this houſe will, early in the next ſeſſion of parliament, proceed to take into conſideration the circumſtances of the ſlave-trade complained of in the petitions, and what may be fit to be done thereupon." A diſcuſſion took place in conſequence, during which there was an apparent enthuſiaſm in the houſe in behalf of the injured Africans. The members for Liverpool, however, denied the exiſtence of any of the cruelties complained of; but they did not oppoſe the motion, and therefore it was unanimouſly agreed to. This pledge having been given by parliament, the public ſeemed ſatisfied with it, and of courſe nothing more was expected in that ſeſſion; when, on the 21ſt of May, ſir William Dolben ſuddenly roſe up in the houſe of commons, and moved for leave to bring in a bill on the ſubject of the ſlave-trade. As the trade, he ſaid, was evidently allowed to go on till the next ſeſſion, he thought it was the duty of the houſe to take care that it ſhould be carried on with as much humanity as poſſible in the interim. His great object, therefore, was to alleviate the ſufferings of the poor Africans in their tranſportation, by allowing them more room, which might be done by regulating the number to be carried by the tonnage of the veſſel. Leave was accordingly given; but the merchants of Liverpool determined to oppoſe the bill in every ſtage. They diſpatched immediately to London thoſe very perſons to be examined before the houſe, whom they had before ſent for examination to the privy-council. When counſel had cloſed their caſe, a debate enſued, in which the ſtatements of theſe witneſſes were expoſed, greatly to their mortification, and the bill paſſed by a majority of fifty-five to five. It was then carried to the lords. Here a ſtill more determined oppoſition was begun, and carried on in ſuch a manner, and with ſo much apparent ſucceſs (the houſe being very thin at that ſeaſon), as to alarm the abolitioniſts, not only for the fate of the bill itſelf, but for that of their great queſtion the enſuing year. At length it paſſed the upper houſe, as through an ordeal of fire, and received the king's aſſent, on July 11. During all this time, the privy-council continued their examinations. Mr. Clarkſon underwent an examination among others. It was at this time that he brought out his powerful eſſay on the impolicy of the ſlave-trade. This was circulated in great numbers by the committee, upon whom too much praiſe cannot be beſtowed for their labours. From July 1787 to July 1788, the time we are now come to, they had held fifty-one long committees: they had held as many more ſub-committees: they had diſtributed (beſides 26,526 reports, debates in parliament, and other matters) 51,432 pamphlets or books. They had rouſed the feelings of the whole Engliſh nation, and had attracted the notice of ſome of the moſt diſtinguiſhed perſons in France and Germany.

The ſeſſion of 1788 was no ſooner over, than Mr. Clarkſon undertook a journey to all the ſea-ports of the kingdom lying between Kent and Cornwall. His object was to find out, if poſſible, new witneſſes to ſtrengthen the good cauſe. He met with conſiderable ſucceſs in his journey, and he formed committees, auxiliary to that of London, as he went along. On his return to London he was again examined by the privy-council, to whom he ſhewed, by way of evidence, his collection of African curioſities, conſiſting of produce and manufactures, which he had now completed. He introduced alſo to their lordſhips, for examination, all the new witneſſes he had diſcovered, and whoſe teſtimony was of the higheſt value. The committee, in the mean time, had been indefatigable. They had directed their correſpondence to new parts of the kingdom, as well as of North America. They had addreſſed the rulers of Spain, Portugal, and Sweden, in behalf of their inſtitution, and had opened a communication with Germany on the ſame ſubject. They had printed and circulated no leſs than five new works to promote their cauſe, and, beſides, that famous engraving of the ſection of the ſlave-ſhip (where the bodies of the negroes were ſeen packed in the different parts of it), which afterwards excited ſuch univerſal ſympathy in the country, and which cauſed ſuch an univerſal abhorrence of the trade. About this time, that is, on the 19th of March, 1789, Mr. Wilberforce, who was then but juſt recovered from his long and ſevere illneſs, moved in the commons, that the houſe ſhould on Thurſday, the 29th of April, take into conſideration its own reſolution of the laſt ſeſſion. This motion was agreed to, but it became immediately the ſignal to all thoſe who ſuppoſed themſelves intereſted in the continuance of the trade, ſuch as planters, mortgagees, merchants, manufacturers, and others, to begin a tremendous oppoſition. Meetings were called, and frightful reſolutions entered into. The public papers were filled with them. Here, as well as in pamphlets, the moſt bitter invectives were poured forth againſt the abolitioniſts. Emancipation was induſtriouſly confounded with abolition. Compenſation was demanded to a moſt monſtrous degree. The cry, indeed, was ſuch, that many began to be ſtaggered about the propriety of the total abolition of the trade. At this time Mr. Pitt, his majeſty's chancellor of the exchequer, laid the privy-council report, conſiſting of the examinations before-mentioned, which came out in the ſhape of a large folio volume in print, upon the table of the houſe of commons, and moved, in order that members might have time to become acquainted with the evidence it contained, that the conſideration of the ſlave-trade, which ſtood, by Mr. Wilberforce's motion, for the 29th of April, ſhould be poſtponed to the 12th of May. This was agreed to. On the day appointed, Mr. Wilberforce roſe, and in a ſpeech of three hours and a half, introduced the great queſtion into parliament. He reaſoned entirely from the evidence contained in the report juſt mentioned, and deduced from it twelve grand propoſitions, which he read, and then laid them upon the table. Theſe propoſitions contained the whole queſtion. He wiſhed them to be argued at a future day. Upon this, great oppoſition was manifeſted by the members for Liverpool and others, and a warm debate took place, when it was agreed that they ſhould be taken into conſideration on the 21ſt of May. When the day arrived, ſeveral petitions were preſented to the houſe, by perſons intereſted in the traffic, againſt its abolition. Mr. Wilberforce roſe up and addreſſed the houſe. After this, an altercation took place rather than a debate, in which much heat and animoſity were manifeſted. Thoſe members who eſpouſed the cauſe of the intereſted perſons, ſeeing that it would be overthrown, if they judged of the merits of it by the privy-council report, would not now abide by the latter, but rejected it as an imperfect ſort of evidence, and demanded that witneſſes ſhould be heard at the bar of the houſe of commons in explanation of many of the mis-ſtatements which that book contained. By theſe means they endeavoured to get rid of the propoſitions altogether. Their demand, however, after a good deal of contention, was complied with, and on the 26th of May counſel were heard, and one witneſs, a ſlave-captain, was examined. Their object now was to interpoſe every legal ſpecies of delay, and in this they ſucceeded ſo well, that from the 26th of May to the 9th of June, only two of their witneſſes had been examined. In this ſlow way they went on till the 23d of the ſame month, when it was ſeen that it would be utterly impoſſible to bring the queſtion to a final deciſion in that ſeſſion, for they declared that they had many evidences yet to produce, and that they muſt and would be heard. Accordingly they moved, and Mr. Wilberforce agreed, that the farther conſideration of the ſubject ſhould be poſtponed to the next ſeſſions.

As thoſe who were intereſted in the continuance of the trade had now got rid of the privy-council report, and had introduced new evidences to the commons in behalf of their caſe, it became the committee to collect as reſpectable a body of witneſſes as poſſible on their own ſide of the queſtion. Mr. Clarkſon had undertaken to traverſe the kingdom again for this purpoſe, and had ſet out, when, hearing that the French revolution had broken out, and that a committee for the abolition of the ſlave-trade had been formed in Paris, he returned, and immediately haſtened to the latter city, where he arrived at the latter end of July. He ſoon became acquainted with the marquis de la Fayette, monſieur Necker, the duke de la Rochefoucauld, the marquis de Condorcet, and Meſſrs. Mirabeau, Petion, Briſſot, Claviere, and other diſtinguiſhed perſons. He ſpent his time, while in Paris, in attending the committee there, in viſiting members of the National Aſſembly, and in the perſonal diſtribution of books among them, but particularly his "Eſſay on the Impolicy of the Slave-Trade," which he had cauſed to be tranſlated into French for that purpoſe. Returning to London in January 1790, he found that Mr. Wilberforce had carried a motion in the commons, that witneſſes ſhould not be examined in future at the bar of that houſe, but in a committee-room, which ſhould be open to all members. This was neceſſary for the ſake of diſpatch, as the examinations otherwiſe might have taken up ten years. Mr. Clarkſon now reſumed the journey which he had begun in the preceding ſummer, in ſearch of new and reſpectable witneſſes. He made a tour of 1200 miles in three weeks, during which he found out ſixteen perſons capable of giving good teſtimony on the ſubject, but could only prevail upon three to be examined. On his return to London, he found that the examinations of witneſſes in behalf of thoſe intereſted were going on in the committee of the houſe of commons, and with ſo much rapidity, that it was expected their caſe would be ſoon cloſed. This alarmed him exceedingly; for out of ſeventeen perſons who ſtood upon his liſt as having promiſed to give their teſtimony in behalf of the abolition, one had lately died, and no leſs than eight, being ſeafaring perſons, were then out of the kingdom. He determined, therefore, upon another journey; and on turning the ſubject over in his mind, he thought he ſhould obtain the greateſt number of diſintereſted witneſſes in the ſhorteſt poſſible time, if he could go on board all the ſhips of war lying in ordinary at the king's ports in different parts of the kingdom. Impreſſed with this idea, he went to Deptford, and firſt boarded all the men of war that were lying there. He then proceeded to Woolwich, and afterwards to Chatham, Sheerneſs, Portſmouth, and Plymouth, where he boarded others in like manner, to the number altogether of four hundred, in which he picked up ſeveral very excellent and important witneſſes. On the 20th of April, the perſons intereſted had juſt cloſed their caſe. Accordingly Mr. Wilberforce moved, on the 23d of the ſame month, in the houſe of commons, that witneſſes ſhould be heard in behalf of the abolition. Upon this much clamour enſued. The members, who acted in union with the perſons intereſted in the continuance of the ſlave-trade, wiſhed to have the caſe directly argued, that is, upon their own evidence, and without hearing any on the other ſide, and reſiſted accordingly. Their oppoſition, however, proved ineffectual againſt the eloquence of Mr. Wilberforce, ſupported powerfully as he was by that of Mr. Pitt and Mr. Fox. At length, the witneſſes in behalf of the abolition took poſſeſſion of the ground which the others had left, and no leſs than twenty-four, ſome of whom had been found out ſince the laſt tour, were examined before the cloſe of the ſeſſion. At this time it is very curious to remark, that the feelings of parliament, and thoſe of the people, were very different on this great queſtion. The tide certainly ran againſt the abolitioniſts in the houſe of commons. The old hue and cry had been revived of intended emancipation under the pretence of abolition; of monſtrous indemnification to the planters; and of the certain maſſacre of the whites by the negroes, if the trade were to be aboliſhed, but in more furious language, and to a greater extent than before. The feeling, on the other hand, in the country, was warmly on the ſide of the abolition. It had been kept up and increaſed by various circumſtances. The committee had been daily employed in anſwering, through the medium of the public papers, every objection which had been ſtarted as hoſtile to their cauſe. They had alſo by this time diſtributed all over England, Scotland, and Wales, the horrible and affecting engraving of the ſection of the ſlave-ſhip before-mentioned. Individuals, too, had kept alive the popular feeling in various ways. Wedgewood, the celebrated manufacturer, had taken the committee's ſeal, as before explained, for a model, and had ſtruck off and diſtributed many thouſand ſmall cameos in plaſter. The ground of each of theſe cameos was white, but the negroe, who was ſeen imploring compaſſion on his knees in the middle of it, was of his own native colour. Cowper alſo, and other poets, had written beautiful and affecting ſongs on the ſubject. Theſe were circulated very copiouſly through the kingdom, and ſome of them were ſung in the very ſtreets.

Not more than half the evidence, which was deemed neceſſary, having been heard on the ſide of the abolition in the ſeſſion juſt paſſed, it became an imperious duty in the committee to uſe every poſſible exertion to complete it, and this in the beſt poſſible manner, before the next. Such exertion was abſolutely eſſential to victory. Mr. Clarkſon was, therefore, again ſolicited to traverſe the kingdom for this purpoſe. This journey being of the utmoſt importance, Mr. Wilberforce prepared an ingenious liſt of queſtions to aſſiſt him in his examinations and inquiries. With this he departed, and travelled from Auguſt 1790, to February 1791, during which time he went over the greateſt part of the iſland, and had the good fortune to add a conſiderable number of new and important witneſſes to his liſt. At length the examinations were reſumed in the committee of the houſe of commons, and they were cloſed finally on the 4th of April. No leſs than ſixty-nine perſons had given their teſtimony in this and the preceding ſeſſion in behalf of the abolition of the ſlave-trade. The evidence having been printed on both ſides for the uſe of the members, as the baſis upon which to argue the caſe, the 18th of April was fixed upon as the day for deciding it. By this time every effort had been made by the perſons intereſted to render the queſtion unpopular in the commons. Emancipation, indemnification, maſſacre, ruin, had been vociferated over and over again in the ears of the members there. At this time, unhappily the moſt ſanguinary ſcenes were taking place in St. Domingo, in conſequence of the revolution which had been effected there, and an inſurrection had broken out in the Britiſh iſland of Dominica. All theſe had been induſtriouſly detailed in print, but with great exaggeration, and added to the cries juſt mentioned. This union of reports and cries had produced ſuch a terrific effect upon many members, that they conſidered the abolitioniſts, by perſevering in their queſtion, as ferocious monſters; and in this unfavourable frame of mind they went into the houſe on the day fixed for the diſcuſſion, to diſcharge their duty with reſpect to this great queſtion. On this day, namely, the 18th of April, 1791, Mr. Wilberforce made a moſt luminous and affecting ſpeech, in which he took a moſt maſterly view of the whole queſtion in all its different departments, as it related both to Africa and the Weſt Indies. He argued the inhumanity of the traffic; he argued its impolicy; he appealed to feeling; he appealed to reaſon; he tried to diſarm his opponents by candour; he exhorted them to attend to their own intereſt; and concluded by moving for leave to bring in a bill to prevent the farther importation of ſlaves into the Britiſh colonies in the Weſt Indies. After this, a moſt ſerious diſcuſſion enſued, which laſted till three in the morning, when ſeveral members, being yet deſirous of ſpeaking, the buſineſs was adjourned to the next day. It was then argued again till half paſt three in the morning, when the houſe divided on the original motion. There were for it but 88 votes, and againſt it 163; ſo that this great cauſe of humanity, juſtice, and religion, which had coſt ſo many years of labour, was loſt by a majority of 75 votes. Upon the news of this ſignal defeat, the committee for the abolition of the ſlave-trade held a meeting, which was conducted with the moſt ſolemn dignity. They voted thanks to the illuſtrious minority which had lately ſtood forth the aſſertors of Britiſh juſtice and humanity, and the enemies of a traffic in the blood of man; and entered into ſeveral reſolutions, the ſubſtance of one of which was, that they conſidered the late deciſion of the houſe rather as a delay than a defeat; that they did not deſpair of final ſucceſs; and that they would never deſiſt from appealing to their countrymen, till the commercial intercourſe with Africa ſhould ceaſe to be polluted with the blood of its inhabitants. Theſe reſolutions were followed up by a ſuitable report, and ſent to all the country committees throughout the kingdom. At length the ſeſſion ended, and a cruel one it had proved to thoſe who had intereſted themſelves in the abolition of this cruel traffic. The defeat, however, which they had experienced, had been rendered more tolerable, becauſe, in conſequence of the unjuſt clamours by which the minds of many members of parliament had been affected, it had been expected. It had been rendered more tolerable again, by knowing that ſeveral of the moſt diſtinguiſhed characters in the kingdom, and all of ſplendid talents in the houſe of commons, ſuch as Pitt, Fox, Burke, Grey, Sheridan, Wyndham, Whitbread, Courtnay, Francis, Rider, W. Smith, and H. Thornton, had ſupported the ſacred cauſe; and becauſe a bill had been carried through both houſes of parliament in this very ſeſſion for the eſtabliſhment of the Sierra Leona company, the object of which was to form a ſettlement on the coaſt of Africa, which ſhould be made a medium for civilizing that continent through two channels, *viz.* by the introduction of a new ſpecies of commerce there, and of cultivation alſo in its neighbourhood, on the principle of free labour.

The people of England, ſoon after the news of the defeat juſt ſpoken of had been communicated to them, began to be ſenſibly affected, and many, in order to waſh their hands of the blood of Africa, left off the uſe of ſugar. Mr. Clarkſon, after a conſultation with Mr. Wilberforce and the committee, undertook to abridge the evidence which had been offered to the houſe of commons on the ſide of the abolition, with a view of circulating its horrible contents through the kingdom, and of thus making the public impreſſion ſtill deeper. This abridgment was begun in June 1791, and was written, printed, and in the hands of all the committee's correſpondents in England, Wales, and Scotland, by the latter end of September. Mr. Clarkſon now undertook to follow the book, and to ſee, if poſſible, that it was actually read. Accordingly he left London in the beginning of November. It was his intention to wait perſonally upon every perſon in every county in the kingdom, to whom the book had been ſent, to get others of the town or neighbourhood to meet him there, to converſe with them on the ſubject, to intreat their individual peruſal of the abridgment, and their united efforts in lending it out judiciouſly, and in ſeeing that it was read. This he attempted to realize, but the proceſs was very tedious. He had travelled 6000 miles in the execution of his plan, when he found that he had yet 4000 to go. To perform this was impoſſible, ſo as to anſwer the purpoſe. He therefore made his ſituation known to the committee. The conſequence was, that Dr. Dickſon, a gentleman who had greatly aſſiſted the cauſe by his writings, ſet off from London, and took the whole of Scotland off his hands. The reſult of the two journeys was ſoon viſible. The people could not bear the facts which the abridgment had diſcloſed to them. Great numbers left off immediately the uſe both of ſugar and rum. The great bulk of the nation, however, vented their feelings in public meetings to addreſs the legiſlature on the ſubject, and this they did with ſo much earneſtneſs and activity, that by the latter end of the month of March, 1792, no leſs than 517 petitions, including ſeveral from whole counties, were laid on the table of the houſe of commons, praying for the total abolition of the ſlave-trade. Emboldened and ſupported in this manner by the voice of the people, Mr. Wilberforce introduced the queſtion again into the commons. This was on the 2d of April. After a ſpeech of four hours, during which he added a profuſion of new light to the ſubject, and during which he endeavoured, in the moſt mild and perſuaſive manner, to do away objections and prejudices, he moved, "that it is the opinion of this houſe that the African ſlave-trade ought to be aboliſhed." This led to a very long and uncommonly intereſting debate. Never, certainly, in the houſe of commons, and never probably in any other place, was ſo much ſplendid oratory diſplayed, as on that night, on the ſide of the abolition of the ſlave-trade. It appeared, in the courſe of the debate, to be the ſenſe of the houſe, that ſome ſort of abolition ſhould take place. Two diviſions took place. In the firſt, there were 193 votes for gradual abolition, and 125 for immediate; and in the ſecond, there were 230 for gradual, and 85 for no abolition at all. In this ſtate the queſtion was left till the 23d of April, when Mr. Dundas (afterwards lord Melville) came forward and propoſed a plan conformable with the reſolutions of the houſe juſt mentioned. The outlines of it, however, were oppoſed by Meſſrs. Pitt, Fox, and Wilberforce, not only as being very defective, but as built upon falſe data. The buſineſs was accordingly adjourned to the 25th. On that day, Mr. Dundas brought forward the ſubject again. He conſidered that eight years ought to be allowed the planters to ſtock themſelves with negroes, and therefore moved that the year 1800 ſhould be the epoch, after which no more ſlaves ſhould be imported from Africa in Britiſh veſſels to the Weſt Indies. Lord Mornington (now marquis Welleſley), in a moſt brilliant ſpeech, moved an amendment, which was, that the year 1793 ſhould be ſubſtituted for that of 1800. There appeared, on a diviſion, to be 158 for Mr. Dundas's motion, and 109 for the amendment. On the 27th of April the ſubject was reſumed in the houſe. Mr. Dundas propoſed the year 1800, as before, and lord Mornington the year 1795. His lordſhip's motion was again loſt, but by a leſs majority than on the former occaſion, *viz.* by 161 to 121, when ſir Edward Knatchbull ſtruck out a middle line, by propoſing the year 1796, which motion was carried by a majority of 151 to 132. The gradual abolition having been thus agreed upon for 1796, a committee of the commons carried the reſolution to the lords. On the 8th of May the lords met to conſider it, when, cruel to relate, a motion was made by lord Stormont, on the part of the planters, merchants, and other intereſted perſons, to hear new evidence. This, after ſome little oppoſition, was acceded to. On the 15th of May, the firſt witneſs on this ſide of the queſtion was introduced; and on the 5th of June, when only ſeven witneſſes had been examined on the ſame ſide, all further examination was poſtponed to the next ſeſſion.

Nothing could be more diſtreſſing to the abolitioniſts than the determination of the lords now mentioned; firſt, becauſe there was no ſaying how many, even years, the hearing of evidence there might take; and ſecondly, becauſe they (the abolitioniſts) had the laborious work to do over again, of finding out and keeping up a reſpectable body of witneſſes on their own ſide of the queſtion. This latter work was eſſentially neceſſary; for it was impoſſible to allow the perſons intereſted to throw in a weight of teſtimony for the furtherance of their own cauſe, and not to take means to counteract it. Mr. Clarkſon, therefore, ſet out again in the month of July, on his old errand. Dr. Dickſon, the gentleman before-mentioned, left London about the ſame time, in order to aſſiſt him. He was to take a different route, which had been before ſettled. They were very ſucceſsful in their reſpective journeys, and both returned in the month of February, 1793. The houſe of commons was then ſitting. The only ſtep to be taken there (but this was eſſentially neceſſary), was to bring before it, in ſome part or other of the ſeſſion, its own vote of the former year, by which the ſlave-trade was to be aboliſhed in 1796, in order that this vote might be reconſidered and renewed. Accordingly Mr. Wilberforce moved the houſe upon the ſubject. It is only neceſſary to ſtate, that his motion was moſt furiouſly oppoſed, and actually loſt by a majority of 61 to 53. By this determination the commons actually refuſed to ſanction their own vote. In this diſtreſſing ſituation, Mr. Wilberforce ſcarcely knew what to do. He was not, however, to be diſmayed by one unexpected defeat. He reſolved, therefore, that he would not allow the ſeſſion to paſs without trying the queſtion in ſome other ſhape. Accordingly, in the month of May, he moved for leave to bring in a bill to aboliſh that part of the trade by which the Britiſh merchants ſupplied foreigners with ſlaves. His motion was carried, but only by a majority of 7; and, alas! on the third reading, it was loſt by a majority of 31 to 29! During all this time the examination of witneſſes had been going on in the houſe of lords. Only ſeven witneſſes, however, had been heard there in the courſe of the whole ſeſſion.

After this moſt cruel ſeſſion, the abolitioniſts were at a loſs how to act for the advantage of their cauſe. One meaſure, however, was obviouſly neceſſary, *viz.* to endeavour to keep up a reſpectable body of evidence to oppoſe that which ſhould be heard againſt the abolition in the lords. For this purpoſe, Mr. Clarkſon, at the requeſt of the committee, once more traverſed the kingdom. He began his journey in September, and returned in February, 1794. Mr. Wilberforce, in the interim, moved in the commons for leave to renew his former bill for the abolition of the foreign ſlave-trade, as carried on by Britiſh ſubjects. He carried it, though with great difficulty, in all its ſtages, through the houſe of commons; but it was almoſt directly loſt in the houſe of lords. In this latter houſe only two evidences had been examined in the courſe of the ſeſſion. At this time Mr. Clarkſon was in ſuch a wretched ſtate of health, as to be unable to lend any farther aſſiſtance to the committee. The inceſſant labour of body and mind for ſo many years, aggravated by anxiety and diſappointments, had made a very ſerious inroad upon his conſtitution. His nervous ſyſtem had been literally ſhattered to pieces; his hearing, memory, and voice, were nearly gone. He was, in ſhort, utterly incapable of any farther exertion; and he was therefore obliged, though very reluctantly, to be borne out of the field, where he had placed the great honour and glory of his life. The queſtion was now in a very deſperate ſtate, for if the houſe of commons would not renew its own reſolution, and if the lords would not aboliſh even the foreign part of the ſlave-trade, what hope was there of ſucceſs? But neither, however, were Mr. Wilberforce nor the committee to be deterred by the proſpect. They determined never to abandon the cauſe. Accordingly Mr. Wilberforce moved in the commons, in the ſeſſion of 1795, for leave to bring in a bill for the abolition of the ſlave-trade. This motion was now neceſſary, and juſtifiable on that account, if the trade, according to a former reſolution of that houſe, was to ceaſe in 1796; but it was loſt by a ſmall majority.

In the ſeſſion of 1796, Mr. Wilberforce reſolved upon trying the queſtion again, but in an entire new form. He moved that the ſlave-trade be aboliſhed in a limited time, but without aſſigning to its duration any ſpecific date. He wiſhed the houſe to agree to this as a general principle. After much oppoſition the principle was acknowledged; but when, in conſequence of this acknowledgment of it, he brought in a bill, and attempted to introduce into one of the clauſes the year 1797, as the period when the trade ſhould ceaſe, he loſt it by a majority of 74 to 70.

He judged it prudent, after mature conſideration, to let the ſeſſion of 1797 paſs without any parliamentary notice of the ſubject, but in that of 1798 he renewed his motion for abolition in a limited time. This, however, met with the ſame fate as the former.

In 1799, undiſmayed by former defeats, he tried the ſame motion again, when there appeared for it 74, and againſt it 82 votes. He determined, however, that the remainder of the ſeſſion ſhould not paſs without an effort to obtain ſomething, if it were only a ſmall part, of what belonged to the cauſe. Accordingly his eſtimable friend, Mr. Henry Thornton, lately deceaſed, brought in a bill, at his requeſt, to aboliſh a very ſmall part of the ſlave-trade. It may be remembered, that a colony had been eſtabliſhed at Sierra Leona, to promote agriculture and a new ſpecies of commerce in its neighbourhood. Now, while the ſlave-trade was carried on all around it, it was found that theſe objects could be but little advanced. The bill, therefore, of Mr. Thornton, went only ſo far as to ſay that the ſlave-trade ſhould not be carried on within a certain diſtance of that colony. This bill was carried through the commons, but though it only aſked that an infant eſtabliſhment, founded on the principles of liberty, and this by parliamentary ſanction, ſhould be protected from the ravages of the ſlave-trade, it was loſt in the houſe of lords. This latter circumſtance was indeed truly diſheartening; yet amidſt the clouds which darkened the horizon, one gleam of hope appeared; for the queſtion had been ſo argued, ſo ſifted, and put into ſuch various lights, that it began now to be underſtood. The conſequence was, that conviction flaſhed upon many, among whom were three planters, Mr. Ellis, Mr. Barham, and Mr. Vaughan. Theſe gentlemen had the candour to riſe up in the houſe of commons, and expreſs themſelves in favour of the abolition, in one of the laſt debates.

The queſtion had been now tried and loſt in almoſt every poſſible ſhape; Mr. Wilberforce and the committee ſeemed to have but two alternatives of choice left them, either to perſevere againſt all hope, or to hold themſelves in readineſs to ſeize the firſt favourable opportunity which ſhould preſent itſelf for furthering the cauſe. It was determined to adopt the latter, and by no means to let the queſtion degenerate into a mere annual motion of form. It was thought proper alſo, as ſeveral members of the houſe of commons were changing their opinions on the ſubject, to give others time to digeſt the powerful eloquence which had been expended upon it. Mr. Wilberforce, therefore, ſuffered the years 1800, 1801, 1802, and 1803, to paſs over without noticing it. In 1804, however, he reſolved to renew his exertions. The committee reſolved to ſecond them, and immediately increaſed its number, that it might act with extraordinary vigour. The circumſtance, which marked this year in particular as favourable for another trial, was the union with Ireland, in conſequence of which a great number of Iriſh members, generous, and open-hearted, and in general friends to the poor Negroes, were added to the Britiſh parliament. Mr. Wilberforce, therefore, under theſe circumſtances, aſked leave to renew his bill for the abolition of the ſlave-trade within a limited time. This motion was as violently oppoſed as any of the former, but was carried at length in a very handſome manner: no leſs than 124 divided in favour of it, and but 49 againſt it. The bill was oppoſed in its ſecond reading, for which however there were 100, and againſt it but 42. When a motion was made for going into a committee it was oppoſed, but carried by 79 to 20. The bill alſo was oppoſed in its laſt ſtage, but carried by a majority of 69 to 36. It was taken up to the lords, but on a motion by lord Hawkeſbury (now lord Liverpool) the diſcuſſion there was put off till the next ſeſſion.

In the ſeſſion of 1805, Mr. Wilberforce renewed his former motion. Leave was at length given him to bring in the bill, but not till after a moſt furious oppoſition. On the ſecond reading of it the oppoſition increaſed, and an amendment was propoſed, *viz.* to put it off to that day ſix months. This amendment was actually carried by a majority of 77 to 70. This defeat occaſioned the aboliſhioniſts the ſevereſt diſappointment. The committee inſtantly met, when ſorrow was ſeen in the countenances of all preſent. Their firſt object was to endeavour to develope the cauſes of the miſcarriage now mentioned. It appeared clearly, after the moſt minute examination, that theſe were accidental. The committee, therefore, reſolved upon renewing the conteſt with redoubled vigour the enſuing year. Juſt at this moment, who ſhould join them but Mr. Clarkſon! Eight years' retirement had nearly reſtored him, and the firſt moment he found himſelf able to embark again in the cauſe, he returned to his poſt. As it then ſeemed probable that the queſtion would be carried the next year through the commons, and, if ſo, that it would go to the lords, and that the lords would probably require farther evidence, it was judged proper that evidence ſhould be prepared. But, alas! the noble band of witneſſes which had been laſt collected, had been broken by death and diſperſion, and a new one was to be formed. Herculean taſk! tremendous, however, as it was, Mr. Clarkſon undertook it. He left London in two or three days afterward, and returned in January 1806, after having travelled in purſuit of his object above 5000 miles. In this month died Mr. Pitt, who was then prime miniſter, and who had been one of the great ſupporters of the cauſe.

On the 31ſt of March, 1806, this great queſtion was uſhered again into parliament, but under new auſpices, namely, under the adminiſtration of lord Grenville and Mr. Fox. It was thought proper that Mr. Wilberforce ſhould be as it were in the back-ground on this occaſion, and that the attorney-general, as a conſpicuous officer of the government, ſhould introduce it. The latter accordingly brought in a bill, one of the objects of which was to prohibit Britiſh merchants and Britiſh capital from being employed in the foreign ſlave-trade. This bill paſſed both houſes of parliament, and was therefore the firſt that diſmembered this cruel traffic. In the debate which enſued upon it, it was declared in ſubſtance, both by lord Grenville and Mr. Fox, in their reſpective houſes, that they would do every thing to effect the abolition, and ſhould they ſucceed in ſuch a noble work, they would regard their ſucceſs as entailing more true glory on their adminiſtration, and more honour and advantage on the country, than any other meaſure in which they could be engaged. Conformably with this ſentiment, Mr. Fox himſelf, on the 10th of June, in a ſpeech moſt luminous and pathetic, followed up the victory which had been juſt gained, by moving a reſolution, "that this houſe, conſidering the African ſlave-trade to be contrary to the principles of humanity, juſtice, and policy, will, with all practical expedition, take effectual meaſures for the abolition of it, in ſuch manner and at ſuch a period as may be deemed moſt adviſeable." This motion produced an oppoſition as before, and an intereſting debate. It was ſupported by ſir Ralph Milbank, Mr. Francis, ſir Samuel Romilly, Mr. Wilberforce, lord Henry Petty (now marquis of Lanſdown), ſir John Newport, Mr. Canning, and Mr. William Smith. It was carried by a majority of 114 to 15. Mr. Wilberforce directly moved an addreſs to his majeſty, "praying him to direct a negociation to be entered into, by which foreign powers ſhould be invited to co-operate with his majeſty, in meaſures to be adopted for the abolition of the African ſlave-trade." This was alſo carried, but without a diviſion. On the 24th of June, the lords met to conſider both the reſolution and addreſs. A propoſition was directly made in that houſe (in order to create delay), that counſel and evidence ſhould be heard. This, however, was happily overruled. Lord Grenville then roſe up and introduced the ſubject. His ſpeech was among the maſter-pieces of eloquence. He was ſupported in the debate, which followed by the lord chancellor (Erſkine), the biſhop of London (Dr. Porteus), the biſhop of St. Aſaph (Dr. Horſley), earl Groſvenor, earl Stanhope, earl Spencer, earl of Suffolk, and the lords Holland and Ellenborough. The reſolution and addreſs were at length both carried, by a majority of 41 to 20. After this a belief was generally prevalent, that the ſlave-trade would fall in the next ſeſſion. This occaſioned a fear in the abolitioniſts, leſt it ſhould be carried on in the interim, being as it were the laſt harveſt of the merchants, to a tenfold extent, and therefore with tenfold murder and deſolation to Africa. It was therefore thought neceſſary, as the ſeſſion was about to cloſe, to introduce another bill into parliament, and this as quickly as poſſible, that no new veſſel ſhould be permitted to go to the coaſt of Africa for ſlaves. Accordingly a bill to that effect was prepared, and it paſſed both houſes. In the month of October following, after theſe great and deciſive victories, died the right honourable Charles James Fox, one of the nobleſt champions of this noble cauſe. He had lived juſt to put it into a train for final triumph. This triumph, however, he enjoyed in anticipation. The proſpect of it ſoothed his pains, and cheered his ſpirit in the hours of his ſickneſs. At this melancholy ſeaſon it became with him a frequent topic of converſation, and the hope of it was perceived to quiver on his lips, in one of the laſt moments of his life.

The ſeſſion of 1807 had not long commenced, when the conteſt was renewed. Lord Grenville judged it expedient, at this particular criſis, to reverſe what had been hitherto the order of proceeding, that is, to agitate the queſtion firſt in the houſe of lords. On the 2d of January he preſented a bill there, which he called an act for the abolition of the African ſlave-trade. It was very ſhort; he propoſed that it ſhould be printed, and that it ſhould then lie on the table for a while, that it might be maturely conſidered before it was diſcuſſed. On the 4th, no leſs than four counſel were heard againſt it. On the 5th the debate commenced. Lord Grenville took a brilliant part in it. He was ſupported by his highneſs the duke of Glouceſter, the biſhop of Durham (Dr. Barrington), the earls Moira, Selkirk, and Roſslyn, and the lords Holland, King, and Hood. The bill was at length carried, at four in the morning, by a majority of 100 to 36. On the 10th of February it went to the commons. On the 20th counſel were heard againſt it there. On the 23d a debate enſued upon it, on the motion of lord viſcount Howick (formerly Mr. Grey, and now lord Grey), who urged the commons to confirm it. The other ſpeakers in favour of it were Mr. Roſcoe, Mr. Fawkes, Mr. Luſhington, the lords Mahon and Milton, ſir Samuel Romilly, ſir John Doyle, Mr. Wilberforce, and earl Percy; and it was carried by the vaſt majority of 283 to 16. On the 6th of March the blanks were filled up. It was propoſed, firſt, that no veſſel ſhould clear out for ſlaves from any port within the Britiſh dominions, after the 1ſt of May following, that is, 1807, and that no ſlave ſhould be landed in the Britiſh colonies after the 1ſt of March 1808. This and almoſt every other propoſition were oppoſed, but happily without effect. Suffice it to ſay, that on the 18th the bill, with the blanks filled up, was carried back to the lords; that in conſequence of various amendments, it paſſed and repaſſed from one houſe to the other, but always with oppoſition; that on the 24th it paſſed both houſes; and that on the 25th, at half paſt eleven in the morning, it received the royal aſſent. Thus paſſed, after a twenty years' hard ſtruggle, during which the field had been diſputed inch by inch, and won at laſt by the arms of reaſon, this magna charta for Africa in Britain, under the adminiſtration of lord Grenville and Mr. Fox, an adminiſtration which, on account of its noble exertions in behalf of the oppreſſed African race, will paſs to poſterity, living through ſucceſſive generations, in the love and gratitude of all the moſt virtuous of mankind. The news of this great event gave uncommon joy throughout the kingdom, and this joy was farther heightened by authentic news juſt then received from North America, that the government there had paſſed a ſimilar bill, which was to be obſerved as a law through the United States.

In France, on the re-eſtabliſhment of the Bourbon dynaſty, it was propoſed to aboliſh the ſlave-trade at a diſtant period. Upon the return of Bonaparte from Elba, an order was iſſued for its immediate abolition; and a decree to the ſame purpoſe has been paſſed ſince the expulſion of Napoleon, and the reſtoration of the preſent reigning monarch.

SLAVE-COAST, in *Geography*, a tract of country in Africa, bordering on the Atlantic, ſituated between the Gold Coaſt and Benin, and comprehending the kingdoms of Ardra, Koto, Popo, and Whidah. See each reſpectively, and alſo SLAVE-TRADE.

The inhabitants reſemble thoſe of the Gold Coaſt in their politics, religion, and manners.

SLAVE-FALLS, a cataract of North America, in Winnipeg river, 100 yards wide and 20 feet in height. N. lat. 50° 6′. W. long. 95° 20′.

SLAVE-INDIANS, Indians of North America, who were driven from their original country by their enemies the Kniſteneaux, along the borders of the Unjigah or Peace river, where it aſſumes from them the name of the Slave river; though the term by no means involves the idea of ſervitude, but was given to thoſe fugitives as a term of reproach, that denoted more than common ſavageneſs.

SLAVE-LAKE, *Great*, a large lake of North America, ſo called by the Kniſteneaux, which derived its name from that of its original inhabitants, who were called ſlaves. This lake is well known to the Kniſteneaux, who are among the inhabitants of the plains on the banks of the Saſkatchiwine river; for formerly, when they uſed to make war in this country, they came in their canoes to that lake, and left them there; from whence there is a beaten path all the way to the Forks, or E. branch of this river, which was their war-road. This lake is ſaid to be more than 200 miles in length, and about 12 in breadth. It is ſuppoſed to be the ſame with Hearne's *Athapuſcow*, which ſee. Bitumen is found on the coaſt of this lake, in N. lat. 60°, near its diſcharge by Mackenzie's river, which, flowing from Slave-lake, diſcharges itſelf into the North ſea, on the banks of which are coal and bitumen, as far north as latitude 66°. N. lat. 61° 20′. W. long. 115°.

SLAVE-LAKE, *Leſſer*, a lake of North America, in N. lat. 55° 30′. W. long. 115°, which diſcharges itſelf into the Elk river.

SLAVENSK, a town of Ruſſia, in the government of Ekaterinoſlav, on the Dnieper; 48 miles S. of Ekaterinoſlav. N. lat. 47° 24′. E. long. 34° 44′.

SLAVE-RIVER, a river of North America, being a continuation of Unjigah or Peace river, which diſcharges itſelf into the greater Slave-lake. Near that part of the Slave-river, where it firſt loſes the name of Peace river, and along the extreme edge of the adjoining plains, are very ſtrong ſalt ſprings, which in the ſummer concrete and cryſtallize in great quantities.

SLAUGHTER. See MANSLAUGHTER, HOMICIDE, MURTHER, BUTCHER, &c.

SLAUGHTER-*Houſe*, in *Rural Practice*, the place where neat cattle and other animals are killed for the butcher. In common houſes for this purpoſe, the blood, filth, and other naſtineſs are left to remain upon the floors; but in thoſe of the improved kind, the floors are laid in ſuch a manner as to have a proper full degree of fall or declination towards the thing, if it were only a ſmall part, of what belonged to the cauſe. Accordingly his eſtimable friend, Mr. Henry Thornton, lately deceaſed, brought in a bill, at his requeſt, to aboliſh a very ſmall part of the ſlave-trade. It may be remembered, that a colony had been eſtabliſhed at Sierra Leona, to promote agriculture and a new ſpecies of commerce in its neighbourhood. Now, while the ſlave-trade was carried on all around it, it was found that theſe objects could be but little advanced. The bill, therefore, of Mr. Thornton, went only ſo far as to ſay that the ſlave-trade ſhould not be carried on within a certain diſtance of that colony. This bill was carried through the commons, but though it only aſked that an infant eſtabliſhment, founded on the principles of liberty, and this by parliamentary ſanction, ſhould be protected from the ravages of the ſlave-trade, it was loſt in the houſe of lords. This latter circumſtance was indeed truly diſheartening; yet amidſt the clouds which darkened the horizon, one gleam of hope appeared; for the queſtion had been ſo argued, ſo ſifted, and put into ſuch various lights, that it began now to be underſtood. The conſequence was, that conviction flaſhed upon many, among whom were three planters, Mr. Ellis, Mr. Barham, and Mr. Vaughan. Theſe gentlemen had the candour to riſe up in the houſe of commons, and expreſs themſelves in favour of the abolition, in one of the laſt debates.

The queſtion had been now tried and loſt in almoſt every poſſible ſhape; Mr. Wilberforce and the committee ſeemed to have but two alternatives of choice left them, either to perſevere againſt all hope, or to hold themſelves in readineſs to ſeize the firſt favourable opportunity which ſhould preſent itſelf for furthering the cauſe. It was determined to adopt the latter, and by no means to let the queſtion degenerate into a mere annual motion of form. It was thought proper alſo, as ſeveral members of the houſe of commons were changing their opinions on the ſubject, to give others time to digeſt the powerful eloquence which had been expended upon it. Mr. Wilberforce, therefore, ſuffered the years 1800, 1801, 1802, and 1803, to paſs over without noticing it. In 1804, however, he reſolved to renew his exertions. The committee reſolved to ſecond them, and immediately increaſed its number, that it might act with extraordinary vigour. The circumſtance, which marked this year in particular as favourable for another trial, was the union with Ireland, in conſequence of which a great number of Iriſh members, generous, and open-hearted, and in general friends to the poor Negroes, were added to the Britiſh parliament. Mr. Wilberforce, therefore, under theſe circumſtances, aſked leave to renew his bill for the abolition of the ſlave-trade within a limited time. This motion was as violently oppoſed as any of the former, but was carried at length in a very handſome manner: no leſs than 124 divided in favour of it, and but 49 againſt it. The bill was oppoſed in its ſecond reading, for which however there were 100, and againſt it but 42. When a motion was made for going into a committee it was oppoſed, but carried by 79 to 20. The bill alſo was oppoſed in its laſt ſtage, but carried by a majority of 69 to 36. It was taken up to the lords, but on a motion by lord Hawkeſbury (now lord Liverpool) the diſcuſſion there was put off till the next ſeſſion.

In the ſeſſion of 1805, Mr. Wilberforce renewed his former motion. Leave was at length given him to bring in the bill, but not till after a moſt furious oppoſition. On the ſecond reading of it the oppoſition increaſed, and an amendment was propoſed, *viz.* to put it off to that day ſix months. This amendment was actually carried by a majority of 77 to 70. This defeat occaſioned the aboliitioniſts the ſevereſt diſappointment. The committee inſtantly met, when ſorrow was ſeen in the countenances of all preſent. Their firſt object was to endeavour to develope the cauſes of the miſcarriage now mentioned. It appeared clearly, after the moſt minute examination, that theſe were accidental. The committee, therefore, reſolved upon renewing the conteſt with redoubled vigour the enſuing year. Juſt at this moment, who ſhould join them but Mr. Clarkſon! Eight years' retirement had nearly reſtored him, and the firſt moment he found himſelf able to embark again in the cauſe, he returned to his poſt. As it then ſeemed probable that the queſtion would be carried the next year through the commons, and, if ſo, that it would go to the lords, and that the lords would probably require farther evidence, it was judged proper that evidence ſhould be prepared. But, alas! the noble band of witneſſes which had been laſt collected, had been broken by death and diſperſion, and a new one was to be formed. Herculean taſk! tremendous, however, as it was, Mr. Clarkſon undertook it. He left London in two or three days afterward, and returned in January 1806, after having travelled in purſuit of his object above 5000 miles. In this month died Mr. Pitt, who was then prime miniſter, and who had been one of the great ſupporters of the cauſe.

On the 31ſt of March, 1806, this great queſtion was uſhered again into parliament, but under new auſpices, namely, under the adminiſtration of lord Grenville and Mr. Fox. It was thought proper that Mr. Wilberforce ſhould be as it were in the back-ground on this occaſion, and that the attorney-general, as a conſpicuous officer of the government, ſhould introduce it. The latter accordingly brought in a bill, one of the objects of which was to prohibit Britiſh merchants and Britiſh capital from being employed in the foreign ſlave-trade. This bill paſſed both houſes of parliament, and was therefore the firſt that diſmembered this cruel traffic. In the debate which enſued upon it, it was declared in ſubſtance, both by lord Grenville and Mr. Fox, in their reſpective houſes, that they would do every thing to effect the abolition, and ſhould they ſucceed in ſuch a noble work, they would regard their ſucceſs as entailing more true glory on their adminiſtration, and more honour and advantage on the country, than any other meaſure in which they could be engaged. Conformably with this ſentiment, Mr. Fox himſelf, on the 10th of June, in a ſpeech moſt luminous and pathetic, followed up the victory which had been juſt gained, by moving a reſolution, "that this houſe, conſidering the African ſlave-trade to be contrary to the principles of humanity, juſtice, and policy, will, with all practical expedition, take effectual meaſures for the abolition of it, in ſuch manner and at ſuch a period as may be deemed moſt adviſeable." This motion produced an oppoſition as before, and an intereſting debate. It was ſupported by ſir Ralph Milbank, Mr. Francis, ſir Samuel Romilly, Mr. Wilberforce, lord Henry Petty (now marquis of Lanſdown), ſir John Newport, Mr. Canning, and Mr. William Smith. It was carried by a majority of 114 to 15. Mr. Wilberforce directly moved an addreſs to his majeſty, "praying him to direct a negociation to be entered into, by which foreign powers ſhould be invited to co-operate with his majeſty, in meaſures to be adopted for the abolition of the African ſlave-trade." This was alſo carried, but without a diviſion. On the 24th of June, the lords met to conſider both the reſolution and addreſs. A propoſition was directly made in that houſe (in order to create delay), that counſel and evidence ſhould be heard. This, however, was happily over-ruled. Lord Grenville then roſe up and introduced the ſubject. His ſpeech was among the maſter-pieces of eloquence. He was ſupported in the debate, which followed by the lord chancellor (Erſkine), the biſhop of London (Dr. Porteus), the biſhop of St. Aſaph (Dr. Horſley), earl Groſvenor, earl Stanhope, earl Spencer, earl of Suffolk, and the lords Holland and Ellenborough. The reſolution and addreſs were at length both carried, by a majority of 41 to 20. After this a belief was generally prevalent, that the ſlave-trade would fall in the next ſeſſion. This occaſioned a fear in the abolitioniſts, leſt it ſhould be carried on in the interim, being as it were the laſt harveſt of the merchants, to a tenfold extent, and therefore with tenfold murder and deſolation to Africa. It was therefore thought neceſſary, as the ſeſſion was about to cloſe, to introduce another bill into parliament, and this as quickly as poſſible, that no new veſſel ſhould be permitted to go to the coaſt of Africa for ſlaves. Accordingly a bill to that effect was prepared, and it paſſed both houſes. In the month of October following, after theſe great and deciſive victories, died the right honourable Charles James Fox, one of the nobleſt champions of this noble cauſe. He had lived juſt to put it into a train for final triumph. This triumph, however, he enjoyed in anticipation. The proſpect of it ſoothed his pains, and cheered his ſpirit in the hours of his ſickneſs. At this melancholy ſeaſon it became with him a frequent topic of converſation, and the hope of it was perceived to quiver on his lips, in one of the laſt moments of his life.

The ſeſſion of 1807 had not long commenced, when the conteſt was renewed. Lord Grenville judged it expedient, at this particular criſis, to reverſe what had been hitherto the order of proceeding, that is, to agitate the queſtion firſt in the houſe of lords. On the 2d of January he preſented a bill there, which he called an act for the abolition of the African ſlave-trade. It was very ſhort; he propoſed that it ſhould be printed, and that it ſhould then lie on the table for a while, that it might be maturely conſidered before it was diſcuſſed. On the 4th, no leſs than four counſel were heard againſt it. On the 5th the debate commenced. Lord Grenville took a brilliant part in it. He was ſupported by his highneſs the duke of Glouceſter, the biſhop of Durham (Dr. Barrington), the earls Moira, Selkirk, and Roſslyn, and the lords Holland, King, and Hood. The bill was at length carried, at four in the morning, by a majority of 100 to 36. On the 10th of February it went to the commons. On the 20th counſel were heard againſt it there. On the 23d a debate enſued upon it, on the motion of lord viſcount Howick (formerly Mr. Grey, and now lord Grey), who urged the commons to confirm it. The other ſpeakers in favour of it were Mr. Roſcoe, Mr. Fawkes, Mr. Luſhington, the lords Mahon and Milton, ſir Samuel Romilly, ſir John Doyle, Mr. Wilberforce, and earl Percy; and it was carried by the vaſt majority of 283 to 16. On the 6th of March the blanks were filled up. It was propoſed, firſt, that no veſſel ſhould clear out for ſlaves from any port within the Britiſh dominions, after the 1ſt of May following, that is, 1807, and that no ſlave ſhould be landed in the Britiſh colonies after the 1ſt of March 1808. This and almoſt every other propoſition were oppoſed, but happily without effect. Suffice it to ſay, that on the 18th the bill, with the blanks filled up, was carried back to the lords; that in conſequence of various amendments, it paſſed and repaſſed from one houſe to the other, but always with oppoſition; that on the 24th it paſſed both houſes; and that on the 25th, at half paſt eleven in the morning, it received the royal aſſent. Thus paſſed, after a twenty years' hard ſtruggle, during which the field had been diſputed inch by inch, and won at laſt by the arms of reaſon, this magna charta for Africa in Britain, under the adminiſtration of lord Grenville and Mr. Fox, an adminiſtration which, on account of its noble exertions in behalf of the oppreſſed African race, will paſs to poſterity, living through ſucceſſive generations, in the love and gratitude of all the moſt virtuous of mankind. The news of this great event gave uncommon joy throughout the kingdom, and this joy was farther heightened by authentic news juſt then received from North America, that the government there had paſſed a ſimilar bill, which was to be obſerved as a law through the United States.

In France, on the re-eſtabliſhment of the Bourbon dynaſty, it was propoſed to aboliſh the ſlave-trade at a diſtant period. Upon the return of Bonaparte from Elba, an order was iſſued for its immediate abolition; and a decree to the ſame purpoſe has been paſſed ſince the expulſion of Napoleon, and the reſtoration of the preſent reigning monarch.

SLAVE-COAST, in *Geography*, a tract of country in Africa, bordering on the Atlantic, ſituated between the Gold Coaſt and Benin, and comprehending the kingdoms of Ardra, Koto, Popo, and Whidah. See each reſpectively, and alſo SLAVE-TRADE.

The inhabitants reſemble thoſe of the Gold Coaſt in their politics, religion, and manners.

SLAVE-FALLS, a cataract of North America, in Winnipeg river, 100 yards wide and 20 feet in height. N. lat. 50° 6'. W. long. 95° 20'.

SLAVE-INDIANS, Indians of North America, who were driven from their original country by their enemies the Kniſteneaux, along the borders of the Unjigah or Peace river, where it aſſumes from them the name of the Slave river; though the term by no means involves the idea of ſervitude, but was given to thoſe fugitives as a term of reproach, that denoted more than common ſavageneſs.

SLAVE-LAKE, *Great*, a large lake of North America, ſo called by the Kniſteneaux, which derived its name from that of its original inhabitants, who were called ſlaves. This lake is well known to the Kniſteneaux, who are among the inhabitants of the plains on the banks of the Saſkatchiwine river; for formerly, when they uſed to make war in this country, they came in their canoes to that lake, and left them there; from whence there is a beaten path all the way to the Forks, or E. branch of this river, which was their war-road. This lake is ſaid to be more than 200 miles in length, and about 12 in breadth. It is ſuppoſed to be the ſame with Hearne's *Athapuſcow*, which ſee. Bitumen is found on the coaſt of this lake, in N. lat. 60°, near its diſcharge by Mackenzie's river, which, flowing from Slave-lake, diſcharges itſelf into the North ſea, on the banks of which are coal and bitumen, as far north as latitude 66°. N. lat. 61° 20'. W. long. 115°.

SLAVE-LAKE, *Leſſer*, a lake of North America, in N. lat. 55° 30'. W. long. 115°, which diſcharges itſelf into the Elk river.

SLAVENSK, a town of Ruſſia, in the government of Ekaterinoſlav, on the Dnieper; 48 miles S. of Ekaterinoſlav. N. lat. 47° 24'. E. long. 34° 44'.

SLAVE-RIVER, a river of North America, being a continuation of Unjigah or Peace river, which diſcharges itſelf into the greater Slave-lake. Near that part of the Slave-river, where it firſt loſes the name of Peace river, and along the extreme edge of the adjoining plains, are very ſtrong ſalt ſprings, which in the ſummer concrete and cryſtallize in great quantities.

SLAUGHTER. See MANSLAUGHTER, HOMICIDE, MURTHER, BUTCHER, &c.

SLAUGHTER-*Houſe*, in *Rural Practice*, the place where neat cattle and other animals are killed for the butcher. In common houſes for this purpoſe, the blood, filth, and other naſtineſs are left to remain upon the floors; but in thoſe of the improved kind, the floors are laid in ſuch a manner as to have a proper full degree of fall or declination towards the middle parts, where there is a drain made for taking away all ſuch offenſive matters, and keeping the houſes quite clean and ſweet, merely by pumping or throwing water upon the floors of them.

Houſes of this ſort have uſually the dimenſions of about twenty-two feet in length by ſixteen in width; but they may be conſtructed in this way to any ſuitable extent that may be neceſſary. The drains of ſlaughter-houſes are often connected with pits or reſervoirs, by which means large quantities of excellent manure are accumulated.

Theſe houſes, likewiſe, ſometimes form parts in the arrangement of farm buildings in large farm-yards.

SLAUGHTER-*Skins*, a term uſed by our curriers and leather-dreſſers for the ſkins of oxen, or other beaſts, when freſh, and covered with the hair: ſuch as they receive them from the ſlaughter-houſes where the butchers flay the carcaſe.

SLAUGHTER *Creek*, in *Geography*, a bay of America, on the coaſt of Maryland, in the Cheſapeak.

SLAUGHTERING *of Animals*, the cuſtom of killing them for the purpoſe of food. This operation, for the ſake of humanity, ſhould conſtantly be performed in the moſt ſudden and ready manner poſſible, and not in the lingering, brutal, protracted way which is uſually practiſed by the generality of butchers in this country. See STRIKING *or Pithing Animals*.

SLAVI, SLAVONIA, and SLAVONIANS. See SCLAVI, SCLAVONIA, and SCLAVONIANS.

SLAWATICZE, in *Geography*, a town of Lithuania, in the palatinate of Brzeſc, near the Bug; 16 miles S. of Brzeſc.

SLAWENTITZ, a town of Sileſia, in the principality of Oppeln; 24 miles S.E. of Oppeln.

SLAWIETIN, a town of Bohemia, in the circle of Schlan; 12 miles N.W. of Schlan.

SLAWKOW, a town of Auſtrian Poland, in the palatinate of Cracow; 25 miles N.W. of Cracow.

SLAWKOW. See AUSTERLITZ and SCHLAKENWALD.

SLAWONICA. See ZLABINGS.

SLEAFORD, or NEW SLEAFORD, a market-town in the wapentake of Flaxwell, parts of Keſteven, and county of Lincoln, England, is ſituated 16 miles S. of Lincoln and 116 N. of London, on a ſmall rivulet called the Slea, which riſes in the vicinity, and runs to Chapel Hill, where it joins the river Witham. Many Roman coins of the Conſtantine family have been found here, from which, and other circumſtances, Dr. Stukeley conjectures, that this was a Roman town. "We find the diſtance," he obſerves, "between Caſtor and Lincoln about forty miles, has two towns upon it at proper intervals for lodging: theſe are Sleaford and Stanfield. The original names of them are in irrecoverable ſilence, but the eternity of the Romans is inherent. It is probable that Alexander, biſhop of Lincoln, built his work upon the ſcite of a Roman citadel. Beſide, at Sleaford comes in the other Roman road from the fen country by Brig End Cauſy, and at the interſection of theſe two roads the old town ſtood." The work here alluded to was the caſtle, which, in Leland's time, was ſtanding, and is thus deſcribed by him. "Withoute the towne of Sleford ſtandith, weſt-ſouth-weſt, the propre caſtell of Sleford, very well mantayned; and it is compaſſed with a renning ſtreme, cumming by a cut oute of a little feene, lying almoſte flatte weſte againſt it. In the gateway be two portcuſliſes, a high towre in the middle of the caſtelle, but not ſet upon a hill of raiſed earth: the vaults of the caſtle by the ground be fair. The houſe, or manor place, lately almoſt new, buildid of ſtone and timbre, ſtandith ſouthward without the town. The town nor market is of no price: the ornaments of it is the biſhop of Lincoln's caſtle, and the late lord Huſſey's houſe." Since Leland's time, however, Sleaford has become a different place, and is ſtill improving both as to buildings and population. In the return to parliament in the year 1811, the houſes are ſtated to be 385, the inhabitants 1781. The caſtle has been wholly levelled with the ground, and lord Huſſey's manſion, at Old Sleaford, is now a farm-houſe. A weekly market is held on Mondays, and four fairs are held annually.

The church is a handſome, ſpacious ſtructure, and, from a manuſcript found in the pariſh cheſt, appears to have been built in the year 1271, by Roger Blunt and Roger Brickham, of Sleaford, merchants. It conſiſts of a chancel, nave, tranſept, and two aiſles; with a tower crowned by a ſpire, which riſes to the height of 144 feet. In the chancel are ſeveral monuments to the family of Carr, by one of which a free-ſchool was erected and liberally endowed in the year 1603; and alſo an hoſpital for twelve poor men. The manor and eſtates were conveyed by marriage, with an heireſs of the Carr family, to the late earl of Briſtol.

At Kyme, about three miles from Sleaford, Leland ſays, there was in his time "a goodly houſe and park." Philip de Kyme, in the reign of Henry II., built here a priory for black canons of the order of St. Auguſtine, to the honour of the Bleſſed Virgin. Its ſurrender by a prior and nine canons to Henry VIII. is noticed by Willis.

About ſeven miles eaſt of Sleaford, is Haverholme priory, the ſeat of ſir Jeniſon William Gordon, bart. The houſe and grounds occupy an area of about 300 acres, which conſtitute an iſland, formed by two branches of a river. It was given by biſhop Alexander, in 1139, to the nuns and canons of the order of St. Gilbert of Sempringham; and at the diſſolution was granted to Edward, lord Clinton. The preſent poſſeſſor of Haverholme made numerous additions to the old remains in 1788, and has formed a manſion in a ſtyle correſponding with the importance of the place. Beauties of England and Wales, vol. ix. by J. Britton, F.S.A.

SLEAMORE POINT, the ſouthern extremity of the iſland of Iniſherkan, oppoſite to Baltimore, in the county of Cork, Ireland. N. lat. 51° 24′. W. long. 9° 19′.

SLEASY HOLLAND, a kind of holland thus called, becauſe made in Sileſia in Germany; and which, from its ſlightneſs, occaſions all thin, ſlight, ill-wrought hollands, to be called *ſleaſy*.

SLEBEZE, or SLYBZE, in *Geography*, a ſmall iſland in the ſtraits of Sunda. S. lat. 5° 54′. E. long. 105° 24′.

SLECK, in *Rural Economy*, a provincial term applied to the ſmall of pit-coal: alſo to the black matter of ſmutty grain.

SLED, in *Agriculture*, provincially a ſledge.

SLEDGE, a kind of carriage without wheels, for the conveyance of very weighty things, as huge ſtones, bells, &c. The ſledge for carrying criminals, condemned for high treaſon, to execution, is called *hurdle*.

The Dutch have a kind of ſledge, on which they can carry a veſſel of any burden by land. It conſiſts of a plank of the length of the keel of a moderate ſhip, raiſed a little behind, and hollow in the middle; ſo that the ſides go a little aſlope, and are furniſhed with holes to receive pins, &c. The reſt is quite even.

SLEDGE, in *Agriculture*, an implement employed for conveying various articles upon. It is made of two ſtrong pieces of wood framed together.

It is a very uſeful ſort of contrivance for different kinds of work and purpoſes in farming in different ſituations of land, but eſpecially thoſe that are rather of a hilly nature; ſuch as the conveying away various ſorts of heavy materials, as thoſe of ſtones and earthy matters, and in ſome inſtances the produce of the land. Sledges alſo ſerve the purpoſe of tranſporting ploughs and other heavy tools of agriculture to the different fields and other places where they are to be uſed or employed, being contrived expreſsly for ſuch uſes and intentions. They are a kind of tool, which are made much uſe of in many of the northern diſtricts of the kingdom, as well as in ſome of the ſouthern ones.

In the county of Cornwall they employ a ſort of ſledge or dray, on moſt farms, for the carriage of their hay, corn, faggot-wood, and many other matters. Their ſledges moſtly conſiſt of two ſtrong ſide-pieces of wood, ſomewhat in the form of a common boat, only more ſharply turned upwards at the ends, which have five, ſix, and ſometimes ſeven croſs-bars mortiſed into each, being ſhod below with thick rough portions of ſtrong timber, on which the whole ſlides upon the ſurface of the ground.

In ſome caſes two, ſmall, low wheels are attached, on which the machine moves. Theſe ſledges are drawn either by horſes or oxen in the above diſtrict, and are found to be handy and convenient in various ways.

SLEDGE is a large ſmith's hammer, to be uſed with both hands: of this there are two ſorts, the *up-hand ſledge*, which is uſed by under workmen, when the work is not of the largeſt ſort; it is uſed with both the hands before, and they ſeldom raiſe it higher than their head. But the other, which is called the *about-ſledge*, and which is uſed for battering or drawing out the largeſt work, is held by the handle with both hands, and ſwung round over their heads, at their arms end, to ſtrike as hard a blow as they can.

SLEDGE, among *Miners*. See DIGGING.

SLEDGES, in *Rope-making*, are frames of oak mortiſed together, and clamped with iron in different parts. They are from three feet wide, and eight or twelve feet long, to five feet wide and fifteen feet long. The two ſides are the length of the ſledge, five by ſeven inches thick, and tied in by oak bars at each end: near the front are two uprights five feet high, mortiſed into the ſides, and ſupported by two ſlanting pieces from the upper end. A breaſt-board nine inches wide, and from three to five inches thick, is faſtened with iron pins to the uprights, and contains holes for the hooks to go through, on which the yarn is hung, which being turned by men, is twiſted into ſtrands, and then cloſed and finiſhed into rope. Theſe ſledges are loaded to any degree the rope in making may require.

SLEDGE *Iſland*, in *Geography*, an iſland in the North Pacific ocean, near the weſt coaſt of North America; about 12 miles in circuit. This iſland is compoſed of large looſe ſtones, covered with moſs and other vegetables, of which there are twenty or thirty different ſpecies, moſtly in flower. Captain Cook ſaw neither ſhrub nor tree, either upon the iſland or continent. He obſerved one fox, a few plover, and other ſmall birds, and alſo ſome decayed huts conſtructed partly below the ground. A beaten path was ſeen from one end of the iſland to the other, and theſe circumſtances indicated its having been lately viſited by ſome people. A ſledge alſo was found, which gave name to the iſland: this was ſuch as the Ruſſians in Kamtſchatka uſed to convey goods from one place to another, over the ice or ſnow. It was 10 feet long, 20 inches broad; it had a kind of railwork on each ſide, and was ſhod with bone. Its conſtruction was admirable, its parts being neatly put together, partly with wooden pins, but principally with thongs or laſhings of whale-bone. N. lat. 64° 50′. W. long. 166° 3′.

SLEDINGEN, a town of France, in the department of the Scheld; 5 miles N. of Ghent.

SLEEAN, in *Rural Economy*, provincially the ſmut in corn.

SLEEP, in *Phyſiology*, the more or leſs complete ſuſpenſion of the functions of ſenſation and volition, that is, of the action of the five ſenſes, of the brain, of the voluntary muſcles, and the voice, or the organs which connect us with the external world, to which animals, at leaſt thoſe of the claſſes mammalia and birds, are ſubject at certain more or leſs regular intervals, for the purpoſe of renewing the power of action exhauſted by exerciſe.

In the article LIFE we have ſtated, that the internal functions, which make up the *organic* life, differ remarkably from the external, which compoſe the *animal* life, in the duration of their action; that while the former go on inceſſantly, the latter are ſubject to intermiſſions or periods of complete repoſe, each particular organ experiencing, from its activity, an exhauſtion of power, a fatigue, which renders reſt abſolutely neceſſary before it can be again exerted; which exhauſtion or fatigue is unknown in the organic life. This law, of the intermiſſion of action, has been very ſatisfactorily applied by Bichat to the theory of ſleep. "General ſleep," ſays he, "is the aſſemblage of particular ſleeps. It is derived from that law of the animal life, which cauſes in its functions a conſtant ſucceſſion of periods of activity, and times of intermiſſion;—a law, which pointedly diſtinguiſhes it from the organic life. Hence ſleep influences the latter only in an indirect way, while it exerts its full operation on the former.

"Numerous varieties may be remarked in this periodic ſtate, to which all animals are expoſed. The moſt complete ſleep is that, in which the whole external life, that is, the ſenſes, perception, imagination, memory, judgment, locomotion, and the voice, are ſuſpended; the leaſt perfect affects only a ſingle organ. We ſee numerous gradations between theſe two extremes; ſometimes the ſenſes, perception, locomotion, and the voice, are ſuſpended; imagination, memory, and judgment remaining active; ſometimes locomotion and the voice are added to the latter. Such is the ſleep which is agitated by dreams. A portion of the animal life ſtill continues active, having eſcaped the torpidity in which the reſt is plunged. Three or four ſenſes only may have paſſed into the ſtate of repoſe, and ceaſed to be influenced by external objects; then that kind of ſomnambuliſm occurs, in which, to the action of the brain, the muſcles, and the larynx, are added thoſe of hearing and touch, often in a very diſtinct form.

"Let us then no longer regard ſleep as a conſtant ſtate, invariable in its phenomena. Scarcely do we ſleep twice together in the ſame way; a multitude of cauſes modifies this condition of our being, by applying to a greater or ſmaller portion of the animal life the general law of intermittent action. The various modifications muſt be characteriſed by the functions, which are affected in different inſtances. The principle is the ſame throughout, from the ſimple relaxation, which follows the contraction of a voluntary muſcle, to the entire ſuſpenſion of the animal life. Sleep is in all caſes a conſequence of that general law of intermiſſion, which excluſively characteriſes this life, but the application of which to the various external functions varies infinitely.

"This explanation of ſleep is undoubtedly very different from thoſe narrow ſyſtems, which place its cauſe in the brain, the heart, the large veſſels, the ſtomach, &c. and thus preſent an inſulated phenomenon, often illuſory, as the baſis of one of the great modifications of life.

"Why do light and darkneſs, in the natural order of things, correſpond reſpectively to the activity and repoſe of the external functions? Becauſe, during the day, the animal is ſurrounded with a multitude of exciting cauſes; a thouſand things exhauſt the powers of the ſentient and locomotive organs, fatigue them, and thus prepare a relaxation, which is favoured at night by the abſence of all ſtimuli. Thus, in the modern way of life, in which this order is partly inverted, we aſſemble round us, during the night, various ſtimuli, which prolong the ſtate of watchfulneſs, and make the intermiſſion of the animal life coincide with the firſt hours of the dawn, favouring it by removing all circumſtances that might produce ſenſations.

"By multiplying around them cauſes of excitation, we can, for a certain time, prevent the organs of the animal life from obeying the law of intermiſſion; but they yield at laſt, and nothing, after a certain time, can ſuſpend its influence. Exhauſted by continued exertion, the ſoldier ſleeps at the ſide of the cannon, and the criminal even amid the tortures of the queſtion.

"Let us, however, diſtinguiſh natural ſleep, the conſequence of fatigue of the organs, from that which is cauſed by affections of the brain, as apoplexy, or concuſſion. In the latter caſe the ſenſes are awake, they receive impreſſions, and are affected by them as uſual; but theſe impreſſions cannot be perceived by the diſordered brain, and we conſequently are not conſcious of them. In ſleep, on the contrary, the intermiſſion of action affects the ſenſes as much, and even more than the brain." Recherches Phyſiol. ſur la Vie et la Mort, p. 34—37.

Although the remarks of Bichat in the preceding quotation, reſpecting the ſleep of the particular ſenſes, may be regarded rather as illuſtrations, than as proofs that the ſtate of fatigue from exertion of any particular organ is exactly the ſame as its condition in ſleep, we conſider the general view of the ſubject as perfectly correct. In the moſt complete ſleep, our relations to external objects are entirely ſuſpended, and conſciouſneſs undergoes an equally complete interruption. The appropriate ſtimuli, preſented to the external ſenſes, excite no ſenſations; the operations of the mind do not go on; hence there is nothing to excite volition, and the voluntary powers are conſequently quieſcent. The portion of exiſtence paſſed in ſuch ſleep is a perfect blank. We have examples of it in the moſt tranquil and healthy ſtates of the body and mind, and after conſiderable fatigue, or in the recovery from ſevere and painful diſeaſe.

But this ſound ſleep is much leſs common, than that which is more or leſs interrupted by dreams, in which a ſeries of ſenſations, perceptions, and reflections, paſſes through the mind, as in the waking ſtate. We are conſcious of the ſame kind of tranſactions as occupy our waking hours; we ſee, hear, walk, talk, and perform all the cuſtomary offices of life. The mind reaſons, judges, performs volition, and experiences the various affections, as love, hatred, indignation, anxiety, fear, joy, even in a much more lively degree, than when they are excited by their real cauſes. In dreaming, as in the ſoundeſt ſleep, the action of the external ſenſes is ſuſpended; but the internal faculties are active in greater or leſs number. Volition takes place, but the muſcles do not obey the will. That dreaming is a leſs ſound ſpecies of ſleep, appears from the familiar fact, which has probably been obſerved by every individual; *viz.* that the firſt ſleep is much freer from it than the ſecond. We retire to reſt, fatigued by the exertions of the day, and ſleep ſoundly for five or ſix hours: we wake, and then fall aſleep again towards the morning, and dream the whole time of this ſecond ſleep.

Haller, who mentions that he had attended much to his dreams, obſerves, that in perfect health he remembered only the ſenſation of flying through the air, conceiving himſelf ſuſpended above the earth and carried to a diſtance.

The order of the images and reflections, which paſs through our minds in ſleep, and the laws of their ſucceſſion and connections, are the ſame as when we are awake. We muſt obſerve, however, that theſe internal proceſſes now go on by themſelves, and are not corrected by that reference to external objects, and that exerciſe of the external ſenſes, which takes place in the waking ſtate. Thus we ſee a friend long dead, without being aware that he is not alive; and groſs inconſiſtencies and abſurdities take place without being remarked.

The great activity of the imagination and judgment in the act of dreaming, is evident from the nature of many dreams. "Often," ſays Haller, "in my dreams, I ſeem to read books, printed poems, hiſtories of travels, &c.; and I even ſee the plants of diſtant regions, ſuited to their climates." Others ſolve problems, write, make verſes, &c. The reaſonings which are carried on in ſleep, the ſpeeches which are made, &c. are often more quickly and eaſily performed than when we are awake.

The cauſes of dreams are very obſcure; we cannot determine how the intellectual powers are called into exerciſe, nor what ſtimuli ſhould be applied for that purpoſe. It is known, however, that various bodily derangements have an important influence. The ſtate of the ſtomach, which ſo often acts on the brain, will frequently diſturb our reſt; if a perſon, unaccuſtomed to ſuch indulgence, eat a hearty ſupper, he will experience nightmare, that is, a ſenſe of preſſure about the cheſt, and of ſome moſt dreadful impending danger, without the poſſibility of eſcaping it. When the painful ſenſation is arrived at its height, we awake, and can immediately move. Or the ſame cauſe, inſtead of producing nightmare, may diſtreſs us with terrific dreams, in which dangers aſſail us in every ſhape: we fancy that we cannot eſcape from the intricate paſſages and rooms of a houſe; that we ſhall fall from a precipice, or into a river. In theſe inſtances, too, ſome very ſtrong impreſſion generally rouſes us in a ſtate of great alarm. Inſtances are not wanting of perſons who have determined to remember that the dangers preſented to the mind in dreaming are fallacious, and have recollected this at the time, ſo as to be protected from the alarm, which would otherwiſe have been cauſed. Profeſſor Stewart mentions that Dr. Reid freed himſelf in this way from the diſtreſs of frightful dreams, which had annoyed him for ſome time. The writer of this article has experienced the ſame circumſtance, and Haller mentions a ſimilar fact: "Ita ille, quem diximus, ad vitandas pollutiones voluntatem firmam attuliſſe, expergiſcebat ad ſenſum lubricæ imaginis."

In many bodily diſorders, broken ſleep, and alarming dreams, which make the patient ſtart and awake, are common ſymptoms; ſuch is the caſe in hydrothorax, and diſeaſes of the heart. The delirium of fever is an unnatural activity of the internal faculties, the ſenſes being more or leſs quieſcent, produced by the excitation of the brain, and not differing in its eſſential nature from dreams.

Immediate impreſſions ſometimes influence us during ſleep; children will evacuate their urine on a chamber-pot being put in their hands; and the ſame effect is ſaid to have been produced by putting the hand of a ſleeping child in cold water. The cauſe acts more powerfully than it would in the waking ſtate; and the ſame remark holds good with reſpect to the excretion of the ſeminal ſecretion in ſleep. "Somnium," ſays Haller, "quam ſenſatio fortius eſt, et vehementius animam percellit. Id tribuas ſolitudini, quieti, adtentioni ad unicum objectum. Certe vix unquam ſanus homo ex quacunque libidine ſemen profuderit. In ſomniis id fit, certa quidem ætate, neque fere in ſenis, perfacile in pueris. Sed neque ſenſatio, quæ ſomnii cauſa eſt, aut ſola aut pura menti repreſentatur. Ex lege aſſociationis idearum ad ſimplicem ſtimulum naſcitur idea feminæ pulchræ, amatæ, quam ambias, quæ cedat facilis: accedit lectulus, et omne ſatellitium arcani amoris. Et magis et magis poſt primos ſermones adpropinquat cominus ſperata voluptas, ut viciſſim perinde anxietatis hieroglypha continuo graviora menti incumbunt."

The dreams which occur almoſt nightly in moſt individuals, ſhew the activity of the internal mental operations during ſleep: voluntary motions are leſs commonly performed. Some horſes ſleep ſtanding; and the lower jaw is maintained elevated in us during ſleep. The hand is often raiſed when any ſtimulus is applied to the body, although it may not be ſtrong enough to interrupt ſleep. The fact of children expelling their urine, when the pot is brought to them, has been already noticed. Many perſons laugh, weep, ſigh, and talk in their ſleep: the words are indeed generally indiſtinctly pronounced, and the ſentences incomplete.

The ſleep-walkers differ from theſe only in degree. They execute the voluntary motions, which ariſe out of the mental proceſſes carried on in ſleep. It would be endleſs to recount the particular caſes belonging to this ſubject. It is ſufficient to mention that individuals riſe from bed aſleep, and with their eyes cloſed, and not only walk about the room or houſe, going up or down ſtairs, finding their way readily, and avoiding obſtacles, but paſs ſafely through very dangerous places, as windows, or on the roofs of houſes. They execute, too, ſtill more difficult feats. They dreſs themſelves, go out of doors, light a fire, undreſs and bathe, ſaddle and bridle a horſe, ride, write, make verſes, and execute all the actions of life correctly, and even ſometimes acutely. During this time they are aſleep; the eyes are ſhut, or do not ſee if open; the iris is not irritable. When awakened, which is ſometimes not eaſily effected, they do not remember what they have done.

The proportion of time paſſed in ſleep differs in different individuals, and at different ages. From ſix to nine hours may be reckoned about the average proportion. Men of active minds, whoſe attention is engaged in a ſeries of intereſting employments, ſleep much leſs than the liſtleſs and indolent; and the ſame individual will ſpend fewer hours in this way, when ſtrongly intereſted in any purſuits, than when the ſtream of life is gentle and undiſturbed. The great Frederic of Pruſſia, and John Hunter, who devoted every moment of their time to the moſt active employments of body and mind, generally took only four or five hours ſleep. A rich and lazy citizen, whoſe life is merely a chronicle of breakfaſts, dinners, ſuppers, and ſleep, will ſlumber away ten or twelve hours daily. When any ſubject ſtrongly occupies us, it keeps us awake in ſpite of ourſelves. Theſe phenomena are conſiſtent with what we have already ſaid; the animal organs, when the period of their intermiſſion and repoſe has arrived, are kept in activity by new and unuſual cauſes of excitation, and thus the ordinary period of ſleep may be paſſed over, and its ordinary quantity much diminiſhed. When a perſon, who has thus been kept long awake by the occupation of his mind with important and urgent ſubjects, at laſt falls aſleep, the ſlighteſt irritation calls up in the fancy all the trains of thought which have juſt occupied us, and ſets at work again all the internal machinery which has hardly yet become quiet; the ſleep, under ſuch circumſtances, is imperfect, and much diſturbed by dreaming.

The newly-born child ſleeps moſt of its time; it ſeems to wake merely for the purpoſe of feeding. Some have called fœtal exiſtence a perpetual ſleep; but the animal organs, never having been yet exerciſed, can hardly be ſaid to be in a ſtate of repoſe. See EMBRYO.

For the firſt two or three years, children ſleep more than once in the twenty-four hours. Again; very old perſons ſleep much of their time: in the natural progreſs towards death, the animal faculties are firſt extinguiſhed; accordingly, when they begin to decline in decrepid old age, the periods of their intermiſſion are longer. The celebrated De Moivre, when eighty-three years old, was awake only four hours out of the twenty-four (Hiſt. de l'Acad. des Sc. for 1754); and Thomas Parr at laſt ſlept the greateſt part of his time. Animals which do not prey by night, ſeem to paſs as much time aſleep as awake; that is, they ſleep during the dark, and are awake ſo long as the ſun is above the horizon.

The ſtate of torpidity in which many animals paſs the winter months, cannot properly be called ſleep; it is not a repoſe of the animal organs, conſequent on the fatigue produced by their exerciſe; but is a peculiar condition of the whole frame, affecting the internal as well as the external organs, and cauſed directly by the action of cold.

The exhauſtion of the powers of the animal organs by exerciſe being the determining cauſe of ſleep, it comes on after the cloſe of our daily occupations, when darkneſs neceſſarily cauſes an intermiſſion of labour and a general quiet, which are favourable to repoſe. The number of hours devoted to active occupation, and the time at which diſpoſition to ſleep is felt, are influenced conſiderably by habit: after conſiderable and unuſual exertion, ſleepineſs will be felt in the day-time.

The period of ſleep may be protracted, by unuſual excitation, much beyond the ordinary period; but the effect is loſt after a certain time, and ſleep comes on under circumſtances, which appear at firſt moſt unfavourable to it. An eye-witneſs reported that ſome boys, completely exhauſted by exertion, fell aſleep amid all the tumult of the battle of the Nile; and other inſtances are known of ſoldiers ſleeping amid diſcharges of artillery, and all the tumult of war. Couriers are known to ſleep on horſeback, and coachmen on their coaches. A gentleman who ſaw the fact, reported to the writer of this article, that many ſoldiers in the retreat of ſir John Moore, fell aſleep on the march, and continued walking on. Even ſtripes and tortures cannot keep off ſleep beyond a certain time; but it then indicates the greateſt exhauſtion, and conſequently affords an unfavourable prognoſis. Noiſes at firſt prevent us from ſleeping, but their influence ſoon ceaſes, and perſons reſt ſoundly in the moſt noiſy ſituations. The proprietor of ſome vaſt iron-works, who ſlept cloſe to them, through the inceſſant din of hammers, forges, and blaſt-furnaces, would awake if there was any interruption during the night. And a miller, being very ill and unable to ſleep, when his mill was ſtopped on this account, reſted well and recovered quickly when the mill was ſet a going again.

Great hunger prevents ſleep; and cold affecting a part of the body has the ſame effect. Theſe cauſes operated on the unfortunate women who lived thirty-four days in a ſmall room overwhelmed by ſnow, and with the ſlighteſt ſuſtenance: they hardly ſlept the whole time. (Somis Ragionamento ſopra un fatto avvenuto in Bergemoletto, &c. p. 74.) Indigeſtion, and various bodily affections, produce ſleepleſſneſs. We have already noticed, that all mental occupations attended with intenſe thought, and great intereſt, prevent ſleep; and any great affections of the mind have the ſame effect.

It will eaſily be underſtood that circumſtances oppoſite to thoſe juſt enumerated are favourable to ſleep. Bodily exerciſe with tranquillity of mind, and abſence of all excitation, are the moſt important of theſe. A full repaſt is often followed by ſleep, even in animals, as dogs. The diſtention of the ſtomach excites the circulation, and thus brings on a condition of the brain favourable to ſleep. Various vegetable ſubſtances taken into the ſtomach act on the brain in the ſame way. Intenſe cold, affecting the whole body, exhauſts the animal powers and brings on ſleep, which is ſpeedily fatal. See Cold.

Sleepineſs, when it occurs naturally, after our daily occupations, is marked, firſt, by a ſenſe of muſcular fatigue, particularly in the long muſcles: it may be experienced in various parts, according as they have been more exerciſed. We begin to gape; the intellectual functions languiſh; curioſity is blunted; attention becomes painful; and a great deſire of repoſe is felt over the whole body. The impreſſions on the external ſenſes are indiſtinct; we cannot read well, nor does the memory act with its uſual force or order: an uneaſy ſenſation is perceived in the eye; the upper eye-lid falls in ſpite of every effort to keep it elevated. Now the muſcles of the whole body are more or leſs relaxed: hence the head inclines forwards, and the whole body would come to the ground if the perſon were ſtanding. The ſenſe of hearing ſeems to be ſuſpended laſt; we hear and underſtand the converſation of thoſe near us, when the eyes no longer act. Now the ſucceſſion of our mental operations becomes quite involuntary; and a kind of delirium takes place, in which the trains of thought preſerved in the memory ſucceed according to their natural aſſociations and connections. Theſe operations are then ſuſpended, and ſleep is complete.

Reſpecting the ſtate of the body in ſleep we have very little to add to our general account already given. In complete ſleep the body is perfectly motionleſs; the ſenſes are not affected by their reſpective external objects, unleſs the impreſſions ſhould be ſtrong enough to arouſe us. Hunger and thirſt are not felt; nor are we conſcious of the neceſſity of emptying the bladder or bowels, until the diſtention is ſufficient to waken us. The functions of the organic life go on uninterruptedly; digeſtion, chylification, and the converſion into fæces, abſorption, circulation, reſpiration, nutrition, ſecretion, are all continued. There may be ſome ſlight modifications, but they are unimportant.

After the ſleep has laſted long enough to reſtore the animal powers, we awake, without any change or occurrence which can be ſhewn to affect particularly the brain or other parts, of which the action was ſuſpended by ſleep. We open our eyes, and often rub them. We move the limbs and ſtretch them; and in a few ſeconds we have the full uſe of our ſenſes, intellectual faculties, voice and voluntary muſcles, and they recover their powers of action completely.

There are rare examples of individuals, who have gone on ſleeping for days, weeks, and months: but theſe hiſtories are not accompanied with ſuch particulars as would enable us to judge of the cauſe for ſuch a deviation from the ordinary courſe of nature.

Sleep, *Somnus*, in *Mythology*, the ſon of Erebus and of Night, according to Homer and Heſiod, and the brother of *Mors* or *Death*.

Virgil (Æn. vi. v. 278.) aſſigns to this deity an abode with death, in the ſubterraneous or inviſible world.

Statius and Ovid place the chief reſidence, or great palace of Somnus on our earth, in the country of the Cimmerians; no country agreeing better with ſleep than that which is overſpread with eternal darkneſs. Theb. x. v. 84 to 117. Met. xi. v. 592 to 645.

Dreams were the children of ſleep; Ovid names three of them, *viz.* Morpheus, Phobetor, and Phantaſia.

This deity is moſt commonly repreſented by the artiſts as a ſoft youth, ſtretched at his eaſe on a couch, reſting his head on a lion's ſkin, and ſometimes on a lion; with one arm either a little over or under his head, and the other dropping negligently by the ſide of the couch, and either holding poppies, or a horn with the juice of poppies in it. He is often winged, and much reſembles a little Cupid, from whom he is diſtinguiſhed by the lizard (an animal ſuppoſed to ſleep half the year) placed at his feet. There is ſcarcely any one of the deities that is more fully and particularly deſcribed by the poets than this deity of ſleep. Spence's Polymetis, p. 263, &c.

Sleep *of Plants*, *Somnus Plantarum*, in *Vegetable Phyſiology*, is a term uſed by Linnæus, to expreſs a peculiar ſtate in the conſtitution of many plants during the night, evinced by a change of poſition, generally a drooping, or a folding together, of their leaves or leaflets. Such a change, being occaſioned by the withdrawing of the ſtimulus of light, is probably a ſtate of reſt to their vital functions, and therefore the above term is not ſo hyperbolical as at firſt appears. Linnæus has given a curious treatiſe on this ſubject, in the *Amœnitates Academicæ*, v. 4. 333. The phenomenon itſelf had been noticed long before, by Acoſta and Proſper Alpinus, in the Tamarind-tree; and the latter points out ſeveral parallel inſtances in other leguminous plants with pinnated leaves, natives of Egypt. It is indeed moſt remarkable in ſuch plants. Herbs with ternate leaves, as the Trefoil and *Oxalis*, ſleep with their leaflets folded together in an erect poſture; and Pliny has obſerved that the former of theſe aſſumes that poſition at the approach of ſtorms. Cloudy weather, no doubt, produces this effect, in proportion as the plant is in vigour, and the ſtimulus of preceding ſun-ſhine has been ſtrong. Not that a ceſſation or diminution of heat appears to cauſe the change alluded to; for Linnæus has well remarked, from obſerving ſtove-plants, that ſuch is not the caſe. It is the withdrawing of a conſiderable portion of light. The more young and tender the plant, the more ſenſibly is it affected by this cauſe.

Linnæus has, in the above-mentioned treatiſe, elaborately deſcribed the various poſitions which the leaves of different plants aſſume in their ſleep. In general, it may be remarked that they cover, or fold together, the upper ſurfaces of their leaves, expoſing the under, which latter is almoſt uniformly impatient of light. This is ſo much the caſe, that we cannot but ſuſpect the effect of the returning light upon the backs of ſuch leaves, may be the immediate cauſe of their withdrawing from it, and thus the upper ſurface becomes neceſſarily preſented to its rays.

A ſimilar effect of light is ſeen in many flowers, particularly of the compound tribe. But the expanſion of theſe is regulated by other and more abſtruſe laws, which often limit their changes to certain hours of the day, partly, though not abſolutely, independently of light. Many of the Campion tribe, eſpecially, unroll their delicate petals in an evening only, in a preciſe and determinate manner, not to be attributed either to the preſence or the abſence of light. So the moving-plant, *Hedyſarum gyrans*, performs its curious gyrations with apparently perfect indifference as to the degree of light to which it is expoſed, provided the ſurrounding atmoſphere be warm and ſtill. The cloſing or drooping of flowers, moreover, when it depends only on the diminution of light, generally anſwers an evident ſecondary purpoſe, in ſheltering the organs of impregnation from the injurious effects of rain, or nocturnal dews. But ſuch is ſeldom the caſe with leaves, except incidentally, as in *Lotus ornithopodioides*, which plant firſt led Linnæus to attend particularly to the ſubject before us.

Sleep *of the Soul*, in *Theology*, denotes that inſenſible, unconſcious, and inactive ſtate, into which ſome have ſuppoſed that mankind are removed at death, and in which they remain till the period of the general reſurrection and laſt judgment. The term ſleep has been uſed by way of contradiſtinction to that which has been commonly called the intermediate or ſeparate ſtate. Of the advocates of this opinion, ſome have allowed the eſſential diſtinction between body and ſpirit, and the natural immortality of the human ſoul; ſo that, being a ſubſtance and not a mode, it will go on to exiſt, till by ſome poſitive act of the Creator it is annihilated. They cannot admit the ſuppoſition, that the whole man becomes extinct at death, or that death deſtroys or annihilates the thinking ſubſtance; becauſe, they ſay, the reſurrection on this hypotheſis, will not be a reſurrection, but a creation of a new ſet of beings: if death annihilates us in this ſenſe, there can be no future ſtate; becauſe, a being who has loſt his exiſtence cannot be recovered. Accordingly, they maintain, that what happens to the ſoul at death can be no more than a ſuſpenſion of the exerciſe of its faculties, or an incapacitation, from which it will, by the power of Chriſt, be delivered at the reſurrection: and they allege, that there is an infinite difference between the annihilation of the ſoul at death, and its incapacitation; becauſe, one who believes the former, could not poſſibly entertain the hope of a future ſtate; but one who believes the latter, might reaſonably entertain ſuch a hope. Death, they ſay, is a diſtreſs in which our ſpecies has been involved by extraordinary cauſes, and from which we have obtained the hope of being ſaved by the moſt extraordinary means, *viz.* by the interpoſition of Jeſus Chriſt, who, taking upon him our nature, and humbling himſelf to death, has acquired the power of deſtroying death, and is on this account ſtyled the Saviour of the world. However, moſt of thoſe who deny the notion of an intermediate ſtate of conſcious perception between death and the general reſurrection, reject the ſuppoſition of two diſtinct natures in man, and conſider that principle, which is called the *ſoul*, not as a ſpiritual ſubſtance, but as a quality, or property, either ſuperadded to matter by the creator of our frame, or reſulting from the organization of the human body, and particularly of the brain. See Soul.

Accordingly, they allege, that when the organized ſyſtem, to which the power of thinking, &c. is annexed, on which it depends, and from the organization of which, as ſome maintain, it neceſſarily reſults, is diſſolved by death; all the percipient and thinking powers of man, all his capacities of action, and of ſuffering, or of enjoyment, muſt be extinguiſhed, and ceaſe of courſe. And if the property of thinking neceſſarily attends the property of life, as ſome apprehend, nothing can be requiſite to the reſtoration of all the powers of the man, but the reſtoration of the body (no particle of which can be loſt) to a ſtate of life. Whatever is decompoſed, it is ſaid, may certainly be recompoſed by the ſame Almighty power that firſt compoſed it, with whatever change in its conſtitution, advantageous or diſadvantageous, he ſhall think proper; and then the powers of thinking, and whatever depended upon them, will return of courſe, and the man will be, in the moſt proper ſenſe, the ſame being that he was before. Thoſe who hold this opinion maintain, that, according to the ſcriptures, life and immortality were brought to light by the goſpel of Chriſt, in a ſenſe excluſive of all other teachers, and all other revelations, at leaſt from the birth of Moſes downwards; excluſive, likewiſe, of all information from the light of nature, or the reſult of philoſophical diſquiſition on the ſubſtance or qualities of the human ſoul. They hold, moreover, that the ſentence pronounced upon our firſt parents, imported a total deprivation of life, without any reſerve, or ſaving to the life of the ſoul; and conſequently, that eternal life, or a reſtoration and redemption from the conſequences of this ſentence, was effected for, revealed, conſigned, and inſured to man, in and through Chriſt, and will be accompliſhed in no other way than that ſpoken of by Chriſt and his apoſtles, who, they ſay, have left no room to conclude, that there is a ſeparate or intermediate life for the ſoul, when diſunited from the body.

The learned Dr. Law, biſhop of Carliſle, having, with a particular view to the controverſy concerning the intermediate ſtate, enumerated the ſeveral paſſages both in the Old and New Teſtament, in which the words, that are tranſlated ſoul or ſpirit in our verſion, occur, maintains, that none of them ever ſtand for a purely immaterial principle in man, or a ſubſtance wholly ſeparable from, and independent of, the body; and after examining the account which the ſcriptures give of that ſtate to which death reduces us, he obſerves, that it is repreſented by ſleep, by a negation of all life, thought, or action; by reſt, reſting-place, or home, ſilence, oblivion, darkneſs, deſtruction, or corruption. He adds, that the ſcripture, in ſpeaking of the connection between our preſent and future being, doth not take into account our intermediate ſtate in death; no more than we, in deſcribing the courſe of any man's actions, take in the time he ſleeps: and that, therefore, the ſcriptures, in order to be conſiſtent with themſelves, muſt affirm an immediate connection between death and judgment. As for thoſe texts that are uſually alleged on the other ſide of the queſtion, which he has cited and endeavoured to accommodate to his own opinion, he thinks that they are quite foreign to the point, or purely figurative, or capable of a clear and eaſy ſolution on the principle which he adopts, *viz.* that the times of our death and reſurrection are coincident; and that they cannot be fairly oppoſed to the conſtant, obvious tenor of the ſacred writings. With reſpect to philoſophical arguments, deduced from our notions of matter, and urged againſt the poſſibility of life, thought, and agency, being ſo connected with ſome portions of it as to conſtitute a compound being or perſon, he imagines that they are merely grounded on our ignorance, and that they will equally prove againſt known fact and obſervation, in the production of various animals, as againſt the union of two ſuch heterogeneous principles as thoſe of the ſoul and body are ſuppoſed to be. With reſpect to the conſequences of either opinion, he ſays, that on the one ſide, there is nothing more than a temporary ceſſation of thought, which can hurt nobody, except the ſelf-intereſted papiſt, or the ſelf-ſufficient deiſt; but on the other ſide, there is a manifeſt derogation from, if not a total ſubverſion of, that poſitive covenant, which profeſſes to entitle us to everlaſting life. He adds, that all proper and conſiſtent notions of death, reſurrection, and a future judgment, are confounded, and in fine, all the great ſanctions of the goſpel rendered unintelligible or uſeleſs.

The doctrine of the New Teſtament, ſays another writer againſt a ſeparate ſtate, is that man ſhall become immortal, by the way of a reſurrection of the dead, a reſtoration of the whole man to life; and the New Teſtament is ſo far from acknowledging any intermediate conſciouſneſs in man, between death and the reſurrection, that it always ſpeaks of that interval as a ſleep, which implies a ſuſpenſion of the thinking faculty, a reſt from thoſe labours, which require thought, memory, conſciouſneſs, &c. during which thoſe faculties are uſeleſs.

Beſides, the ſcriptural ſyſtem of immortality ſuppoſes, that man had forfeited his original title to immortality, and would never have received it, but for the interpoſition of a Redeemer. The conſequence of this doctrine is, that between the time of the forfeiture and the actual appearance of the Redeemer, the dead could have life in no ſenſe at all; and that neither before nor after the appearance of the Redeemer, dead men were, or would be reſtored to life, otherwiſe than in the way revealed by him, namely, a reſurrection of the dead.

On the other hand, the advocates of a ſeparate ſtate inſiſt, that the ſoul, being an active, ſimple, uncompounded, immaterial ſubſtance, is immortal in its own nature, and capable of an active and conſcious exiſtence, in a ſtate of diſunion and ſeparation from the body; that this natural capacity of the ſoul was not impaired, or at all affected by any thing that happened upon the tranſgreſſion of our firſt parents; that the death, to which they were condemned, was only the death of the body: hence they infer, that there is, and would have been, a future immortal ſtate of being beyond the preſent life, and (the moral attributes of God preſuppoſed) a juſt retribution therein, independent of the doctrine of a reſurrection of the dead; and that in the interval between death and the general reſurrection, there is an intermediate ſtate, in which the departed ſouls of good men are ſuppoſed to have an imperfect reward, and the ſouls of the wicked an imperfect puniſhment; but that every one, at the period of the reunion of the ſoul and body, and of final judgment, will receive a full and complete recompence for the deeds done in the body.

In proof of this opinion, they allege a variety of paſſages both from the Old and New Teſtament, the principal of which we ſhall here enumerate; ſeveral of which they think cannot be conſiſtently explained on the other hypotheſis. Gen. ii. 7. xv. 15. xxxvii. 35. Exod. iii. 6. 1 Sam. xxviii. 11—19. 1 Kings, xvii. 21, 22. Pſ. xxxi. 5. Eccleſ. iii. 21. xii. 7. Matt. x. 28. xvii. 3. Luke, xvi. 19. xx. 38. xxiii. 43. xxiv. 39. Acts, i. 25. vii. 59. 2 Cor. v. 8. xii. 2. Phil. i. 21—24. 1 Pet. iii. 19. iv. 6. Heb. xi. 40. xii. 23. Rev. vi. 9, 10. xiv. 13.

To theſe authorities of ſcripture, they add the teſtimony of the fathers of the church, who lived in or near the time of the apoſtles, who are ſaid to be unanimous in this opinion, and perſuaded that the ſoul of every man upon the diſſolution of the body died not, but had a proper place to go to, and that accordingly this doctrine is to be found in the moſt ancient Chriſtian liturgies.

Great ſtreſs has been laid, in this controverſy, on the meaning of the term death, as it occurs in ſcripture, and particularly in the ſentence denounced againſt the firſt parent of the human race. (See DEATH, in *Theology*.) The biſhop of Carliſle obſerves, that the word *death*, in its original and obvious ſenſe, implies a ceſſation of all natural life, or a real diſſolution and deſtruction of the whole man. But Mr. Farmer, a well-known and excellent writer, in the introduction to his learned work of the "General Prevalence of the Worſhip of Human Spirits, &c." 1783, has taken ſome pains to aſcertain the meaning of the word *death*, in the threatening denounced againſt Adam. To this purpoſe, he ſays, that if human ſpirits were worſhipped in the age of Moſes, particularly in Egypt and Phœnicia, the word death could not at that time, and in thoſe countries, denote more than the deſtruction of bodily life; for, if this term had farther included in it the inſenſibility or extinction of the ſoul, the dead would not have been honoured as gods. And if Moſes had uſed it in this extenſive ſenſe, he would have been miſunderſtood by the Egyptians, who aſſerted the immortality of the ſoul, and by the Hebrews, who dwelt among them, and had adopted their ſyſtem of religion.

This learned writer, in confirmation of this interpretation of death, obſerves, that although one great deſign of Moſes, in giving an account of the introduction of death into the world, was to guard againſt the worſhip of departed ſpirits, and though nothing could have anſwered this deſign more effectually than repreſenting the ſoul of Adam as a mere quality, or as the reſult of the peculiar ſtructure and organization of his body, yet, ſo far is he from ſuppoſing this to be the caſe, that according to him, after the body of the firſt man was perfectly organized by the immediate hand of the Almighty, he did not become a living ſoul or perſon, till God breathed into his noſtrils the breath of life; a principle diſtinct from the duſt out of which his body was formed, and, therefore, capable of ſubſiſting in a ſtate of ſeparation from it. Nor does Moſes uſe the ſame language in relating the formation of any other living creatures; which proves that the principle of life in man is of a ſuperior kind to that in brutes.

Beſides, the ancient patriarchs did not believe that the ſoul of man periſhed with his body. Agreeably to the moſt ancient opinion concerning departed ſpirits, the ſacred writers ſuppoſed the ſouls of the dead to exiſt in *ſheol*, or *hades*, a place inviſible to human ſight, and that, in the diſtribution of them, regard was had to the former relation in which they ſtood to one another. Moreover, Moſes himſelf believed the ſeparate ſubſiſtence of the ſoul, and has even given it a divine ſanction. Gen. xv. 15.

Nor do any of the ſacred writers ever deſcribe death in terms different from thoſe uſed by perſons, who certainly acknowledged the continuance of the ſoul after it.

Sleep, by which it is deſcribed, is not a ſtate of nonexiſtence, but of reſt; and it is well known, that this ſoft image of death was commonly uſed to expreſs the thing itſelf, by thoſe who aſſerted the exiſtence of ſouls in hades. Silence, oblivion, darkneſs, and corruption, by which the ſtate of the dead is deſcribed, refer only to the body, or to the ſuppoſed ſtate of the ſoul, while it was in ſheol, and are not peculiar to the ſacred writers, but were common in all countries, where both the popular belief, and the eſtabliſhed worſhip, were inconſiſtent with the notion of the ſoul's periſhing with the body.

And many of the terms, by which death was deſcribed in all countries, clearly imply, and are built upon, a belief of the diſtinction between ſoul and body, and of their being ſeparated at death.

According to the Greeks, to die was to depart, to go away; and the writers of the New Teſtament deſcribe death by a departure, (Luke, ix. 31.) that is, of the ſoul from the body to another ſtate. To all which it may be added, that the Jews, from the time of their return from Babylon, aſſerted the ſeparate exiſtence of the ſoul after death; as appears from their imitation of the heathen idolatry, from their evocation of the dead, and from the early references in ſcripture to the receptacle of departed ſouls, and many other proofs. This was the opinion, not only of a few eminent individuals, ſuch as Philo, but of the learned ſects, the Eſſenes and Phariſees, and of the whole body of the people, almoſt without exception, in the time of our Saviour. To this principle the Phariſees, whoſe doctrine formed the popular creed, added another, *viz.* the reſurrection of the dead. The Sadducees believed the extinction of the ſoul at death, but did not admit the reſurrection; the Phariſees, on the other hand, admitted the latter and denied the former. By the term reviviſcence, or return to life, by which the reſurrection is deſcribed, the Jews could not mean creating anew the ſoul, that had been deſtroyed, becauſe, if it were poſſible, they did not allow that the former ſoul periſhed at death. Nor did they believe, that man had no ſoul; and, therefore, that his reſurrection conſiſted in the re-organization of his former body, or in furniſhing him with a new body, organized as that was; becauſe this is a flat contradiction to their belief of the diſtinction between ſoul and body, and the ſeparate exiſtence of the former. What then did they, or could they mean by the reſurrection to life, but the reſtoration of that kind of life which they had loſt, by the reunion of their ſouls to a human body, either the ſame which they had before, or one in effect the ſame? In virtue of this reunion, the *dead* man became a *living* man, the ſame as he was before he died, with the ſame conſciouſneſs and recollection, the principle of conſciouſneſs having never periſhed. And if, in or near the time of Chriſt, the terms reſurrection, reviviſcence, or living again, as uſed both by Jews and Gentiles, denoted the reunion of a ſoul to a human body, the ſame terms, when adopted by Chriſt and his apoſtles, muſt have the ſame meaning: and every one would underſtand them in their common and ordinary ſignification. Conſequently, if life, as expreſſing the reſurrection, ſignifies the ſoul's return to a human body, death, its oppoſite, denotes its ſeparation; both terms imply the continuance of the ſoul after death: a principle, ſays Mr. Farmer, held in the moſt ancient times, by Heathens and Jews, by patriarchs and prophets, and by the people, particularly in the times of Moſes and the Meſſiah, and which gives great probability to the doctrine of a reſurrection.

The advocates of the ſleep of the ſoul, on the other hand, earneſtly contend, that it was the opinion of the apoſtles and early Chriſtians, that, whatever be the nature of the ſoul, its percipient and thinking powers ceaſe at death; and that they had no hope of the reſtoration of thoſe powers, but in the general reſurrection of the dead.

Dr. Campbell, in his "Preliminary Diſſertations," (Part ii.) has introduced ſome remarks, that deſerve attention, on the controverſy concerning an intermediate ſtate between death and the reſurrection. He obſerves, *firſt*, that the arguments, on which the deniers of that ſtate chiefly build, ariſe, in his opinion, from a miſapprehenſion of the import of ſome ſcriptural expreſſions. Καθευδειν, *κοιμαν*, *to ſleep*, are often applied to the *dead;* but this application is no more than a metaphorical euphoniſm, derived from the reſemblance which a dead body bears to the body of a perſon aſleep. Traces of this idiom may be found in all languages, whatever be the popular belief about the ſtate of the dead. They often occur in the Old Teſtament; yet it has been ſhewn, that the common doctrine of the Orientals favoured the ſeparate exiſtence of the ſouls of the deceaſed. But if it did not, and if, as ſome ſuppoſe, the ancient Jews were, on all articles relating to another life, no better than Sadducees, this ſhews the more ſtrongly, that ſuch metaphors, ſo frequent in their writings, could be derived ſolely from bodily likeneſs, and having no reference to a reſurrection, could be employed ſolely for the ſake of avoiding a diſagreeable or ominous word. It is acknowledged, at the ſame time, that Chriſtians have been the more ready to adopt ſuch expreſſions, as their doctrine of the reſurrection of the body, preſented to their minds an additional analogy between the bodies of the deceaſed and the bodies of thoſe aſleep, that of being one day awaked. But our author ſees no reaſon to imagine that, in this uſe, they carried their thoughts further than to the corporeal and viſible reſemblance now mentioned. Another miſtake about the import of ſcriptural terms, is in the ſenſe which has been given to the word *αναςάσις*. They confine it, by a uſe derived merely from modern European tongues, to that renovation which we call the reunion of the ſoul and the body, and which is to take place at the laſt day. But this is not always the ſenſe of the term in the New Teſtament.

Dr. Campbell remarks, *ſecondly*, that many expreſſions of ſcripture, in the natural and obvious ſenſe, imply that an intermediate and ſeparate ſtate of the ſoul is actually to ſucceed death. Such are the words of our Lord to the penitent thief upon the croſs (Luke, xxiii. 43.); Stephen's dying petition (Acts, vii. 59.); the compariſons which the apoſtle Paul makes in different places (2 Cor. v. 6, &c. Philip. i. 21.) between the enjoyment which true Chriſtians can obtain by their continuance in this world, and that on which they enter at their departure out of it, and ſeveral other paſſages. Let the words referred to be read by any judicious perſon, either in the original, or in the common tranſlation, which is ſufficiently exact for this purpoſe, and let him, ſetting aſide all theory or ſyſtem, ſay candidly, whether they would not be underſtood, by the groſs of mankind, as preſuppoſing that the ſoul may and will exiſt ſeparately from the body, and be ſuſceptible of happineſs or miſery in that ſtate. If any thing could add to the native evidence of the expreſſions, it would be the unnatural meaning that is put upon them, in order to diſguiſe that evidence. The apoſtle Paul, they are ſenſible, ſpeaks of the ſaints as admitted to enjoyment in the preſence of God, immediately after death. Neverthelcſs, in order to palliate the direct contradiction this bears to their doctrine, that the vital principle, which is all they mean by the ſoul, remains extinguiſhed between death and the reſurrection, they remind us of the difference between abſolute or real, and relative or apparent, time. They admit that, if the apoſtle be underſtood as ſpeaking of real time, what is ſaid flatly contradicts their ſyſtem: but they ſay, his words muſt be interpreted as ſpoken only of apparent time. He talks indeed of entering on a ſtate of enjoyment, immediately after death, though there may be many thouſands of years between the one and the other: for he means only, that when that ſtate ſhall commence, however diſtant in reality the time may be, the perſon entering on it will not be ſenſible of that diſtance, and conſequently there will be to him an apparent coincidence with the moment of his death. But, ſays Campbell, does the apoſtle any where give a hint that this is his meaning? or, is it what any man would naturally diſcover from his words? Did the ſacred penman, then, as our author proceeds, mean to put a cheat upon the world, and, by the help of an equivocal expreſſion, to flatter men with the hope of entering, the inſtant they expire, on a ſtate of felicity; when, in fact, they knew that it would be many ages before it would take place? But, were the hypotheſis about the extinction of the mind between death and the reſurrection well founded, the apparent coincidence they ſpeak of is not ſo clear as they ſeem to think it.

Our author remarks, *thirdly*, that even the various equivocation, (or, perhaps, more properly, mental reſervation,) that has been deviſed for them, will not, in every caſe, ſave the credit of apoſtolical veracity. The words of Paul to the Corinthians are, "Knowing, that whilſt we are at home in the body, we are abſent from the Lord." Again: "We are willing rather to be abſent from the body, and preſent with the Lord." Could ſuch expreſſions have been uſed by him, if he had held it impoſſible to be with the Lord, or indeed any where, without the body; and that, whatever the change was which was made by death, he could not be in the preſence of the Lord, till he returned to the body? Abſence from the body, and preſence with the Lord, were never, therefore, more unfortunately combined, than in this illuſtration. Things are combined here as coincident, which, in the hypotheſis of thoſe gentlemen, are incompatible. If recourſe be had to the original, the expreſſions in Greek are, if poſſible, ſtill ſtronger. They are, οι ενδημȣντες εν τω σωματι, *thoſe who dwell in the body*, who are εκδημȣντες απο τȣ Κυριȣ, *at a diſtance from the Lord;* as, on the contrary, they are οι εκδημȣντες εκ τȣ σωματος, *thoſe who have travelled out of the body*, who are οι ενδημȣντες προς τον Κυριον, *thoſe who reſide*, or *are preſent with the Lord.* In the paſſage to the Philippians alſo, the commencement of his preſence with the Lord is repreſented as coincident, not with his return to the body, but with his leaving it, with the diſſolution, not with the reſtoration, of the union. We may here ſubjoin an inquiry, how the apoſtle could be *in a ſtrait betwixt two* (Philip. i. 23.), that of *living in the fleſh*, and *being with Chriſt*, which he pronounces to be *far better*, if the exerciſe of his powers of ſervice and capacity of enjoyment ceaſed at death. A mind like his could not heſitate between living in the fleſh, and thus ſerving the Chriſtian cauſe, and ſinking at death into a ſtate of total inaction, and of thus continuing for a long but indefinite period.

The *fourth* remark made by Dr. Campbell on this ſubject is, that from the turn of the New Teſtament, the ſacred writers appear to proceed on the ſuppoſition, that the ſoul and the body are naturally diſtinct and ſeparable, and that the ſoul is ſuſceptible of pain or pleaſure in a ſtate of ſeparation. It were endleſs to enumerate all the places which evince this. The ſtory of the rich man and Lazarus (Luke, xvi. 22, 23.); the laſt words of our Lord upon the croſs (Luke, xxiii. 46.), and of Stephen when dying; Paul's doubts, whether he was in the body or out of the body, when he was tranſlated to the third heaven and paradiſe (2 Cor. xii. 2, 3, 4.); our Lord's words to Thomas, to ſatisfy him that he was not a ſpirit (Luke, xxiv. 39.); and the expreſs mention of the denial of ſpirits, as one of the errors of the Sadducees (Acts, xxiii. 8.): theſe are irrefragable evidences of the general opinion on this ſubject, both of Jews and Chriſtians. By *ſpirit*, it is obſerved, as diſtinguiſhed from *angel*, is evidently meant the departed ſpirit of a human being; for that man is here, before his natural death, poſſeſſed of a vital and intelligent principle, which is commonly called his ſoul or ſpirit, it was never pretended that they denied. It has been ſaid, that this manner of expreſſing themſelves has been adopted by the apoſtles and evangeliſts, merely in conformity to vulgar notions. To me, ſays Dr. Campbell, it appears a conformity, which (if the ſacred writers entertained the ſentiments of our antagoniſts in this article) is hardly reconcileable to the known ſimplicity and integrity of their character.

Before the council of Florence, held in 1439, under pope Eugenius IV., the ancient doctrine, both of the Greek and Latin churches, is ſaid to have been, that the ſouls of the ſaints were in *abditis receptaculis*, or in *exterioribus atriis*, where they expected the reſurrection of their bodies, and the glorification of their ſouls; and though the fathers believed all of them to be happy, yet they did not think they would enjoy the beatific viſion before the reſurrection. But in this council it was decreed, that the ſouls of thoſe, who, after baptiſm, have incurred no ſtain of ſin, and alſo thoſe ſouls, which having contracted the ſtain of ſin, whether in their bodies or diveſted of their bodies, have been purged by the ſacrifice of the maſs, prayer, and alms, are received into heaven immediately, &c.

In the Lateran council, held under Leo X., in 1513, it was decreed, that the ſoul is not only truly, and of itſelf, and eſſentially the form of the human body, as is expreſſed in the canon of pope Clement V., publiſhed in the general council of Vienne, but likewiſe immortal, and according to the number of bodies into which it is infuſed, is ſingularly multipliable, multiplied, and to be multiplied.

However, Peter Pomponatius, a philoſopher of Mantua, publiſhed a book in 1516, on the immortality of the ſoul, in which, after ſtating the moral arguments againſt the mortality of the ſoul, and endeavouring to ſhew that they are weak and inconcluſive, infers upon the whole, that the immortality of the ſoul, being a problematical queſtion, we can have no aſſurance of it but from revelation; and that they who would build immortality upon any other foundation, only verify the character given to certain ſelf-ſufficient reaſoners by the apoſtle, *viz.* profeſſing themſelves wiſe, they became fools.

In 1520, Luther, in the defence of his propoſitions, which had been condemned by a bull of Leo X., ranks the natural immortality of the ſoul among the monſtrous opinions of Popery; and he afterwards made uſe of the doctrine of the ſleep of the ſoul as a confutation of purgatory and ſaint-worſhip, and he is ſaid to have continued in that belief to the laſt moment of his life.

William Tyndall alſo, the famous tranſlator of the bible into Engliſh, in defending Luther's doctrine againſt ſir Thomas More's objections, conſiders the ſleep of the ſoul as the doctrine of the Proteſtants in his time, and founded on the ſcriptures: though, in conſequence of the oppoſition given to this doctrine by Calvin, in his Pſychopannychia, publiſhed in 1534, and the turn hereby given to the ſentiments of the Reformed in general, he ſeems to have recanted his opinion. Calvin, however, ſeems to have been embarraſſed with the ſouls of the wicked, and ſays, he would only be reſponſible for the faithful.

The firſt expreſs condemnation of the doctrine of the ſleep of the ſoul, in a Proteſtant confeſſion, occurs in the fortieth of king Edward's Articles, compoſed in 1552.

After the long prevalence of the doctrine of the intermediate ſtate, that of the ſleep of the ſoul has of late years been revived, and, as one of its zealous advocates affirms, gains ground, not ſo much from conſiderations of philoſophy, as from a cloſe attention to the ſenſe of the ſcriptures.

We ſhall cloſe this article with obſerving, that a ſingular hypotheſis was advanced a few years ago by Dr. Caleb Fleming, and of late vindicated by an anonymous writer; and this is, that the reſurrection takes place immediately after death. On this ſubject, ſee Law's Appendix and Poſtſcript to his Conſiderations on the Theory of Religion, &c. 1774. Hiſtorical View of the Controverſy concerning an intermediate State, &c. 1772. Prieſtley's Diſquiſitions on Matter and Spirit, 1777. Correſpondence between Dr. Price and Dr. Prieſtley, 1778; and the publications of Steffe, Warburton, Goddard, Coward, Peckard, Jortin, &c. on both ſides of the queſtion, cited by the author of the Hiſtorical View, &c. Fleming's Search after Souls.

SLEEPERS, in *Natural Hiſtory*, a name given to ſome animals which ſleep all the winter: ſuch as bears, marmots, dormice, bats, hedge-hogs, &c. Theſe do not feed in winter, have no ſenſible evacuations, breathe little, or not at all, and moſt of the viſcera ceaſe from their functions. Some of theſe creatures ſeem to be dead, and others to return to a ſtate like unto that of the fœtus before birth. In this condition they continue, till by length of time maturating the proceſs, or by new heat, the fluids are attenuated, the ſolids ſtimulated, and the functions begin where they left off. See Dr. Stevenſon in Med. Ed. Edinb. vol. v. art. 177. See MIGRATION.

SLEEPER, in *Building*, a name uſed for the oblique rafter, that lies in a gutter.

SLEEPERS, in the *Glaſs Trade*, are the large iron bars croſſing the ſmaller ones, and hindering the paſſage of the coals, but leaving room for the aſhes.

SLEEPERS, in the *Military Art*. See PLATFORM.

SLEEPERS, in *Ship-Building*, pieces of long compaſs-timber, fayed and bolted diagonally upon the tranſoms and timbers adjoining withinſide, to ſtrengthen the buttock of the ſhip. There are from two to three pairs.

SLEEPY CREEK, in *Geography*, a river of America, in North Carolina, which runs into the Atlantic, N. lat. 34° 43′. W. long. 76° 44′.

SLEETS, in *Gunnery*, are the parts of a mortar, paſſing from the chamber to the trunnions, for ſtrengthening that part.

SLEEVE, HIPPOCRATES's. See HIPPOCRATES.

SLEIDAN, JOHN, in *Biography*, a celebrated hiſtorian, was born in 1506 at Sleidan, a ſmall town at Cologne. His origin, it has been inferred, was obſcure, becauſe he took no other name than that of the town in which he was born. He received the early part of his education in his native country, and then went to Paris, whence he removed to Orleans, in order that he might ſtudy the law as a profeſſion. On his return to Paris, he was recommended by his countryman and ſchool-fellow, J. Sturmius, to cardinal archbiſhop du Bellay, who obtained for him a penſion, and initiated him into the routine of public buſineſs. In 1542 he was obliged, owing to his attachment to the reformed religion, to retire to Straſburg. He was at firſt a follower of Zuingle, but he afterwards joined the Lutherans, and became a conſiderable writer in their defence. He was alſo entruſted with employments of conſiderable importance to the welfare of the party which he had joined. In 1545 he was deputed to the king of England; and in 1551 he was one of the Proteſtant envoys to the council of Trent, which, however, was ſoon diſſolved by the troops of Maurice, elector of Saxony. The death of his wife, which happened in 1555, threw him into a deep melancholy, which had the calamitous effect of obliterating his memory to ſuch a degree, that he did not know even his own children. He died at Straſburg, in the following year. He is chiefly known as an author by a work, entitled "De Statu Religionis et Reipublicæ Carolo Quinto Cæſare, Commentaria, Lib. XXV." which was firſt publiſhed in 1555. It comprehends the hiſtory of his own times, from 1517 to the year of its publication, and has always been in great credit among the Proteſtants; though it has been charged with partiality by Catholic writers, and by the adherents of the emperor Charles. "Much of it," ſays his biographer, "is extracted from public records, and from the archives of the city of Straſburg, with which he was furniſhed by his friend J. Sturmius." De Thou ſpeaks of it as a work drawn up "exacta fide et diligentia," and he praiſes very highly the writer's learning and talents for buſineſs. This work has been tranſlated into ſeveral modern languages: the French verſion was made by Le Courayer. Another celebrated work of Sleidan's is a compendium of ancient hiſtory, entitled "De quatuor Summis Imperiis, Lib. tres," which has gone through a great number of editions. He publiſhed likewiſe a Latin tranſlation of the Hiſtory of Philip de Comines, and an abridgment of that of Froiſſart, beſides verſions of other works on general hiſtory and politics.

SLEKTENES, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Lapland. N. lat. 70° 25′.

SLEMISH, or SLENISH, a mountain of the county of Antrim, Ireland, near the centre, and forming a very conſpicuous object from moſt parts of the county. Dr. Richardſon calls it a round *hummock*, formed by an accumulation of rectilineal baſaltic ſtrata of ſteady parallelism. The height, as meaſured by the barometer, is 1398 feet. See HUMMOCK.

SLESWICK, *Duchy of*, ſometimes called South Jutland, (ſee DENMARK and JUTLAND,) a province of Denmark, bounded on the north by Jutland, on the eaſt by the Baltic, on the ſouth by the duchy of Holſtein, and on the weſt by the North ſea; about 72 miles in length, and from 30 to 56 in breadth, without including ſeveral iſlands on the coaſt. The country is well ſupplied with corn, cattle, and fiſh; it has no mountains, and but few eminences that deſerve the name of hills. The ſoil is, in general, well cultivated, and agriculture is much encouraged by the crown. Sleſwick has from time immemorial been united to Denmark, but has ſometimes been given to a brother of the reigning king, as a fief; but this grant has produced conſiderable diſputes, more eſpecially in the laſt century, when the duke in poſſeſſion attempted to become an independent prince. In 1720 it was recovered to the crown. The adminiſtration is veſted in a governor, chancellor, vice-chancellor, and counſellors: the governor reſides at Gottorp. The inhabitants are a mixture of Danes, Saxons, Friſchians, and Hollanders, who reſpectively ſpeak their own languages. The prevalent religion is Lutheran. This duchy contains ſeveral towns, and 1500 villages.

SLESWICK, the capital of the above duchy, ſituated on the river or gulf of Sley; formerly called "Hetheby," from queen Hetha, who was the founder. After having undergone a variety of viciſſitudes, it is now no longer a port, the Sley being choaked up with ſand. It is an irregular town of great length, and contains about 5630 inhabitants. The houſes are conſtructed with brick, and in neatneſs and manner of building reſemble thoſe of Holland; the inhabitants are alſo the Dutch, and many of them ſpeak their tongue, though the uſual languages are the German and the Daniſh. Cloſe to Sleſwick is the old palace of Gottorp, which is a large brick edifice, ſurrounded with a rampart and moat. It was formerly the ducal reſidence, and more lately inhabited by the ſtadtholder or governor, prince Charles of Heſſe Caſſel, who married Louiſa, princeſs of Denmark. From this caſtle the ducal line, formed by Adolphus, ſon of Frederic I. king of Denmark, was denominated Holſtein-Gottorp, which ſtill ſubſiſts in the perſon of the great duke of Ruſſia; 60 miles N. of Hamburg. N. lat. 54° 33′. E. long. 9° 34′.

SLETDALER, or *Baſe Rixdollar*, in *Commerce*, a money of account in Denmark, reckoned at 4 marks, or 64 ſkillings Daniſh.

SLICES, in *Ship-Building*, tapering pieces of plank, uſed to drive between the timbers before planking, as now practiſed in the navy, for ſetting up a ſhip on her ways for launching, &c.

SLICH, in *Metallurgy*, the ore of any metal, particularly of gold, when it has been pounded, and prepared for farther working.

The manner of preparing the ſlich at Cremnitz, in Hungary, is this: they lay a foundation of wood three yards deep, upon this they place the ore, and over this there are four-and-twenty beams, armed at their bottoms with iron; theſe, by a continual motion, beat and grind the ore, till they reduce it to powder: during all this operation, the ore is covered with water. There are four wheels uſed to move theſe beams, each wheel moving ſix; and the water, as it runs off, carrying ſome of the metalline particles with it, is received into ſeveral baſons, one placed behind another; and finally, after having paſſed through them all, and depoſited ſome ſediment in each, it is let off into a very large pit, of almoſt half an acre of ground; in this it is ſuffered to ſtand ſo long, as to depoſit all its ſediment, of whatever kind, and after this it is let out. This work is carried on day and night, and the ore taken away, and replaced by more, as often as occaſion requires. That ore which lies next the beams, where it was pounded, is always the cleaneſt or richeſt.

When the ſlich is waſhed as much as they can, a hundred weight of it uſually contains about an ounce, or perhaps but half an ounce of metal; which is not all gold, for there is always a mixture of gold and ſilver, but the gold is in the largeſt quantity, and uſually is two-thirds of the mixture: they then put the ſlich into a furnace with ſome lime-ſtone, and ſlaken, or the ſcoria of former meltings, and run them together. The firſt melting produces a ſubſtance, called *lech;* this lech they burn with charcoal, to make it lighter, to open its body, and render it porous, after which it is called *roſt;* to this roſt they add ſand in ſuch quantity as they find neceſſary, and then melt it over again.

They have at Cremnitz many other ways of reducing gold out of its ore, but particularly one, in which they employ no lead during the whole operation; whereas, in general, lead is always neceſſary, after the before-mentioned proceſſes. See GOLD.

SLICKENBORCH, in *Geography*, a town of Holland, in the ſtate of Frieſeland, on the river Linde, at its union with the Kuynder; 28 miles S. of Lewarden.

SLICKENBURG, a ſmall iſland near the N.W. coaſt of Borneo. N. lat. 3° 59′. E. long. 112° 31′.

SLIDE-*Butt*, in *Agriculture*, a ſort of ſledge contrived in the form of a ſtrong, oblong box, and ſhod underneath with ſtrong, rough, thick pieces of timber. It is capable of holding about three or four common wheel-barrows full of earth or compoſt. In Cornwall and other hilly diſtricts, it is found uſeful and convenient for drawing out dung and other dreſſings to ſmall diſtances from the large heaps depoſited in the fields or other places. They are uſed with one or two oxen or horſes for the moſt part. They have ſometimes alſo low wheels, when they are denominated gurry butts in the above county.

SLIDE-*Rails*, or *Guard-Rails*, in the conſtruction of *Canals*, are long pieces of timber fixed to piles or plugs in the face of the walls of locks, bridges, tunnels, &c. generally a little above the ſurface of the water, to prevent boats from ſtriking and injuring the walls.

SLIDING, in *Mechanics*, *Superinceſſus radens*, is, when the ſame point of a body, moving along a ſurface, deſcribes a line on that ſurface.

Such is the motion of a parallelepiped, protruding along a plane.

SLIDING-*Rule*, a mathematical inſtrument, ſerving to work queſtions in gauging, meaſuring, &c. without the uſe of compaſſes; merely by the ſliding of the parts of the inſtrument one by another, the lines and diviſions of which give the anſwer, by inſpection.

This inſtrument is variouſly contrived, and applied by various authors, particularly Everard, Coggeſhall, Gunter, Hunt, and Partridge; but the moſt uſual and uſeful ones are thoſe of Everard and Coggeſhall; the deſcription and uſes of which are as follow.

SLIDING-*Rule, Everard's*, is principally uſed in gauging; being ordinarily made of box, a foot long, an inch broad, and $\frac{6}{10}$ths of an inch thick. It conſiſts of three parts: a rule, on each ſide of which, *a b* and *c d* (*Plate* VII. *Surveying*, *fig.* 4.) is a groove, and two ſmall ſcales, or ſliding-pieces, *m*, *n*, ſlide in the grooves. When both theſe pieces are drawn out to their full extent, the inſtrument is three feet long.

On the firſt broad face of the inſtrument, *a b*, are four lines of numbers; for the properties, &c. of which, ſee GUNTER'S *Line*. The firſt, marked A, conſiſting of two radiuſes numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 1; and then 2, 3, 4, 5, &c. to 10. On this line are four braſs centre-pins, two in each radius; one in each of which is marked M B, to ſignify that the number it is ſet againſt, 2150.42, is the number of cubic inches in a malt-buſhel; the other two are marked with A, to ſignify that the numbers they are ſet againſt, *viz.* 282, are the cubic inches in an ale-gallon. The ſecond and third lines of numbers are on the ſliding-pieces, and are exactly the ſame with the firſt. They are diſtinguiſhed by the letter B. Cloſe to the figure 7, in the firſt radius, is a dot, marked S *i*, ſet exactly over .707, denoting .707 to be the ſide of a ſquare inſcribed in a circle, whoſe diameter is unity. Cloſe to 9 is another dot, marked S *e*, ſet over .886, which is the ſide of a ſquare equal to the area of a circle, whoſe diameter is unity. Another dot, near W, is ſet over 231, the number of cubic inches in a wine-gallon; and another, near C, is ſet over 3.14, the circumference of a circle, whoſe diameter is unity. The fourth line of numbers, marked M D, to ſignify *malt depth*, is a broken line of two radiuſes, numbered 2, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 9, 8, 7, &c. the number 1 being ſet directly againſt M B on the firſt radius.

On the ſecond broad face, marked *c d*, are 1. A line of numbers of one radius, numbered 1, 2, 3, &c. to 10, noted by the letter D. On this are four centre-pins; the firſt, marked W G, is the gauge-point for a wine-gallon, *i. e.* the diameter of a cylinder, whoſe height is an inch, and content 231 cubic inches, or a wine-gallon, which is 17.15 inches: the ſecond centre-pin, A G, ſtands at the gauge-point for an ale-gallon, which is 18.95 inches. The third, M S, ſtands at 46.3, the ſide of a ſquare, whoſe content is equal to the inches in a ſolid buſhel. The fourth, M R, is the gauge-point for a malt-buſhel, which is 52.32 inches. 2. Two lines of numbers on the ſliding-piece, which are exactly the ſame as thoſe on the ſliding-piece on the other ſide, called C. Cloſe to the diviſion 8 is a dot, marked *c*, which is ſet to .795, the area of a circle, whoſe circumference is unity; and another, marked *d*, ſtands at .785, the area of a circle, whoſe diameter is unity. 3. Two lines of ſegments, each numbered 1, 2, 3, to 100; the firſt, for finding the ullage of a caſk, taken as the middle fruſtum of a ſpheroid, lying with its axis parallel to the horizon; and the other for finding the ullage of a caſk ſtanding.

Again, on one of the narrow ſides, noted *e*, are, 1. A line of inches, numbered 1, 2, 3, &c. to 12, each ſubdivided into ten equal parts. 2. A line, by which, with that of inches, we find a mean diameter for a caſk, in the figure of the middle fruſtum of a ſpheroid: it is numbered 1, 2, 3, &c. to 7, and marked *ſpheroid*. 3. A line for finding the mean diameter of a caſk, in the figure of the middle fruſtum of a parabolic ſpindle, which gaugers call the *ſecondary variety of caſks;* it is numbered 1, 2, 3, &c. and noted *ſecond variety*. 4. A line, by which we find the mean diameter of a caſk of the third variety, *i. e.* of a caſk in the figure of two parabolic conoids, abutting on a common baſe; it is numbered 1, 2, 3, &c. and noted *third variety*.

On the other narrow face, marked *f*, are, 1. A foot divided into 100 equal parts, marked F M. 2. A line of inches, like that before-mentioned, noted I M. 3. A line for finding the mean diameter of a fourth variety of caſks, which is the middle fruſtum of two cones, abutting on a common baſe. It is numbered 1, 2, 3, &c. and noted F C, ſignifying fruſtum of a cone.

On the back ſide of the two ſliding-pieces is a line of inches, from 13 to 36, when the two pieces are put endwiſe; and againſt that, the correſpondent gallons, or hundred parts, that any ſmall tub, or the like open veſſel (from 13 to 36 inches diameter), will contain at one inch deep.

Mr. Overley, and other writers on this ſubject, have ſuggeſted ſome improvements in the conſtruction of this inſtrument. See Overley's Young Gauger's Inſtructor, p. 108.

SLIDING-*Rule, Uſe of Everard's*.—1. To multiply one number by another. Suppoſe 4 required to be multiplied by 6: ſet 1 on the line of numbers B, to 4 on the line A; then, againſt 6 upon B is 24, the product ſought upon A. Again, to multiply 26 by 68, ſet 1 on B to 26 on A; then, againſt 68 on B is 1768 on A, the product ſought.

2. To divide one number by another. Suppoſe 24 to be divided by 4: ſet 4 on B to 1 on A; then againſt 24 on B is 6 on A, which is the quotient. Again, to divide 952 by 14; ſet 14 on A to 1 on B, and againſt 952 on A, you have, on B, 68, which is the quotient.

3. To work the rule of three. If 8 gives 20, what will 22 give? Set 8 on B to 20 on A, then againſt 22 on B ſtands 55 on A, the number ſought.

4. To find a mean proportional between two numbers, ſuppoſe between 50 and 72: ſet 50 on C to 72 on D; then againſt 72 on C you have 60 on D, which is the mean required.

5. To extract the ſquare root of a number. Apply the lines C and D to one another, ſo that 10 at the end of D be even with 10 at the end of C; then are theſe two lines a table, ſhewing the ſquare root of any number leſs than 1000000 by inſpection: for againſt any number on C, the number anſwering to it on D is the ſquare root of it.

Note, if the given number conſiſts of 1, 3, 5, or 7 places of integers, ſeek it on the firſt radius, on the line C, and againſt it is the root required at D.

6. Either the diameter or circumference of a circle, being given, to find the other. Set 1 on the line A againſt 3.141 (to which is written C) on the line B; and againſt any diameter on the line A, you have the circumference on B, and contrariwiſe: thus, the diameter being 20 inches, the circumference will be 62.831 inches; and the circumference being 94.247, the diameter will be 30.

7. The diameter of a circle given, to find the area in inches, or in ale or wine-gallons. Suppoſe the diameter 20 inches, what is the area? Set 1 upon D, to .785 (noted *d*) on C; then againſt 20 on D is 314.159, the area required. Now, to find that circle's area in ale-gallons, ſet 18.95 (marked A G) upon D, to 1 on C; then againſt the diameter 20 upon D, is the number of ale-gallons on C, *viz.* 1.11. The ſame may ſerve for wine-gallons, regard being only had to the proper gauge-point.

8. The two diameters of an ellipſis being given, to find the area in ale-gallons. Suppoſe the tranſverſe diameter 72 inches, and the conjugate 50: ſet 359.05, the ſquare of the gauge-point, on B, to one of the diameters (ſuppoſe 50) on A; then againſt the other diameter 72 on B, you will have the area on A, *viz.* 10.02 gallons, the content of this ellipſis at one inch deep. The like may be done for wine-gallons, if, inſtead of 359.05, you uſe 249.11, the ſquare of the gauge-point for wine-gallons.

9. To find the area of a triangular ſurface in ale-gallons. Suppoſe the baſe of the triangle 260 inches, and the perpendicular let fall from the oppoſite angle 110 inches: ſet 282 (marked A) upon B, to 130, half the baſe, on A; then againſt 110 on B is 50.7 gallons on A.

10. To find the content of an oblong in ale-gallons. Suppoſe one ſide 130 inches, and the other 180: ſet 282 on B, to 180 on A; then againſt 130 upon B is 82.97 ale-gallons, the area required.

11. To find the content of a regular polygon in ale-gallons, one of the ſides being given. Find the length of the perpendicular let fall from the centre to one of the ſides: this, multiplied by half the ſum of the ſides, gives the area. For an inſtance; ſuppoſe a pentagon, whoſe ſide is 1 inch, here the perpendicular will be found .837, by ſaying, as the ſine of half the angle at the centre, which, in this polygon, is 36°, is to half the given ſide .5, ſo is the ſine of the complement of 36°, *viz.* 54°, to the perpendicular aforeſaid. Whence the area of a pentagon, whoſe ſide is unity, will be found 1.72 inches, which, divided by 282, gives .0061, the ale-gallons in that polygon.

12. To find the content of a cylinder in ale-gallons. Suppoſe the diameter of the baſe of the cylinder 120 inches, the perpendicular height 36 inches: ſet therefore the gauge-point (A G) to the height 36 on C; then againſt 120, the diameter on D, is found 1443.6, the content in ale-gallons.

13. The bung and head-diameters of any caſk, together with its length, being given; to find its content in ale or wine-gallons. 1. Suppoſe the length of a caſk taken (as the middle fruſtum of a ſpheroid, which is the firſt caſe or variety) be 40 inches, its head-diameter 24 inches, and bung-diameter 32 inches: ſubtract the head-diameter from that of the bung, the difference is 8. Look, then, for 8 inches on the line of inches, on the firſt narrow face of the rule; and againſt it, on the line *ſpheroid*, ſtands 5.6 inches, which, added to the head-diameter 24, gives 29.6 inches for that caſk's mean diameter: ſet, therefore the gauge-point for ale (marked A G) on D, to 40 on C; and againſt 29.6 on D, is 97.45, the content of the caſk in ale-gallons. If the gauge-point for wine (marked W G) be uſed inſtead of that for ale, you will have the veſſel's content in wine-gallons.

2. If a caſk, of the ſame dimenſions as the former, be taken (as the middle fruſtum of a parabolic ſpindle, which is the *ſecond variety*), ſee what inches, and parts, on the line marked ſecond variety, ſtand againſt the difference of the bung and head-diameters, which, in this example, is 8; and you will find 5.1 inches, which, added to 24, the head-diameter, makes 29.1 inches, the mean diameter of the caſk: ſet, therefore, the rule, as before, and againſt 29.1 inches, you will have 94.12 ale-gallons for the content of the caſk.

3. If the caſk taken be the middle fruſtum of two parabolic conoids, which is the third variety; againſt 8 inches, the difference of the head and bung-diameters, on the line of inches, you will find 4.57 inches on the line called *third variety*; this, added as before to 24, gives 28.57 for the caſk's mean diameter; proceeding, as before, you will find the content 90.8 gallons.

4. If the caſk taken be the fruſtums of two cones, which is the *fourth variety*, againſt 8 inches on the line of inches,

you will find on the line marked F C, 4.1 inches to be added to 24 inches: the reſt, carried on as before, gives the content of the caſk 87.93 ale-gallons.

14. A caſk partly empty, lying with its axis parallel to the horizon; to find the quantity of liquor in it. Find its whole content as above, which ſuppoſe 97.455 gallons; and ſuppoſe the inches left dry, 8, and the bung-diameter 32: then, as the bung-diameter on C is to 100 on the line of ſegments L, ſo are the dry inches on C to a fourth number on the line of ſegments: and as 100 upon B is to the caſk's whole content on A, ſo is that fourth number to the liquor wanting to fill up the caſk, which, ſubtracted from the whole content of the caſk, gives the liquor remaining therein; *e. gr.* ſet 32, the bung-diameter on C, to 100 on the ſegment-line L; then againſt 8, the dry inches on C, ſtands 17.6 on the ſegment-line: ſet, therefore, 100 on B to the caſk's whole content on A; and againſt 17.6 on B, you have 16.5 gallons on A: ſubtracting, therefore, the ſaid gallons from 97.45, the veſſel's whole content, the liquor in the caſk will be 80.95 gallons.

15. A caſk ſtanding upright, or with its axis perpendicular to the horizon, to find the liquor therein. Suppoſe the length of the caſk 40 inches, and 10 of them dry; ſet 40 inches on the line C, to 100 on the ſegment-line S; and againſt 10, the dry inches on the line C, ſtands 24.2 on S, the ſegment-line. Set then 100 on B to 97.455, the caſk's whole content on A; and againſt 24.2 on B, you will have 23.5 gallons, which is what is wanting to fill up the caſk: this, therefore, ſubtracted from the whole content 97.455, gives 73.955 gallons, for the quantity of liquor remaining in the caſk.

16. To find the content of any right-angled parallelepiped (*e. gr.* a ciſtern, uting-fat, or the like) in malt buſhels. Suppoſe the length of the baſe 80 inches, the breadth 50, and depth 9 inches; ſet the breadth 50 on B, to the depth 9 on C; then againſt the length 80 on A, ſtand 16.8 buſhels on B, the number required.

SLIDING-*Rule, Coggeſhall's,* is principally uſed in meaſuring of the ſuperficies and ſolidity of timber, &c.

It conſiſts of two rulers, each a foot long, which are framed or put together various ways; ſometimes they are made to ſlide by one another, like glaziers' rules: ſometimes a groove is made in the ſide of a common two-foot joint-rule, and a thin ſliding-piece put in, and Coggeſhall's lines added on that ſide: but the moſt uſual and commodious way is, to have one of the rulers ſlide in a groove made along the middle of the other, as it is repreſented in *Plate* VII. *Surveying, fig.* 5.

On the ſliding ſide of the rule are four lines of numbers, three of which are double, that is, are lines to two radiuſes, and one, a ſingle broken line of numbers: the three firſt, marked A, B, C, are figured 1, 2, 3, &c. to 9; then 1, 2, 3, &c. to 10. Their conſtruction, uſe, &c. are the ſame as thoſe on Everard's ſliding rule. The ſingle line, called the *girt-line,* and noted D, whoſe radius is equal to the two radiuſes of any of the other lines, is broken, for the eaſier meaſuring of timber, and figured 4, 5, 6, 7, 8, 9, 10, 20, 30, &c. from 4 to 5. It is divided into 10 parts, and each tenth ſubdivided into two, and ſo on from 5 to 10, &c.

On the backſide of the rule are, 1. A line of inch-meaſure, from 1 to 12; each inch being divided and ſubdivided.

2. A line of foot-meaſure; conſiſting of one foot, divided into 100 equal parts, and figured 10, 26, 30, &c. The backſide of the ſliding-piece is divided into inches, halves, &c. and figured from 12 to 24; ſo that when ſlid out, there may be a meaſure of two feet.

SLIDING-*Rule, in meaſuring plain ſuperficies, uſe of Coggeſhall's.* 1. To meaſure a ſquare. Suppoſe, *e. gr.* the ſides be each five feet: ſet 1 on the line B, to 5 on the line A; then againſt 5 on the line B is 25 feet, the content of the ſquare on the line A.

2. To meaſure a long ſquare. Suppoſe the longeſt ſide 18 feet, and the ſhorteſt 10: ſet 1 on the line B, to 10 on the line A: then againſt 18 feet on the line B is 180 feet, the content on the line A.

3. To meaſure a rhombus. Suppoſe the ſide 12 feet, and the length of a perpendicular let fall from one of the obtuſe angles to the oppoſite ſide, 9 feet: ſet 1 on the line B, to 12, the length of the ſide, on the line A; then againſt 9, the length of the perpendicular on the line B, is 108 feet, the content.

4. To meaſure a triangle. Suppoſe the baſe 7 feet, and the length of the perpendicular let fall from the oppoſite angle to the baſe 4 feet: ſet 1 on the line B, to 7 on the line A: then againſt half the perpendicular, which is 2 on the line B, is 14 on the line A, for the content of the triangle.

5. To find the content of a circle, its diameter being given. Suppoſe the diameter 3.5 feet: ſet 11 on the girt-line D, to 95 on the line C; then againſt 3.5 feet on D, is 9.6 on C, which is the content of the circle in feet.

6. To find the content of an oval or ellipſis. Suppoſe the longeſt diameter 9 feet, and the ſhorteſt 4. Find a mean proportional between the two, by ſetting the greater 9 on the girt-line, to 9 on the line C; then, againſt the leſs number 4, on the line C, is 6, the mean proportional ſought. This done, find the content of a circle, whoſe diameter is 6 feet; this, when found by the laſt article, will be equal to the content of the ellipſis ſought.

SLIDING-*Rule, in meaſuring timber, uſe of Coggeſhall's.* 1. To meaſure timber the uſual way. Take the length in feet, half feet, and, if required, quarters; then meaſure half-way back again; there girt the tree with a ſmall cord or line; double this line twice, very evenly; and meaſure this fourth part of the girt or perimeter, in inches, halves, and quarters. The dimenſions thus taken, the timber is to be meaſured as if ſquare, and the fourth of the girt taken for the ſide of the ſquare, thus; ſet 12 on the girt-line D, to the length in feet on the line C; then againſt the ſide of the ſquare, on the girt-line D, taken in inches, you have, on the line C, the content of the tree in feet.

For an inſtance: ſuppoſe the girt of a tree, in the middle, be 60 inches, and the length 30 feet, to find the content: ſet 12 on the girt-line D, to 30 feet on the line C; then againſt 15, one-fourth of 60, on the girt-line D, is 46.8 feet, the content on the line C. If the length ſhould be 9 inches, and the quarter of the girt 35 inches, here, as the length is leſs than a foot, meaſure it on the line of foot-meaſure, and ſee what decimal part of a foot it makes, which you will find .75: ſet 12, therefore, on the girt-line, to 75 on the firſt radius of the line C, and againſt 35 on the girt-line is 6.4 feet on C, for the content.

2. To meaſure round timber the true way. The former method, though that generally in uſe, is not quite juſt. To meaſure timber accurately, inſtead of the point 12 on the girt-line, uſe another, *viz.* 10.635; at which there ſhould be placed a centre-pin. This 10.635 is the ſide of a ſquare equal to a circle, whoſe diameter is 12 inches. For an inſtance: ſuppoſe the length 15 feet, and $\frac{1}{4}$th of the girt 42 inches: ſet the point 10.635 to 15, the length;

then againſt 42 on the girt-line is 233 feet for the content ſought; whereas, by the common way, there ariſe only 184 feet. In effect, the common meaſure is only to the true meaſure, as 11 to 14. See TIMBER.

3. To meaſure a cube. Suppoſe the ſides to be 6 feet each: ſet 12 on the girt-line D, to 6 on C; then againſt 72 inches (the inches in 6 feet) on the girt-line are 216 feet on C, which give the content required.

4. To meaſure unequally ſquared timber; that is, where the breadth and depth are not equal. Meaſure the length of the piece, and the breadth and depth (at the end) in inches; then find a mean proportional between the breadth and depth of the piece. This mean proportional is the ſide of a ſquare equal to the end of the piece: which found, the piece may be meaſured as ſquare timber.

For an inſtance: let the length of the piece of timber be 13 feet, the breadth 23 inches, and the depth 13 inches: ſet 23 on the girt-line D, to 23 on C; then againſt 13 on C is 17.35 on the girt-line D for the mean proportional. Again, ſetting 12 on the girt-line D to 13 feet, the length on the line C, againſt 17.35, on the girt-line is 27 feet, the content.

5. To meaſure taper timber. The length being meaſured in feet, note one-third of it; which is found thus: ſet 3 on the line A, to the length on the line B; then againſt 1 on A is the third part on B: then if the ſolid be round, meaſure the diameter at each end in inches, and ſubtract the leſs diameter from the greater; add half the difference to the leſs diameter; the ſum is the diameter in the middle of the piece. Then ſet 13.54 on the girt-line D to the length on the line C, and againſt the diameter in the middle, on the girt-line, is a fourth number on the line C. Again, ſet 13.54 on the girt-line to the third part of the length on the line C; then againſt half the difference on the girt-line, is another fourth number on the line C: theſe two fourth numbers, added together, give the content. For an inſtance: let the length be 27 feet (one-third of which is 9), the greater diameter 22 inches, and the leſs 18; the ſum of the two will be 40, their difference 4, and half the difference 2, which, added to the leſs diameter, gives 20 inches for the diameter in the middle of the piece. Now, ſet 13.54 on the girt-line, to 27 on the line C, and againſt 20 on D is 58.9 feet. Again, ſet 13.54 on the girt-line to 9 on the line C; and againſt 2 on the girt-line (repreſented by 20) is .196 parts; therefore, by adding 58.9 feet to .196 feet, the ſum is 59.096 feet, the content.

If the timber be ſquare, and has the ſame dimenſions; that is, the length 27 feet, the ſide of the greater end 22 inches, and that of the leſſer 18 inches; to find the content: ſet 12 on the girt-line to 27, the length on the line C; and againſt 20 inches, the ſide of the mean ſquare on the girt-line, is 75.4 feet. Again, ſet 12 on the girt-line to 9 feet, one-third of the length, on the line C; and againſt 2 inches, half the difference of the ſides of the ſquares of the ends on the girt-line, is .25 parts of a foot: both together make 75.65 feet, the content of the ſolid.

The girt or circumference of a tree, or round piece of timber, given; to find the ſide of the ſquare within, or the number of inches of a ſide when the round timber is ſquared. Set 10 on A to 9 on B; then againſt the girt on A are the inches for the ſide of the ſquare on the line B. See DENDROMETER.

Dr. Roget has lately communicated to the Royal Society the "Deſcription of a new Inſtrument for performing the Involution and Evolution of Numbers," by which he has very much improved the conſtruction, and extended the application of the "ſliding-rule."

In his ingenious paper on this ſubject, he has ſtated and elucidated the general principles on which inſtruments of this kind are conſtructed, and the ordinary purpoſes to which they are applicable. It is well known, that the Gunter's line and common ſliding-rule are derived from the properties of logarithms, and that their primary uſe conſiſts in facilitating the *multiplication* and *diviſion* of numbers. (See GUNTER's *Line* and GUNTER's *Scale*.) Our author's inſtrument is founded on a particular mode of employing logarithms, and is deſigned for immediate application to the *involution* and *evolution* of numbers. The common ſliding-rule, it is obvious, ſerves for comparing the intervals between the numbers on Gunter's ſcale; and for this purpoſe it conſiſts of a ſcale, called the ſlider, exactly of the ſame length with the former, and bearing the ſame diviſions, which, by being moveable along the ſide of the other, allows of the application of any part of the one to any part of the other. If the two ſcales originally coincide, and the ſliding ſcale is the undermoſt, then, by advancing the ſlider through any given diſtance, each of its diviſions will be brought under thoſe of the fixed ſcale, which before were reſpectively ſituated farther forwards by an interval equal to that given diſtance. Every number in the upper ſcale will therefore have to the number ſtanding under it on the ſlider the ſame conſtant ratio; a ratio indicated by the number under which the unity, or commencement of the ſcale of the ſlider has been placed. The former numbers will therefore be the multiples of the latter by this conſtant number. Thus, by adjuſting the ſlider ſo that its unity ſhall ſtand under any given multiplier or diviſor, the upper line will exhibit the ſeries of the products of all the ſubjacent numbers by the given multiplier; and converſely, the ſlider will exhibit the ſeries of the quotients reſulting from the diviſion of the numbers immediately above them by the given diviſor. In order to facilitate the general uſe of the ſliding-rule, Dr. Roget has pointed out the following propoſition, as leading directly to the ſolution of every caſe to which the inſtrument can be applied. "In every poſition of the ſlider, all the fractions formed by taking the numbers on the upper line as numerators, and thoſe immediately under them as denominators, are equal. Thus, every correſponding numerator and denominator, having to each other the ſame ratio, may be conſidered as two terms of a proportion. Any two of theſe equivalent fractions will therefore furniſh the four terms of a proportion; of which any unknown term may be ſupplied when the others are given, by moving the ſlider till the numbers compoſing the terms of the given fraction are brought to coincide on the two lines. The required term will then be found occupying its proper place oppoſite to the other given term. Thus, from the proportion A : B :: C : D, we may derive $\frac{A}{B} = \frac{C}{D}$; and adjuſting the ſlider ſo that B ſhall ſtand under A, D will be found under C, when C is given; or C will be found over D, when D is given. A ſimilar proceſs would have furniſhed A or B, when one of them, together with C and D, were given. Since the products of each numerator by the denominator of the other fraction are equal (that is, $AD = BC$); when one of the terms is unity, the queſtion becomes one of ſimple multiplication or diviſion. The product of A and B, which we may call P, will be found as before, by placing the ſlider ſo as to expreſs the fractions $\frac{A}{1} = \frac{P}{B}$. The quotient of A divided by B, which we may call Q, will in like manner be found by forming the fractions $\frac{A}{B} = \frac{Q}{1}$; that is, in the former caſe, the product P will ſtand over B, when the 1 on the ſlider is brought under A; and in the latter caſe, the quotient Q will ſtand over the 1 of the ſlider when B is brought under A."

The ſliding-rule has been variouſly modified, ſo as to ſerve for the calculation of exchanges, the meaſurement of plane and ſolid bodies, and the computations of trigonometry; and lately by Dr. Wollaſton, in his ſynoptic ſcale of chemical equivalents; but notwithſtanding theſe modifications, its uſe is neceſſarily limited to operations that are performed by the ſimple addition or ſubtraction of logarithms, and to the correſponding arithmetical operations above mentioned. It is not directly adapted to perform the involution or evolution of numbers, to which the multiplication and diviſion of logarithms correſpond. (See LOGARITHM.) Neverthele ſs, queſtions that involve geometrical progreſſions, or exponential quantities, and the computation of the terms of a ſeries in obtaining approximate ſolutions, not unfrequently occur. The common ſliding-rule affords no direct method of determining even the ſimple power or root of any given number; but when the exponent of the required power or root is not an integral, but a fractional number, it is ſtill more inadequate to the ſolution of the queſtion. Indeed, the ſquares and ſquare roots are often pointed out on the common rules by means of a ſupplementary line graduated ſo that each of its diviſions is double in length to thoſe of the other two lines. A line of cubes, or cube-roots, or of any other given power, might, in like manner, be ſubjoined. But the uſes of ſuch additional lines are reſtricted to caſes where a particular power is concerned; but they afford no aſſiſtance in the caſe of any other power or root, which is not immediately related to the power.

Dr. Roget adopts a new mode of graduation, exhibiting on ſimple inſpection all the powers and roots of any given number to any given exponent, with the ſame facility, and in the ſame way, that products, quotients, and proportionals are exhibited by the common ſliding-rule. Accordingly it is a meaſure of powers, juſt as the ſcale of Gunter is a meaſure of ratios. The principle of its conſtruction will be beſt illuſtrated by an example. If it were required to raiſe the number 2.123 to the fifth power; with the uſe of logarithms we ſhould multiply the log. of 2.123 (or 0.32695) by 5; the product (1.63475) would be found by the tables to correſpond to 43.127, the fifth power of 2.123. If the exponent, inſtead of being a whole number 5, were fractional, as 4.3719, the operation may be abridged by the aid of logarithms: thus, add the log. of 0.32695 or 9.5144813, to that of 4.3719 or 0.6406702, and the ſum, or 0.1551525, is a logarithm anſwering to the number 1.4294, the product required, *viz.* 26.878, or $\overline{2.123}|^{4.3719}$.

In this example, the firſt of the numbers added together is the logometric logarithm (that is, the logarithm of the logarithm) of the given root; the ſecond is the ſimple logarithm of the exponent, and the ſum of theſe is the logometric logarithm of the power. If a table were conſtructed having three ſets of columns, the firſt containing the natural ſeries of numbers, the ſecond their correſponding logarithms, and the third the logarithms of thoſe logarithms, we ſhould be able to raiſe any given number to any given power, by the ſimple addition of the numbers in the ſecond and third columns; as common multiplications are performed by the addition of common logarithms. Hence it is evident, that a line might be graduated ſo that its diviſions ſhould correſpond to the numbers in the third column, or repreſent the logometric logarithms of the numbers marked upon them; and if this line were applied ſo as to ſlide againſt another line logometrically divided, we might be able by it to perform the operation that has been deſcribed; and we ſhould thus have, by inſpection, the powers correſponding to any given root and exponent.

The inſtrument propoſed would therefore, in its ſimpleſt form, conſiſt of two graduated ſcales applied to each other.

In *Plate* VII. *Surveying, fig.* 6. a portion of theſe ſcales is repreſented. The lower rule A A, called the ſlider, is the common Gunter's double line of numbers, or a line logometrically divided; the diviſions of the firſt half being from 1 to 10, and repeated on the ſecond half in the ſame order. The upper, or fixed rule B B, is ſo graduated, that each of its other diviſions is ſet againſt its reſpective logarithm on the ſlider; and, conſequently, all the numbers on the ſlider will be ſituated immediately under thoſe numbers in the upper rule, of which they are the logarithms. Thus, 2 on the rule will be over 0.30103 of the ſlider; 3 over 0.47712; 2 on the ſlider will ſtand under 100 on the rule; 3 under 1000, and ſo on.

As the ſeries of ordinary logarithms expreſs the exponents of 10, of which the correſponding numbers are ſo many ſucceſſive powers, in this poſition of the inſtrument it is evident, that the upper line will exhibit the ſeries of the powers of 10, correſponding to all the exponents marked on the ſlider. *E. gr.* The 2d power of 10 is 100; the 3d, 1000, &c.; the 0.5th (or the ſquare root) is 3.163; the 0.25th (or 4th root) is 1.778; the 0.2th (or the 5th root) is 1.585, &c.

In every other poſition of the ſlider, the upper rule will exhibit, in like manner, the ſeries of powers of that number, under which the unit of the ſlider has been placed, while the oppoſite numbers on the ſlider are the exponents of thoſe powers. Thus, if (*Plate* VII. *fig.* 7.) the unit of the ſlider be placed under the diviſion 3 of the upper rule (at R), the ſquare of 3, or 9, will be found over the 2 of the ſlider; its cube, 27, over the 3; its 4th power, 81, over the 4, &c. Hence, in order to find a given power of any number, the unit of the ſlider muſt be ſet underneath that number in the upper rule; and the number ſought will then be found above that number in the ſlider, which expreſſes the magnitude of the required power. The uſe of the inſtrument will be obvious in performing the contrary operation of finding the roots. In this caſe the root might be conſidered as a fractional power; but as this would require a reduction into decimals, the eaſieſt mode will be to place the number expreſſing the degree of the required root under the given number, and the root itſelf will then be found over the unit, or beginning of the ſcale, in the ſlider. For fractional powers, the denominator of the exponent muſt be placed under the root, and its numerator will then point out the power. By the ſame mode we may diſcover the exponent of any given power to any given root; ſince, whatever be the root over the unit of the ſlider, the whole ſeries of the powers of that root, with their correſponding exponents, are rendered apparent. This circumſtance may be conſidered as an additional recommendation to the employment of this inſtrument; for it affords to thoſe leſs verſed in the contemplation of numerical relations, an ocular illuſtration of the theory of involution. It preſents, at one view, the whole ſeries of powers ariſing from the ſucceſſive multiplication of all poſſible numbers, whether entire or fractional; and exhibits this ſeries in its whole continuity, when the exponents are fractional, and even incommenſurate with the root itſelf. The production of the upper line in one direction, conveys a more accurate notion of the progreſſive and rapid increaſe of thoſe powers, than can be acquired by mere abſtract reflection; and its continuation on the other ſide ſhews the ſlow approximation to unity which takes place in the ſucceſſive extractions of higher and higher roots. Among the variety of forms of conſtruction of which inſtruments that operate on the principle now explained are capable, Dr. Roget conceives the following to be, upon the whole, the moſt convenient for practical purpoſes. Its repreſentation, on a reduced ſcale, appears in *Plate* VII. *fig.* 8. With a view of preſerving a ſufficient extent of ſcale, the line of roots and powers is divided into two parts; one being placed above and the other below, and between them a ſlider with a double ſcale of exponents. The ſlider of the common ſliding-rule is graduated in a way that is exceedingly well ſuited to this purpoſe, having diviſions on each edge, and carrying two ſets of numbers from 1 to 10. Adapting a blank ruler to one of theſe ſliders, which muſt be fixed in a proper poſition, Dr. Roget marks off, on the upper line, the ſeries of numbers againſt their reſpective logarithms on the ſliders; placing 10 over the middle unit of the ſlider, 100 over the 2, 1000 over the 3, and ſo on, proceeding towards the right, from 10 to 10000000000, the 10th power of 10; an extent which is more than ſufficient for all uſeful purpoſes. The ſpace to the left is alſo graduated on the ſame principle, from 10 to 1.259, which is the 10th root of 10, or $\overline{10}|^{0.1}$. The upper portion of the rule being thus filled, Dr. R. places the continuation of the ſame line on the lower portion, beginning on the right hand, and proceeding in a deſcending ſeries of fractional powers of 10, correſponding with the exponents on the intermediate ſlider, which, when applied to this portion, are to be taken as only $\frac{1}{100}$th of their value when applied to the upper portion. While 1.259 therefore is marked on the right, 1.0233 ($= \overline{10}|^{0.01}$) will occupy the middle, and 1.002305 ($= \overline{10}|^{0.001}$) the left end of the lower line. The graduation, it is plain, might be thus continued indefinitely in both directions. But for all practical purpoſes, the limits thus obtained will be found amply ſufficient. In proportion as numbers in a deſcending ſeries approach very near to unity, their logarithms bear more and more exactly a conſtant ratio to the exceſs of thoſe numbers above unity, *viz.* the ratio expreſſed by the modulus of the ſyſtem, or 1 to .4342944819. As we deſcend in the ſcale, therefore, the decimal part of the exponents becoming ſmaller and ſmaller, the correſponding logarithms will approximate ſo nearly to the multiple of that decimal part by this modulus, that no ſenſible error will reſult from aſſuming them to be the ſame. Thus the log. of 1.05 is .021189; that of 1.005 is .0021661; and that of 1.0005 is .00021709, which differs from the product of the modulus by .0005 (or .00021715) by a quantity affecting only the 4th ſignificant figure. The roots 1.0005, 1.00005, 1.000005, &c. may, therefore, without ſenſible error, be conſidered as coinciding with the diviſion 217 on the ſlider. Hence, the diviſions to the left of the lower portion of the rule may be taken as ſufficiently accurate repreſentations of the diviſions which would occur in the ſucceeding portions of the line, if it were prolonged indefinitely in that direction.

This inſtrument may, from the principle of its conſtruction, be applied to the ſolution of various problems in which geometrical progreſſions are concerned. *E. g.* As the ſucceſſive amounts of a ſum placed at compound intereſt compoſe a geometrical progreſſion, all queſtions of compound intereſt are reſolvable by this inſtrument. The rate of intereſt, or the *per centage per annum*, being added to 1, gives the amount of 1*l.* at the end of one year. Thus, at 5 *per cent.* the amount is 1.05, at 3 *per cent.* 1.03, &c. In either caſe this number is to be regarded as the firſt term, or root of the ſeries. Setting the unit of the ſlider againſt this number on the rule, we ſhall find the amount of 1*l.* at the end of 5½ years oppoſite to the number 5.5 on the ſlider, and the ſame of any other interval of time. If it be required to aſcertain in what time a ſum placed at compound intereſt at 3 *per cent.* will be doubled; placing the unit over 1.03, the number 2 on the rule will indicate 23.45 on the ſlider, as the number of years required for doubling the ſum at that rate of compound intereſt. The interpolation of a given number of mean proportionals between two given numbers, is ſometimes required for the ſolution of a problem; and it is eaſily effected by the rule above deſcribed. Thus, in dividing the muſical octave into 12 equal ſemitones, the following ſeries of numbers muſt be calculated, *viz.* $2^{\frac{1}{12}}$, $2^{\frac{2}{12}}$, $2^{\frac{3}{12}}$, $2^{\frac{4}{12}}$, $2^{\frac{5}{12}}$, $2^{\frac{6}{12}}$, $2^{\frac{7}{12}}$, $2^{\frac{8}{12}}$, $2^{\frac{9}{12}}$, $2^{\frac{10}{12}}$, $2^{\frac{11}{12}}$: this may readily be done in one poſition of the ſlider; for when the 12 marked on it is placed under 2 on the rule, the 1 of the ſlider will point to $1.0595 = 2^{\frac{1}{12}}$, the 2 of the ſlider will indicate $1.1225 = 2^{\frac{2}{12}}$, the 3, $1.1892 = 2^{\frac{3}{12}}$, &c.

A variety of queſtions relating to the general theory of logarithms may be illuſtrated by this inſtrument. The aſſumption of the number 10, as the baſis of our ſyſtem of logarithms, is arbitrary, and choſen merely for greater convenience in computation. The hyperbolic ſyſtem, whoſe baſis is the number 2.302585093, &c. has its peculiar advantages, eſpecially in the higher branches of analyſis. The inſtrument may be made to exhibit at one view the ſeries of any particular ſyſtem of logarithms, that is, of a ſyſtem with any given baſis, or any given modulus, by merely ſetting the unity of the ſlider againſt the given baſis on the rule, or the given modulus on the ſlider againſt the number 2.7182818, &c. on the rule. The diviſions on the ſlider will then denote the logarithms of the numbers oppoſed to them on the rule.

Let it be required to determine the particular ſyſtem of logarithms, in which the modulus ſhall be equal to the baſis. Take out the ſlider, and introduce it in an inverted poſition, ſo that the numbers on it ſhall increaſe from right to left; and place the numbers .4343, &c. (the modulus of the common ſyſtem) under 10 (its correſponding baſis) on the rule, as repreſented in *Plate* VII. *fig.* 9. We ſhall find that, in this poſition, all the other numbers on the ſlider will be the moduli correſponding to the reſpective baſes of each different ſyſtem on the rule. Thus, the 1 on the ſlider, or the modulus of the hyperbolic ſyſtem, is oppoſite to 2.718, the baſis of that ſyſtem. On the other hand, the diviſion 2 on the rule is oppoſite to 1.4427, which is the modulus of the ſyſtem having for its baſis the number 2. Carrying the eye ſtill more to the left, and obſerving the point where ſimilar diviſions appear, both on the rule and the ſlider, we ſhall find it to be at the number 1.76315, which therefore expreſſes the modulus and the baſis in that particular ſyſtem in which they are both equal. The reaſon of the above proceſs will readily appear, when it is conſidered, that the modulus of every ſyſtem is the reciprocal of the hyperbolic logarithm of its baſis.

This inverted condition of the ſlider will alſo afford an eaſy method of ſolving exponential equations, for which there exiſts no direct analytical method. *E. g.* Let the root of the equation $x^x = 100$ be required. Set the unit of the inverted ſlider under 100 on the rule, and obſerve, as before, the point where ſimilar diviſions coincide: this will be at

3.6,

3.6, which is a near approximation to the required root; and accordingly, $\overline{3.6}|^{3.6} = 100$.

Our author's inſtrument admits of being applied in various forms to the ſeveral purpoſes above recited, as well as to others which he has enumerated: but the following deſerves particular mention, on account of the peculiarities that attend them. If to the upper ſcale, which we may ſuppoſe to be fixed, and to be graduated logometrically, conſtituting the line of exponents, a ſlider be adjuſted, graduated on both edges, according to the logometric logarithms; and the line below, which, like the upper one, is ſuppoſed to be fixed, be graduated in the ſame manner as the ſlider, the inſtrument will poſſeſs the following property. When the diviſion 10 on the ſlider is ſet againſt any particular number, or exponent, in the upper line, all the numbers on the lower line will be the powers, to the ſame degree, of the numbers oppoſite to them on the ſlider; the degree of the power being marked by the exponent on the upper line, which is above the 10 on the ſlider. The lower line will, therefore, exhibit the whole ſeries of ſimilar powers belonging to all poſſible roots; and converſely, the ſlider will exhibit all the roots of the ſame dimenſions, with regard to all poſſible numbers. Thus, if the 10 on the ſlider be under 3 in the line of exponents, it will itſelf be above 1000 (which is its cube) in the lower line; all the other numbers in that line will be the cubes of their oppoſites on the ſlider; and, converſely, the former will every where be the cube-roots of the latter. This will ſufficiently appear, when it is recollected that the addition or ſubtraction of logometric logarithms, anſwers to the multiplication or diviſion of ſimple logarithms, and therefore to the involution and evolution of numbers. The rule in this form of it, therefore, bears a cloſer analogy to the common ſliding-rule; ſince in every poſition it exhibits the ſeries of ſimilar powers and roots, exactly in the ſame way as the latter exhibits the ſeries of ſimilar products and quotients.

Dr. Roget has alſo contrived to give another form to the inſtrument, by throwing the whole ſcale, like Gunter's line, into a circular form: and of this form he has given a drawing. The circle on the outſide being logometrically divided from 1 to 10 round the circumference, will conſtitute the line of exponents. The line of powers, being diſpoſed in a ſpiral, will occupy the interior ſpace, which may be made to revolve within the former, and ſhould be provided with one or more threads, extending from the centre to the circumference, and ſerving as radii to mark the poſition of all the parts of the ſpiral line with regard to the diviſions of the outer circle. One of theſe threads may be fixed at the unit or beginning of the ſcale, and will ſerve to mark the poſition for the root of any required power. The ſpiral itſelf muſt be graduated exactly as the upper line in the firſt deſcribed rule; that is, the ſituation of the diviſion 10 muſt be firſt determined upon, and then brought under the unit in the circle of exponents; that is, under the fixed thread. Every other diviſion muſt then be marked with reference to the place of its logarithm on the circle, or muſt be made to occupy the ſame angular diſtance from the thread. This graduation will be moſt conveniently made by means of the moveable leg of a ſector revolving on the centre of the circle. The compariſon of the diviſions of the ſpiral with thoſe of the circle may be made, either with this moveable ſector, or with the threads already mentioned. The numbers on the ſpiral will increaſe as they recede from the centre, and each turn will carry on the powers to an exponent ten times higher than the preceding; and the converſe will obtain with regard to the deſcending portion. Thus, immediately in a line with the 10, on the ſuperior branch of the ſpiral, is found the number 10000000000, or 10^{10}; below it, on the inferior branches, we find ſucceſſively $1.258926 = 10^{0.1}$, $1.023293 = \overline{10}|^{0.01}$, $1.00230524 = \overline{10}|^{.001}$, $1.000230285 = \overline{10}|^{.0001}$, $1.0000230261 = \overline{10}|^{.00001}$, &c. of which the decimal figures approach nearer and nearer to 2.302585093, &c. the reciprocal of the modulus of the logarithmic ſyſtem. Our ingenious author has further ſhewn how to exhibit in one view the whole ſeries of roots, powers, and exponents, in all their poſſible relations, by a ſuitable diſpoſition of lines. For further particulars we refer to the Phil. Tranſ. for 1815, part 1. p. 9, &c. For an account of Mr. W. Nicholſon's improvements of the Gunter's ſcale, &c. ſee the Phil. Tranſ. for 1787, vol. lxxvii. part 2. See GUNTER's *Line* and *Scale*.

SLIDING-*Keels*, in *Ship-Building*, an invention of the ingenious captain Schank, of the royal navy, to prevent veſſels from driving to leeward. They were compoſed of plank of various widths, erected vertically by a winch, ſo as to ſlide up and down in a trunk, and through the keel. Many veſſels were built with no leſs than three of theſe keels; but it has not ſeemed to have anſwered.

SLIDING-*Planks*, are the flat forms upon which the bilge-ways ſlide in launching the ſhip.

SLIDING-GUNTER-SAIL, in *Sail-Making*, a triangular ſail, uſed in boats, bent at its foremoſt leech to loops or grommets that ſlide on the lower maſt: the peek or head is attached to a ſmall top-maſt, that ſlides up in the direction of the lower maſt, through two hoops fixed at its head, about three feet aſunder. When the top-maſt is lowered, the ſail furls up cloſe to the lower maſt.

SLIEBH, or SLIABH, the Iriſh name for a range of mountains, or a ſingle one, covered with heath. O'Brien ſays it ſignifies heath-land, whether mountain or plain. It is prefixed to the names of many Iriſh hills.

SLIEBH-AN-ERIN, in *Geography*, a range of mountains in the county of Leitrim, Ireland, extending in a N.E. direction from Lough Allen.

SLIEBH-EN-EWR, called alſo *Dartry* mountains, a cluſter of hills, covering almoſt the whole of the northern barony of the county of Leitrim, Ireland. Of theſe and the preceding it is obſerved by Dr. Beaufort, that they are far from unprofitable; for producing abundance of coarſe graſs, they annually pour forth immenſe droves of young cattle.

SLIEVE-BAUGHT MOUNTAINS, a chain of mountains on the confines of the counties of Monaghan and Tyrone, and extending into both. They form an uninterrupted ridge of high land, the higheſt part of which is called Cairn-more. They have, in general, neither a fruitful ſoil, nor any natural beauties to recommend them, being an uninteresting waſte, and almoſt always wet and moory. There are parts, however, which have beds of the richeſt limeſtone, and abundance of marle, particularly on the eaſtern ſide of Cairn-more. This mountain is famous for its millſtone quarry: thoſe moſt valued conſiſt of a red and very hard grit or ſand-ſtone, the grain of which is cloſe: there is alſo a ſoft whitiſh ſand-ſtone, more eaſily procured, but which ſoon waſtes away. Potters' clay found in the neighbourhood is carried to the pottery at Dundalk. Stat. Ac. of Monaghan.

SLIEBH-BAUGHTA MOUNTAINS, an extenſive range of rather low hills, which cover the ſouthern part of the county of Galway, and the adjoining part of Clare, in Ireland.

SLIEBH-BLOOM, or SLIE-BLOOM, a mountain in Ireland, or rather a chain of mountains, of conſiderable extent, dividing the King's and Queen's counties, and extending into the county of Tipperary. It is about 25 miles in length, and, in ſome parts, 10 miles broad, at the baſe. It is very unequal in height. Some few ridges are of conſiderable altitude, eſpecially thoſe which divide Eli O Carrol from Oſſory. One of theſe is called *Ard-Erin*, *i. e.* the higheſt part of Ireland. This, however, is very doubtful, as it is probable that no accurate compariſon on the ſubject has been ever made. Slie-bloom affords, in general, good paſturage, and in ſome parts, like many other Iriſh mountains, is green to the ſummit; but in other parts it is rocky, wild, and inacceſſible, inſomuch that wolves are ſaid to have found harbour in its caverns later than in any other part of the kingdom, even within the laſt century.

Some of the declivities of this mountain yield good corn, and are highly improved by plantations, and gentlemen's ſeats which command very extenſive and pictureſque views. It is remarkable for the number of fine rivers that ſpring from it. Three of theſe form an intereſting ſubject to poets as well as geographers. "Near Oſſory," ſays Camden, "are thoſe huge copling mountains named *Sliew-blamy*, which Giraldus calls *Bladinæ Montes*, of a vaſt height, out of the bowels whereof ſpring three rivers, the Suire, the Nore, and the Barrow. Theſe deſcend in three ſeveral channels, but join in one before they fall into the ſea, which made the ancients call them the Three Siſters."

It may be obſerved, that the moderns likewiſe call them ſiſters, although Spenſer repreſents them as brothers, the ſons of the giant Blœmius and the nymph Rheuſa, born in the mountain Slew-bloome; and the poet thus deſcribes their courſes and final confluence.

"Theſe three fair ſons, which being thenceforth powr'd,
In three great rivers ran, and many countreis ſcowr'd.
The firſt, the gentle Shure, that, making way
By ſweet Clonmel, adornes rich Waterford;
The next, the ſtubborn Newre, whoſe waters gray,
By faire Kilkenny and Roſſeponte boord;
The third, the goodly Barrew, which doth hoord
Great heaps of ſalmons in his deepe boſome:
All which, long ſundred, doe at laſt accord
To ione in one ere to the ſea they come;
So, flowing all from one, all one at laſt become."
Fairie Queen, book iv. canto xi.

For a more particular account of the three ſiſters of Slie-bloom, ſee BARROW, NORE, and SUIRE; and for a deſcription of the ſoil, quarries, &c. of this mountain, ſee KING'*s* and QUEEN'*s Counties*.

SLIEBH-BONN MOUNTAINS, a range of mountains in the county of Roſcommon, Ireland, extending nearly parallel to the Shannon, at a few miles diſtance, from Ruſkybridge to Laneſborough.

SLIEBH-BUY MOUNTAINS, a mountainous tract in the county of Wexford, Ireland, near the borders of Wicklow.

SLIEBH-CROOB MOUNTAINS, in the county of Down, Ireland, north of the Mourne mountains, and lying between Ballynahinch and Caſtlewellan.

SLIEBH-DHAM, a mountainous range in the weſtern part of the county of Sligo, Ireland, being part of the ridge to which Arrowſmith has given the name of Knock-na-ree.

SLIEBH-DONARD, one of the Mourne mountains, in the county of Down, Ireland, ſaid to be the higheſt of them, and to be 2800 feet in height. See MOURNE.

SLIEBH-GALLAN, a cluſter of hills in the ſouth of the county of Londonderry, Ireland; about 1250 feet above the level of the ſea.

SLIEBH-GULLIEN, in the ſouth-eaſt of the county of Armagh, Ireland, which is thought to be nearly as high as Sliebh-Donard; and which, like it, conſiſts of granite. It has a cairn on the ſummit.

SLIEBH-LEAGUE MOUNTAINS, a cluſter which occupies the peninſula weſt of Killybegs, in the county of Donegal, Ireland; called by Arrowſmith *Sleave-long*.

SLIEBH-LOGHER MOUNTAINS, in the county of Kerry, Ireland, on the borders of the county of Cork. Spenſer has repreſented this range as the ſource of the river Allow:

"Strong Allo tumbling from Sliebh-Logher ſteep:"

but in this he departs from geographical accuracy, as the Allow takes its riſe in the Limerick mountains, and the Blackwater paſſes under Sliebh-Logher, from which it receives a large ſupply of water. See BLACKWATER.

SLIEBH-MISH, a range of hills ſouth of Tralee, in the county of Kerry, Ireland.

SLIEBH-MORE, a mountain in Achil iſland, county of Mayo, Ireland.

SLIEBH-NA-COILTRA MOUNTAINS, a range in the county of Wexford, Ireland, ſouth of the town of New Roſs.

SLIEBH-NA-MAN, a high mountain of the county of Tipperary, Ireland, not far from the Nine-mile houſe, on the road from Clonmel to Kilkenny.

SLIEBH-NA-MUCK, a range of hills N. of the Galtees, in the county of Tipperary, Ireland, extending eaſt and weſt, and lying ſouthward of the town of Tipperary.

SLIEBH-RUSSEL, a mountain of the county of Cavan, Ireland, near Swanlinbar.

SLIEBH-SNAGHT, a mountain of the county of Donegal, Ireland, in the peninſula of Iniſhowen.

SLIGO, a county of Ireland, in the province of Connaught, bounded on the E. by the county of Leitrim, on the S. by Roſcommon, on the S.W. and W. by Mayo, and on the N. by the bay of Donegal. Its greateſt length, from Bunduff in the N. to the Curlew mountains in the S. is 31 Iriſh (39½ Engliſh) miles, and the greateſt breadth 29 Iriſh (37 Engliſh) miles. It contains 247,150 acres, or 386 ſquare miles, Iriſh meaſure, equal to 397,060 acres, or 620 ſquare miles, Engliſh. The number of houſes was 11,509, ſuppoſed to contain 60,000 inhabitants; but the documents on which this is ſtated were very imperfect, and the increaſe muſt have been inconſiderable. There are 39 pariſhes, of which 16 only had churches when Dr. Beaufort publiſhed his valuable work; they lie in the biſhoprics of Elphin, Achonry, Killalla, and Ardagh. This county and the town of Sligo are repreſented in parliament by three members.

Sligo contains very good land, intermixed with large tracts of coarſe and unprofitable ground. In the northern diſtrict, lying between the county of Leitrim and the ſea, are the mountains of Benbulb and Samore. A chain of rough hills extends from Lough Gilly to the bounds of Roſcommon and Leitrim. The barony of Tyreragh, though level along the coaſt, is interſected by large bogs; and the ſouthern part of it is bounded by the Ox mountain, Sliebh-Dham, and a great range of deſolate hills, that extend acroſs the middle of the country; whilſt the Curlews and other mountains cover much of the ſouthern part of it. Among theſe hills there are many large lakes, and abundance of rivers. The Moy, which riſes in the mountain of Knockna-ree, flows firſt to the ſouthward, and after a winding courſe, takes a northerly direction to the bay of Killalla. It receives in its courſe the ſuperfluous waters of Lough Conn, and forms, for ſome miles, the weſtern boundary of the county. Lough Arrow is about eight miles long, full of iſlands, and of a very irregular form: a river of the ſame name proceeds from it, and running northward to Ballyſadere, ruſhes at once into the ſea in a ſtupendous cataract. Lough Garra, on the borders of Roſcommon, in the moſt ſouthern part of the county, communicates with Lough Key by the river Boyle, which joins the Shannon. Lough Gilly exhibits that variety of charming proſpects which bold hills, wooded lawns, and large iſlands clothed with verdure, and crowned with trees, united with a great extent of water, cannot fail to produce. Upon the river by which the waters of this lake are diſcharged into the bay of Sligo, called by Arrowſmith the Garwoag, ſtands the town of Sligo, the only town of note in the county. There are, however, ports at Ballyſadere and Eſky-bridge, at the mouths of the rivers Arrow and Eſky. Hazlewood, the ſeat of Owen Wynne, eſq. is diſtinguiſhed for its beauty as well as for agricultural improvement, which has been carried here probably to a greater extent than at any other place in Ireland. The linen manufacture has made great progreſs in different parts of the county, eſpecially in the vicinity of Ballymote, where it was eſtabliſhed by the late Hon. Tho. Fitzmaurice.

Sligo, a poſt-town of Ireland, chief town of the county of the ſame name, and a ſea-port, ſituated at the mouth of the river which flows from Lough Gilly to the bay of Sligo. Veſſels of 200 tons can come up to the quays, and the trade of Sligo has been increaſing for many years. When Dr. Beaufort publiſhed, its population was eſtimated at upwards of 8000, the number of houſes being 916. The county aſſizes are held here, and it ſends a member to the imperial parliament. The magiſtrates are a provoſt and town-clerk. A caſtle was built here in 1245, and ſoon after a monaſtery, of which Mr. Archdall has ſaid, "that the few ruins which remain evince its former ſplendour. Three ſides of the cloiſter may ſtill be ſeen, covered with an arched roof: the arches and pillars are of extraordinary workmanſhip, and a few of the pillars are ornamented with ſculpture. The great eaſt window is beautiful, and the high altar, adorned with relievos, in the Gothic ſtyle. The nave is ſpacious, with a paſſage round it in the nature of a gallery, ſupported by ſtone pillars. This great and curious monument of antiquity ſeems to have fallen a prey to the devouring teeth of time, rather than to the hands of man, though Cromwell is ſaid to have injured it." Sligo is 105 miles N.W. from Dublin.

SLIME, in *Agriculture*, a material left by the tides and other waters in different places, which is an uſeful manure. See Ooze.

SLINCK, or Slinghe, in *Geography*, a river of Holland, which joins the Berchel, near Borckeloe, in the county of Zutphen.

SLINE-HEAD. See Slyme-head.

SLING, Funda, a ſtring inſtrument, ſerving for the caſting of ſtones, &c. with the greater violence.

Pliny, l. lxvi. c. 5. attributes the invention of the ſling to the Phœnicians; but Vegetius aſcribes it to the inhabitants of the Balearic iſlands, now called Majorca and Minorca, who were famous in antiquity for the dexterous management of them. Florus and Strabo ſay, thoſe people bore three kinds of ſlings, ſome longer, others ſhorter, which they uſed according as their enemies were nearer or more remote. Diodorus Siculus adds, that the firſt ſerved them for a head-band, the ſecond for a girdle, and that the third they conſtantly carried with them in their hand.

In fight they threw large ſtones with ſuch violence, that they ſeemed to be projected from ſome machine, inſomuch that no armour could reſiſt their ſtroke. In beſieging a town, they wounded and drove the garriſon from the walls, throwing with ſuch exactneſs, that they ſeldom miſſed their mark: this dexterity they acquired by conſtant exerciſe, being trained to it from their infancy, the mothers placing their daily food on the top of a pole, and giving them no more than they beat down with ſtones from their ſlings. This art is ſtill, in ſome meaſure, preſerved by the Minorquin ſhepherds. The invention of the ſling has been erroneouſly aſcribed by ſome writers to the inhabitants of theſe iſlands. Froiſſart (vol. i. c. 85.) gives an inſtance in which ſlings were employed for the Engliſh by the people of Brittany in a battle fought in that province during the reign of Philip de Valois, between the troops of Walter de Mauni, an Engliſh knight, and Louis d'Eſpagne, who commanded 6000 men in behalf of Charles de Blois, then competitor with the earl of Montfort for the duchy of Brittany. According to the ſame author, they were alſo uſed in naval combats. Slings were uſed in 1572, at the ſiege of Sancerre, by the Huguenots, in order to ſave their powder. D'Aubigné, who records this fact, ſays that they were hence called Sancerre harquebuſſes. Slings were conſtructed for throwing not only ſtones, but leaden bullets, and clay-balls, baked or hardened in the ſun. They were made of different materials, chiefly flax, hair, or leather, woven into bands, or cut into thongs, broadeſt in the centre, for the reception of the ſtone or ball, and tapering off gradually towards both ends: with one of theſe ſlings, a good ſlinger would, it is ſaid, throw a ſtone 600 yards. An ancient Icelandic treatiſe, entitled "Speculum Regale," ſuppoſed to have been written about the 12th century, mentions ſlings fixed to a ſtaff.

Sling, in *Surgery*, a well-known bandage for the arm and hand.

Slings, in *Rigging*, ſhort ropes uſed to hang the yards to the maſts, &c. See Slinging.

SLINGELANDT, Peter Van, in *Biography*, was born at Leyden in 1640. He was a laborious diſciple of Gerard Douw, and wrought in the highly finiſhed ſtyle of that maſter; and is as neat in his execution. His pictures, however, do not poſſeſs the reliſh found in thoſe of Gerard, either in compoſition or colour; and they are taſteleſs in deſign. He is ſaid to have been moſt patiently perſevering and induſtrious, employing months and years upon one performance; and never being ſatisfied till he found every individual part imitated, however trivial, of any object which he had choſen to repreſent. His works are often paſſed off for thoſe of his maſter, and of Mieris; and it ſometimes demands a conſiderable portion of connoiſſeurſhip to diſcover the impoſition. He died in 1691.

SLINGER's Bay, in *Geography*, a bay of the Eaſt Indian ocean, on the N. coaſt of New Ireland. S. lat. 3°. E. long. 151°.—Alſo, an inlet of the Pacific ocean, between the iſlands of Ramos and St. Juan.

SLINGING is uſed variouſly at ſea; but chiefly for the hoiſting up of caſks, or other heavy things, with ſlings, *i. e.* contrivances of ropes ſpliced into themſelves at either end, with one eye big enough to receive the caſk, or any thing to be ſlung.

There are other ſlings which are made longer, and with a ſmall eye at each end; one of which is put over the breech of a piece of ordnance, and the other eye comes over the end of an iron crow, which is put into the mouth of the piece, to weigh and hoiſt the gun as they pleaſe.

There are alſo ſlings for the yards; which is done by binding them faſt to the croſs-tree aloft, and to the head of the maſt, with a ſtrong rope or chain, that if the tie ſhould happen to break, or to be ſhot to pieces in fight, the yard, nevertheleſs, may not fall upon the hatches.

Slinging *a Man overboard*, in order to ſtop a leak in a ſhip, is done thus: the man is truſſed up about the middle in a piece of canvas, and a rope to keep him from ſinking, with his arms at liberty, a mallet in one hand, and a plug, wrapped in oakum and well tarred in a tarpawling-clout, in the other, which he is to beat with all diſpatch into the hole or leak.

SLIP, among *Ship-Builders*, denotes a place lying with a gradual deſcent on the banks of a river, convenient for *ſhip-building;* which ſee.

Slips, maſſes of earth which are apt to ſlip out of the banks of canals, reſervoirs, &c.

Slips, in *Gardening*, ſuch portions of plants as are ſlipped off from the ſtems or branches for the purpoſe of being planted out as ſets. A great number of plants, both of the woody and herbaceous kinds, is propagated by ſlips, which is effected in the woody kinds by ſlipping off ſmall young ſhoots from the ſides of the branches, &c. with the thumb and finger, inſtead of cutting them off with a knife; but there is no material difference, in the ſucceſs or future growth, between ſlips and cuttings, only the former in ſmall young ſhoots is more proper to be ſlipped off by the hand, which, in numerous ſmall ſhrubby plants, will grow; but it is more commonly practiſed in the lower ligneous plants, ſuch as ſage, winter-ſavory, hyſſop, thyme, ſouthernwood, roſemary, rue, lavender, and others of ſlow ſhrubby growths. The beſt ſeaſon of the year for effecting the work, is generally the ſpring and beginning of ſummer, though many ſorts will grow if planted at almoſt any time, from the ſpring to the latter end of the ſummer, as ſhewn in ſpeaking of their culture.

And in performing the work of ſlipping in theſe ſorts, the young ſhoots of but one year's growth, and in many ſorts the ſhoots of the year, ſhould be choſen as growing the moſt readily, even when to plant the ſame ſummer they are produced, eſpecially the hard-wooded kinds: but in the more ſoft-wooded plants, the ſlips of one year's growth will alſo often readily grow; being careful always to chooſe the moderately-growing ſide-ſhoots ſituated on the outward part of the plants, from three to ſix or eight inches long, ſlipping them off cloſe to the branches, and clearing off the lower leaves; then planting them in a ſhady border, if in ſummer, and watered, or ſo as they can be occaſionally ſhaded in hot ſunny weather, eſpecially ſmall ſlips, inſerting the whole two parts of three into the ground, giving occaſional water in dry warm weather, till properly rooted; and then towards autumn, or in the ſpring following, tranſplanting them where they are to remain.

But in planting ſlips of the ſhoots of tender ſhrubby exotics of the greenhouſe and ſtove, many ſorts require the aid of a hot-bed or bark-bed, to promote their emitting roots more effectually, as ſhewn in their reſpective culture; but ſome others of the ſhrubby kinds, ſuch as geraniums, will root freely in the natural earth in ſummer; and many of the herbaceous tribe, producing bottom-rooted offſets for ſlips, as aloes, &c. alſo readily grow, either with or without a hot-bed; but where there is the convenience of hot-beds in which to plunge the pots of ſlips of tender plants, it runs them off more expeditiouſly; and moſt hot-houſe plants in particular require that aſſiſtance. But many ſhrubby plants, growing into large bunches from the root of the ſmall under-ſhrubby kinds, as thyme, ſavory, hyſſop, ſage, &c. as well as theſe of larger growth, as roſes, ſpiræas, raſpberries, and numerous other ſorts, may be ſlipped quite to the bottom into ſeparate plants, each furniſhed with roots, and planted either in nurſery-rows, or at once where they are to remain.

And as to the ſlipping of herbaceous plants, various ſorts multiply by the roots, &c. into large bunches, which may be ſlipped into many ſeparate plants, by ſlipping off the increaſed ſuckers or offſets of the root, and in ſome ſorts by the offſets from the ſides of the head of the plants, and in a few ſorts by ſlips of their bottom ſhoots, as well as of the ſtalks and branches in plants of buſhy growth; but the greater part by ſlipping the roots, as in many of the bulbous-rooted tribe, and numerous fibrous-rooted kinds of plants. The ſlipping of the bulbous plants is performed in ſummer when their leaves decay, the roots being then taken up, ſlipping off all the ſmall offſets from the main bulb, which are generally ſoon planted again in nurſery-beds for a year or two. See Bulbous *Roots*.

In the fibrous-rooted ſorts, the ſlipping ſhould generally be performed in the ſpring or early part of autumn, which may be effected either by ſlipping the outſide offſets with roots, as the plants ſtand in the ground; or more effectually, by taking the whole bunch of plants up, and ſlipping them into ſeveral ſeparate parts, each ſlip being furniſhed alſo with roots, planting them, if ſmall, in nurſery-rows for a year, to gain ſtrength; or ſuch as are ſtrong may be planted at once where they are to remain. See the culture of the different ſorts under their reſpective heads.

SLIPPER. See Plinth.

Slipper, a kind of iron ſledge, or lock, for the uſe of a tram-waggon.

Slipper *Iſland*, in *Geography*, a ſmall iſland in the Eaſt Indian ſea. N. lat. 14° 8′. E. long. 93° 30′.

Slipper, *Lady's*, in *Botany*. See Cypripedium.

SLIPPERY Rock, in *Geography*, a townſhip of America, in the ſtate of Pennſylvania, and county of Mercer, containing 789 inhabitants.—Alſo, a townſhip of Pennſylvania, in Butler county, containing 658 inhabitants.

SLIPPING, among *Gardeners*, the tearing off a ſprig from a branch, or a branch from an arm of a tree. Theſe ſorts of ſlips take root more readily than cuttings. See Slips.

Slipping, in *Rural Economy*, a term uſed among animals to denote abortion in them. Thus, mares are ſaid to ſlip their colts, ewes their lambs, and cows their calves. And it has been ſuggeſted, that cows in calf, by ſmelling to any fleſh, particularly in a putreſcent ſtate, are affected by ſuch a nauſea as to ſtimulate the womb to action, and to eject the fœtus: this is well known in the north of Scotland, where it is particularly guarded againſt. It is obſerved by Mr. Roſs, in the 25th volume of the "Annals of Agriculture," that through the inattention of a game-keeper, there was always horſe-fleſh lying about his yards, and he had many cows which ſlipped calves. It is ſuppoſed, in the "Eſſex Agricultural Report," that bleeding, when one-third or half gone, is a preventative. When it happens, the abortion ſhould be immediately buried, and the cow kept as widely apart as poſſible from the herd, and not receive the bull that goes with them. It is conſidered as certainly infectious.

And in Suſſex it has been ſuppoſed by ſome that the ſlipping of lambs has been cauſed by too free a uſe of rape, as one large ſheep-farmer, ſome years ſince, loſt eighty or ninety in this way; which was ſuppoſed to ariſe from feeding the ewes upon it about the end of the year, though it had been made uſe of before without any bad effect of this kind. The ewes in this inſtance had been hard kept. The ſame circumſtance has alſo taken place among the flocks of other ſheep-farmers. The ſame ſort of crop has, however, been fed on the other ſide of the hedge at the ſame time with the ſame ſort of ſtock without any inconvenience of this nature occurring. It is, therefore, moſt probably to be aſcribed to ſome other unperceived cauſe. Ewes are, however, certainly, from ſome cauſe or other, very ſubject to ſlip their lambs, and of courſe require much care and attention in this reſpect. They ſhould conſtantly be kept in a ſtate of quiet, and free from all ſort of diſturbance for ſome time after the ram has been put to them.

SLIRE, in *Geography*, a town of Norway, in the province of Aggerhuus; 68 miles N.N.W. of Chriſtiania.

SLIT, in *Agriculture*, a crack or cleft in the breaſts of fat cattle, &c.

SLIT-*Grafting*. See ENGRAFTING.

SLIT-*Planting*, among planters, a mode of planting trees in ſmall openings without the whole of the ground being dug out, a ſmall ſlit or opening only being made for each tree. See PLANTING.

SLITTE, in *Geography*, a river of Scotland, which runs into the Tiviot, near Hawick, in Roxburghſhire.

SLOANE, *Sir* HANS, in *Biography*, immortalized as the principal founder of the Britiſh Muſeum, was born at Killaleagh, in the county of Down, Ireland, April 16, 1660. His family is ſaid to have been of Scottiſh extraction; but whatever their ſituation in life might be, they were deſtined to acquire more honour from him, than he derived from them; though, by the education which he received, his circumſtances appear to have been far from indigent. He is ſaid to have been attached, from his youth, to the ſtudy of nature, and this led him perhaps to that of medicine, as a profeſſion. A ſpitting of blood confined him at home for three years, and it was not till his 19th year that he was able to enter on a regular courſe of medical education at London. To this he devoted the four ſucceeding ſeaſons, during which he was introduced to the acquaintance, and even the friendſhip, of Boyle and Ray; great names, whoſe continued favour affords ſufficient teſtimony of the ſucceſsful application of the young ſtudent, to the two ſciences in which they reſpectively took the lead. Sloane proceeded to Paris, in company with Mr. Tancred Robinſon; ſee ROBINSONIA. There he attended the lectures of Tournefort and Du Verney; and he is reported to have taken his medical degrees at Montpellier. This he could hardly have done as a Proteſtant, and therefore we preſume another report to be more correct, of his having graduated at Orange, where poſſibly there might, at that time, be a ſort of Proteſtant univerſity. Returning to London late in 1684, Dr. Sloane became a favourite and inmate of the great Sydenham, who ſeems to have intended taking him by the hand as a phyſician. He was ſoon choſen a fellow of the Royal Society, and in April 1687, entered into the College of Phyſicians. Theſe early advancements afford, as Dr. Pulteney remarks, the ſtrongeſt preſumptions in favour of his knowledge and abilities. Yet he relinquiſhed his domeſtic proſpects, to gratify his ardour for natural knowledge.

A deſire of inveſtigating the natural hiſtory of the Weſt Indies, the appetite for which, among the learned of Europe, had rather been whetted than ſatisfied by ſlight and ſuperficial information, induced Dr. Sloane to embark for Jamaica, in September 1687, as phyſician to the duke of Albemarle, juſt then appointed governor of that iſland. But the death of this nobleman, on the 19th of December, ſoon after their arrival, putting an end to the office of his phyſician, the ſtay of the latter in the new world, which he had been ſo eager to viſit, became abridged by his circumſtances, and neceſſary proſpects in life. He ſnatched fifteen months from theſe calls, and devoted that period, with all poſſible ardour, to the accompliſhment of the real object of his voyage. The Weſt Indies had hitherto been viſited by Engliſhmen, for none but the moſt ſordid purpoſes, and the paſſions, taſtes, and characters of the ſettlers have generally been formed and moulded by the malignant influence of their domeſtic ſyſtem, their luxurious habits, and the natural effects of the climate. Sloane paſſed through this triple ordeal untouched; for he was armed by a love of nature, a thirſt for knowledge, and ſufficient ſcientific acquirements to be ſenſible of the value of what he poſſeſſed, and of what lay within his reach. He made ample collections of natural hiſtory, bringing home from Jamaica, Barbadoes, Nevis, and St. Kitt's, about 800 ſpecies of dried plants, enriched with a moſt abundant ſtore of information reſpecting their qualities and uſes. He arrived in London, May 29, 1689, where he directly reſumed his medical occupations, with which he happily and ſucceſsfully aſſociated his literary purſuits. A fine perſon, and agreeable manners, doubtleſs contributed more to his ſucceſs as a London phyſician, than the ſkill of Hippocrates would have done by its own intrinſic worth. The intereſt of Dr. Sloane ſeems to have lain much in the city. In 1694 he became phyſician to Chriſt's hoſpital, and the next year he married Elizabeth, daughter of alderman Langley, who lived with him near thirty years, dying in 1724. She bore him a ſon and daughter, who died young; beſides two daughters, who carried rich inheritances into the families of Stanley and Cadogan, and who both ſurvived their father.—In 1693 Dr. Sloane was elected ſecretary to the Royal Society, which office he held for nineteen years, to the great honour and benefit of that body as well as himſelf, for he immediately revived the publication of its Philoſophical Tranſactions, which had for ſix years been neglected. He was no leſs attentive to his medical duties in the College, for he projected and eſtabliſhed a diſpenſary for the poor, ſteering ſkilfully through all the difficulties which uſually attend any ſcheme for public benefit, where bodies of men are concerned. The oppoſition he encountered gave riſe to Dr. Garth's celebrated and beautiful poem of the "Diſpenſary," by which alone the memory of theſe conteſts, and of moſt of the parties engaged, is now preſerved. But it is not ſo with Sloane. Unfading wreaths, though not of poetic laurel, adorn his buſt, and his favourite ſcience conſecrates his name in one of the moſt ſtately Weſt Indian plants. See SLOANEA.

In 1696, the ſubject of our memoir publiſhed his Latin Catalogue of the Plants of Jamaica, a cloſely printed octavo of 232 pages. He follows Ray's ſyſtem of arrangement, and is content with referring his ſpecies, as well as he could, like that great writer himſelf in his catalogues of Britiſh plants, to ſome popularly received genus; in which habit and general reſemblance, rather than the ſtructure of the fructification, are his guides. In ſcientific generic diſcrimination indeed, Sloane muſt yield the palm to Plumier and many others. His incompetence in this point, rendered him unfit to eſtimate the talents of Linnæus; when the latter viſited him in 1736, and remarked to Haller, that no botaniſt in England, except Dillenius, underſtood, or cared about, generic characters. But Sloane is nevertheleſs entitled to rank high as a literary botaniſt from his uncommon attention to ſynonyms, by which the little volume in queſtion is rendered almoſt a complete *Pinax* of the plants it contains, and the hiſtory of the ſeveral ſpecies is preſerved, as much as poſſible, from confuſion. That ſuch a work ſhould be free from errors, is impoſſible, but it evinces the learning and diligence of its author. This catalogue was not followed up, till the year 1707, by the publication of the firſt volume of the great work, to which it was a kind of *Prodromus*, and which is entitled "A Voyage to the Iſlands Madera, Barbados, Nieves, St. Chriſtopher's and Jamaica, with the Natural Hiſtory of the Herbs and Trees, four-footed Beaſts, Fiſhes, Birds, Inſects, Reptiles, &c. of the laſt of thoſe iſlands." To this volume is prefixed an introduction, of 154 pages, containing an account of the hiſtory and climate of Jamaica, the manners, domeſtic economy, food, trade, &c. of the inhabitants, and particularly an ample detail of their diſeaſes. The whole is full of curious and inſtructive matter. The body of this volume, compriſing 264 pages, 47 of which are devoted to a journal of the author's voyage, conſiſts of deſcriptions of plants, with every thing that could be got together, relative to their hiſtory or qualities. The whole is illuſtrated by 256 plates, chiefly of plants, each plate often being occupied by ſeveral ſpecies. Theſe were taken from the dried ſpecimens, ſtill extant in the author's herbarium; and are therefore very imperfect as to botanical details, though characteriſtic in their general appearance. It is ſcarcely neceſſary to remark that certain coloured copies which exiſt, are mere impoſitions upon the purchaſer. It is more important to obſerve, that the genera or affinities of the plants are ſometimes widely erroneous, in conſequence of the work having been compoſed from a rather ſuperficial inſpection of dry ſpecimens. Thus *Cardamomum minus, pſeudo-aſphodeli foliis; Cat.* 61; page 166. t. 103. f. 3, of the preſent work, is actually an *Orchidea*, of the genus *Neottia;* whilſt *Orchis elatior latifolia, aſphodeli radice, ſpicâ ſtrigoſâ; Cat.* 119; p. 250. t. 147. f. 2, is, according to the herbarium, an *Alpinia*. The figure however repreſents an *Orchidea*.

The ſtatiſtical part of this book is valuable, but there are ſome remarks relative to the management of ſlaves, which we cannot paſs over, eſpecially as the queſtion of the ſlave-trade ſtill calls for all the vigilance of the Chriſtian moraliſt and politician, to defeat the machinations of its advocates, and ſecret promoters. The following, amongſt others, are Sloane's words. "The puniſhments for crimes of ſlaves, are *uſually* for rebellions burning them, by nailing them down on the ground with crooked ſticks on every limb, and then applying the fire by degrees from the feet and hands, burning them gradually up to the head, whereby their pains are extravagant. For crimes of a leſſer nature, gelding, or chopping off half of the foot with an axe. Theſe puniſhments are ſuffered by them with great conſtancy." The author proceeds as coolly to deſcribe "*uſual*" whipping and other puniſhments, and concludes thus. "After they are whip'd till they are raw, ſome put on their ſkins pepper and ſalt, to make them ſmart; at other times their maſters will drop melted wax on their ſkins, and uſe ſeveral very exquiſite torments. Theſe puniſhments are *ſometimes* merited by the blacks, who are a very perverſe generation of people; and though they *appear harſh*, yet are ſcarce equal to ſome of their crimes, and inferior to what puniſhments other European nations inflict on their ſlaves in the Eaſt Indies, as may be ſeen by Moquet, and other travellers." The author, in palliating theſe enormities, worthy of Spaniſh inquiſitors, and perhaps originally derived from ſome ſuch helliſh ſource, does not inform us whether our Chriſtian Proteſtant miniſters preached againſt them; but we learn from other documents that they durſt not. We know alſo that the parent ſtate, eccleſiaſtical as well as civil, for ages looked on, without interfering; and even at this moment, all the ſtrenuous exertions of the virtuous few, ſupported by the awakened zeal of moſt Chriſtian divines, of every perſuaſion, are ſcarcely able to ſucceed in demoliſhing the root of the evil. Regulations have indeed been made to guard againſt ſome of the above enormities, and the African ſlave-trade has been aboliſhed by law. But let Britons never forget that ſuch things have exiſted, and guard, with all their power and vigilance, againſt a poſſibility of their return. The coolneſs or partiality of Sloane, only proves the callous ſtate of the public mind reſpecting this queſtion, upon which he tried to make himſelf as eaſy as he could. He was, on the whole, a man of good feelings, charitable to the poor, alive to their intereſts wherever they came in his way, and friendly to all improvements in his profeſſion; ſuch as inoculation for the ſmall-pox, and the uſe of the Peruvian bark; both which were combated in his day, even more abſurdly, and no leſs diſhoneſtly, than vaccination is at preſent.

The ſecond volume of Sloane's Jamaica did not appear till the year 1725. By ſome accident, this is much the moſt common of the two, and frequently ſells for a trifle, while both together fetch about twelve guineas. Of this ſecond volume, 187 pages are devoted to the vegetable, and 148 to the animal, kingdom. There is beſides a copious index of 102 pages. About 80 of the plates relate to plants, and 42 to animals. A ſhort account is given of the author's return to England, with the dowager ducheſs of Albemarle; and numerous corrections, or additions, to the firſt volume are ſubjoined. The author frequently refutes his antagoniſt Plukenet in a deciſive ſtyle, but with leſs acrimony than the latter has uſually betrayed. It would be tedious and unprofitable to follow them through all the mazes of their criticiſm, but as far as we have incidentally done this, Plukenet is generally moſt exact. (See PLUKENET.) We muſt not omit to notice, that Sloane liberally allowed Ray to make uſe of his Jamaica manuſcripts, in the third volume of the *Hiſtoria Plantarum*, where the original generic diſtributions of the author, if they merit that appellation, are followed. Though Sloane tells us, in the preface to his firſt volume, that ſome of the plants, with his obſervations upon them, had received the approbation of his illuſtrious friend; it does not any where appear that queſtions of botanical arrangement, or technical diſcrimination, had been particularly diſcuſſed between them. We muſt not therefore lay any defects of this kind to the charge of Ray, to whom the ſcientific botany of the Weſt Indies was nearly an unexplored field, of which Sloane furniſhed him by no means with ſufficient materials for the cultivation; the latter having examined nothing very deeply in this reſpect, and his dried ſpecimens being moſtly inſufficient for the purpoſe.

The collections of natural hiſtory, made by Sloane in his voyage, ſeem to have laid the foundation of that muſeum, which became gradually ſo famous. A brother collector and friend, Mr. Courten, in 1702, left his own acquiſitions to augment it, on condition of the payment of certain debts and legacies, to an amount much below the value of what was thus bequeathed. How ſoon curioſities of art were included in Dr. Sloane's muſeum, or whether ſuch made a part of Mr. Courten's, we know not; but the whole collection was now very conſiderable, and continued increaſing during the long life of its owner, who, the year before he died, reckoned up the articles of natural hiſtory, excluſive of 200 volumes of dried plants, as amounting to more than

30,600. His taſte for collecting was followed by many perſons, nor ſhould his humble imitator, Mr. Salter of Chelſea, the founder of the well-known Don Saltero's coffeehouſe, be altogether deſpiſed. Who can anſwer for the taſte or curioſity that may have been awakened by this humble popular muſeum, or the purſuits and diſcoveries to which it may have led? The writer of this is not aſhamed to acknowledge his own obligations to it at a very early period. The diſcoveries of Sloane in the Weſt Indies were moreover uſeful, in exciting collectors of living plants to enrich their gardens from that novel and fertile ſource, by which all the hot-houſes in Europe profited. Hence the French were led to ſend out PLUMIER, ſee that article; and though at war with England in the year 1708, that nation was generous enough to admit the ſubject of our memoir, with the permiſſion of queen Anne, as one of the eight foreign members of the *Academie des Sciences*. His honours and appointments at home were rapidly increaſing. He was conſulted by the royal family, and created a baronet by king George I. This rank, it is ſaid, had never before been conferred on a phyſician; though ſuch an application of it has ſince been frequent; as being eaſier to the giver, and more advantageous to the receiver, than more ſolid, but leſs brilliant, rewards for court ſervice. Sir Hans became phyſician-general to the army, and in 1719 was elected preſident of the College of Phyſicians, which ſtation he held for ſixteen years; but all his other honours fade before that of the preſidency of the Royal Society, conferred upon him, on the death of ſir Iſaac Newton, in 1727. He reſigned the latter, at the age of fourſcore, in 1740, when he retired to the manor-houſe of Chelſea, which manor he had purchaſed about the year 1720. Here he received the viſits of his ſcientific and other friends, patronized the ingenious, and aſſiſted the diſtreſſed. The worthy George Edwards records, in his Eſſays on Natural Hiſtory, that he ſeldom miſſed drinking coffee with "the good ſir Hans Sloane" on a Saturday, during his retirement of about fourteen years at Chelſea. "He was ſo infirm as to be wholly confined to his houſe, except ſometimes, though rarely, taking a little air, in his garden, in a wheeled chair." Edwards unexpectedly found him in the agonies of death, on the 10th of January, 1753, N.S. at four in the afternoon. He expired at four the next morning, in the 92d year of his age, and was buried, along with his lady, in a vault, at the ſouth-eaſt corner of Chelſea church-yard, where a handſome, and very conſpicuous, monument to his memory ſtill exiſts. His epitaph relates that he died "without the leaſt pain of body, and with a conſcious ſerenity of mind." Edwards ſays, "I continued with him later than any one of his relations, but was obliged to retire, his laſt agonies being beyond what I could bear; though under his pain and weakneſs of body, he ſeemed to retain a great firmneſs of mind, and reſignation to the will of God." Theſe accounts may not be totally irreconcileable. The convulſions of death are "agonies" probably in appearance more than reality; and it is conſolatory to ſee a well-directed mind, even in ordinary caſes, generally ſuperior to them, in a remarkable manner. Sloane was, in every reſpect, prepared to meet them.

The perſon of ſir Hans Sloane was tall and handſome; his manners eaſy, polite and cheerful. He delighted in exhibiting and explaining to ſtrangers, and eſpecially foreigners, whatever he poſſeſſed, and is ſaid to have kept an open table once a-week, for his friends, particularly ſuch as belonged to the Royal Society. That his reception of the great Linnæus was not peculiarly flattering, has often been mentioned with regret; nor can we account for it otherwiſe, than by recollecting that he was not ſufficiently gifted with the taliſmanic power of genius, by which kindred minds diſcover each other, through every diſguiſe of rank, or external appearance. But the principal obſtacle to the free intercourſe of theſe diſtinguiſhed men aroſe, perhaps, from the want of a common language. Linnæus could ſpeak nothing but Latin, and that with the foreign accent. He was moreover, at this time, full of thoſe novel ideas of botanical philoſophy, by which he ſubſequently gave laws to the learned world. Boerhaave, who recommended him with enthuſiaſm to Sloane, could appreciate theſe; but to the latter, as at firſt ſight to Dillenius, they promiſed nothing but confuſion and inconvenience; and though the Oxford profeſſor ſoon looked further into their merits; the opulent patron and collector, who had riſen to eminence by his own means, felt no inclination to go to ſchool to a poor Swediſh ſtudent, hardly ſuperior in his eyes to a working gardener. Few men can be ſerviceable in many different ways. The merits of ſir Hans Sloane were tranſcendant in his own line. He neglected no means, that appeared to him eligible, for promoting literature or ſcience. On purchaſing his great eſtate at Chelſea, he preſented the Apothecaries' company with the fee ſimple of the garden which they had already made there, on a condition, equally beneficial to their fame and to ſcience, that it ſhould for ever continue a *botanic* garden. "He was governor," ſays Dr. Pulteney, "of almoſt every hoſpital in London; and to each, after having given an hundred pounds in his life-time, he left a more conſiderable legacy at his death. He was ever a benefactor to the poor, who felt the conſequences of his death ſeverely. He was zealous in promoting the eſtabliſhment of the colony of Georgia, in 1732; and formed, himſelf, the plan for bringing up the children in the Foundling Hoſpital, in 1739."

Nor was the pen of this active philoſopher idle, amid his other occupations. To particularize even the titles of his papers, printed by the Royal Society, amounting to 35, would lead us too far. However curious and uſeful the contents of moſt of the reſt may be, the laſt in the liſt, on Inoculation, vol. 49. 516, is pre-eminently important, as recording the introduction of that practice into England, and diſplaying the candour, as well as good ſenſe, of the writer, in every thing relative to the ſubject.

It remains for us only to mention the eſtabliſhment of the Britiſh Muſeum, for which the nation is entirely obliged to ſir Hans Sloane. He bequeathed it to the public, on condition of a payment, to his heirs, of 20,000 pounds; a ſum ſaid barely to equal the intrinſic value of the precious metals and gems, of the medals and mineral ſpecimens. Beſides the abundance of natural and artificial curioſities, his library, amounting to 50,000 volumes, of books and manuſcripts, was included in the bequeſt. In collecting theſe books, he is reported to have ſent his duplicates, either to the College of Phyſicians, or the Bodleian library. Parliament having accepted the legacy of Sloane, augmented it with the library of ſir Robert Cotton, and the valuable manuſcripts of the lord treaſurer HARLEY; ſee that article. The whole, with various additions, has been depoſited in the vaſt and maſſy palace of Montagu Houſe, where it is now, in the moſt eaſy manner, and free of expence, acceſſible to the public. Two of the founder's deſcendants are always hereditary truſtees of theſe treaſures, aſſociated by the original act of parliament, or by particular election, with a limited number of the moſt eminent men in the kingdom. For the preſent ſtate of this noble repoſitory, and its more particular hiſtory, ſee MUSEUM, *Britiſh*. Sloane's Works. Pulteney's Sketches of Botany. Aikin's Gen. Biog. S.

SLOANEA, in *Botany*, ſo named by Plumier, in honour of his celebrated predeceſſor in the botanical inveſtigation of the Weſt Indies, Sir HANS SLOANE. (See that article.)—Linn. Gen. 265. Schreb. 353. Willd. Sp. Pl. v. 2. 1155. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 296. Swartz Obſ. 212. Juſſ. 291. Lamarck Illuſtr. t. 469. (Sloana; Plum. Gen. 48. t. 15.)—Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Amentaceæ?* Linn. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five, or more, acute, rather unequal, ſegments. *Cor.* none. *Stam.* Filaments very numerous, above 100, ſhort, inſerted into the downy, fleſhy receptacle; anthers oblong, of two cells, attached lengthwiſe to the filaments. *Piſt.* Germen ſuperior, roundiſh, angular; ſtyle ſimple, awl-ſhaped, longer than the ſtamens; ſtigma nearly ſimple. *Peric.* Capſule large, roundiſh, prickly, of from three to ſix valves, and as many cells, burſting at the top, the partitions from the middle of each valve. *Seeds* two or three in each cell, oblong, obtuſe, involved in a pulpy tunic.

Eſſ. Ch. Corolla none. Calyx of one leaf, inferior, in five or more ſegments. Anthers attached longitudinally to the filaments. Capſule prickly, of from three to ſix valves, and as many cells. Seeds two, with a pulpy tunic.

Obſ. Linnæus ſeems to have been led by the very erroneous opinion of Miller, (who referred this genus to *Caſtanea* or *Fagus*,) to conſider it as probably of his amentaceous order. Juſſieu has far more correctly ranged it with his own genuine *Tiliaceæ*, near *Sparrmannia*. Three ſpecies are now known; fine South American, or Weſt Indian, trees, of which Linnæus was acquainted with the firſt only. His *S. emarginata*, Sp. Pl. 731, taken up from Cateſby's work, without the inſpection of any ſpecimen, is, as Willdenow remarks, no other than *Achras Sapota*. Concerning the reſt, great confuſion, originating with Aublet, is perpetuated by no leſs authority than that of Swartz, followed by Willdenow and Aiton. Juſſieu alſo errs in ſuppoſing the Linnæan *Sloanea* to be *Aubletia*, or *Apeiba*. Such may indeed be the plant of the *Hortus Cliffortianus*, but that of *Sp. Pl.* is certainly Plumier's. We ſhall attempt a corrected view of the ſpecies and their ſynonyms, from authentic ſpecimens.

1. S. *dentata*. Cheſnut-leaved Sloanea. Linn. Sp. Pl. 730. Ait. n. 1. (S. Maſſoni; Swartz Ind. Occ. 938. Willd. n. 2. Sloana amplis caſtaneæ foliis, fructu echinato; Plum. Ic. 240. t. 244. f. 1.)—Leaves toothed; heart-ſhaped at the baſe. Stipulas linear, ſerrated. Calyx deeply divided.—Native of South America and the Weſt Indies. Our ſpecimens were gathered by Maſſon in the iſland of St. Kitt's. Miller is ſaid to have cultivated this plant in the ſtove at Chelſea, but it has not been known to bloſſom in Europe. In its native country this is a lofty *tree*, with round leafy *branches*, finely downy when young. *Leaves* alternate, ſtalked, a foot or more in length, and half as broad, ſmooth, with one rib and many ſtrong tranſverſe veins, rather coriaceous; more or leſs heart-ſhaped at the baſe; the margin diſtantly and rather ſlightly toothed. *Footſtalks* downy, two or three inches long. *Stipulas* near an inch in length, narrow, deeply toothed, almoſt pinnatifid, ſituated in pairs at the baſe of each footſtalk. *Cluſters* axillary, towards the ends of the branches, compound, many-flowered, drooping, not half ſo long as the leaves. *Flowers* green, about three-quarters of an inch wide, conſpicuous for their numerous tufted *ſtamens*. *Anthers*, as well as *germen*, hairy. *Capſule* woody, above an inch in diameter, clothed with very long, rigid briſtles, ſpreading in all directions.

2. S. *grandiflora*. Large-flowered Sloanea. (S. dentata; Swartz Obſ. 213. Willd. n. 1, excluding the ſynonyms, except the following. S. Plumierii; Aubl. Guian. v. 1. 536.)—Leaves toothed; tapering at the baſe. Stipulas triangular-heart-ſhaped, ſerrated. Calyx with ſhallow ſegments.—Gathered in the foreſts of Guiana by Aublet, whoſe ſpecimen is before us. He found it bearing flowers and fruit in November. The *trunk* is forty or fifty feet high, and two in diameter. *Leaves* pointed at each end. *Stipulas* very broad at the baſe, and more ſlightly ſerrated or toothed. *Flowers* almoſt twice as large as thoſe of the preceding; the *calyx* remarkably and eſſentially different, having a broad, hemiſpherical, cup-like baſe, and very wide ſhallow ſegments in the border; whereas the *dentata* has a *calyx* divided nearly to the baſe, into lanceolate, or ſomewhat ovate, taper-pointed lobes. *Capſule* of from three to five cells. *Seeds* one, two, or three in each cell, enfolded in a red ſucculent tunic. The ſpecific character and deſcription given by profeſſor Swartz, cannot be miſtaken; but it is remarkable that he ſhould not have detected Aublet's miſapplication of Plumier's ſynonym. This error is indeed the more pardonable in Aublet, as he was acquainted with but one of theſe two ſpecies, and took it, of courſe, for what Plumier had figured.

3. S. *Aubletii*. Small-flowered Sloanea. Swartz Ind. Occ. 940. (S. ſinemarienſis; Aubl. Guian. v. 1. 534. t. 212. Willd. n. 3.)—Leaves roundiſh, abrupt, entire. Calyx in five deep ovate ſegments.—Gathered by Aublet in the foreſts of Guiana about the river Sinemari, 30 leagues above its mouth, bearing flowers and fruit in November. Swartz ſays it was found by Maſſon in St. Kitt's. The *trunk* is deſcribed as forty or fifty feet high, with a reddiſh, cracked, and wrinkled bark. *Branches* ſlender, finely downy when young. *Leaves* in Aublet's ſpecimen near a foot long, on ſtalks about one-third that length, coriaceous, ſmooth, ſtrongly veined. He deſcribes the *ſtipulas* as being long, broad, and pointed. Theſe we have not ſeen, any more than the *flowers*, which grow in ſhort, ſimple, axillary *cluſters*, and are much ſmaller than either of the preceding. The *ſtyle* in Aublet's plate, as well as his own French deſcription, is repreſented divided into four or five deep ſlender ſegments. The *capſule* is oblong, an inch in length, with four or five cells and as many angles, clothed with long, ſlender, aſcending filaments or briſtles. We ſhould gladly have given the name of *parviflora* to this ſpecies, but we have taken the leaſt exceptionable of thoſe that already exiſt. The *Galibis* call this tree *Oulouqua-Palou*, but nothing is recorded of their applying it to any uſe.

SLOATH, or SLOTH, in *Zoology*, the name of an animal remarkable for its ſlow motion. Of this animal there are two ſpecies. See BRADYPUS.

The *three-toed* ſloth has a blunt black noſe, a little lengthened; very ſmall external ears; ſmall, black, and heavy eyes, with a duſky line from the corner of each; the colour of the face and throat a dirty white; hair on the limbs and body long, and very uneven, of a cinereous brown colour, with a black line along the middle of the back; each ſide, about the ſhoulders, is daſhed with ruſt colour; the reſt of the back and limbs ſpotted irregularly with black; the tail ſhort; legs thick, long, and aukwardly placed; the face naked; and three very long claws on each foot. Pennant.

This creature, which grows to the bulk of a middle-ſized fox, is ſo very tedious in all its motions, that it will be three or four days in climbing up, and coming down a tree, and does not go the length of fifty paces upon even ground in a day. It never ſtirs till compelled by hunger: its food is fruit, or the leaves of trees. Its motion is attended with a very moving and plaintive cry, ſo that beaſts of prey avoid it with horror.

The ſound of its voice ſeems only to expreſs the word *haii*, for which reaſon the Braſilians call him by that name; but he uſually repeats the ſound about ſix times together, deſcending, as if one ſhould ſing *la*, *ſol*, *fa*, *mi*, *re*, *ut*.

Its look is ſo piteous as to move compaſſion, and accompanied with tears. Whatever he takes hold of, he does it ſo ſtrongly, or rather ſo ſtiffly, that he will ſometimes ſleep ſecurely while he hangs at it.

Cluſius, Marcgrave, Piſo, and others, have given deſcriptions of this animal, but they none of them mention the length of his fore-feet; which, according to the animal preſerved in the Muſeum of the Royal Society of London, is double that of the hinder pair.

From the ſhag of his body, the ſhape of his legs, and his having little or no tail, as alſo from the ſlowneſs of his gait, and his climbing up trees as little bears uſe to do, he ſeems to come near the bear-kind, from which he differs chiefly in having but three claws upon a foot.

This creature breeds principally in Florida and Braſil. Grew's Muſ. p. 11.

The *two-toed* ſloth has a round head; ſhort projecting noſe; ears like the human; two long ſtrong claws on the fore-feet, and three on the hinder; long and rough hair on the body, in ſome parts curled and woolly; in ſome, of a pale red above, and cinereous below; in others, of a yellowiſh-white below, cinereous-brown above; it has no tail. This animal inhabits South America, and the iſland of Ceylon. Pennant.

SLOATS *of a Cart*, the under pieces which keep the bottom of the cart together.

SLOB-FURROWING, in *Agriculture*, a particular method of ploughing land.

SLOBNA, in *Geography*, a town of the duchy of Warſaw; 25 miles S. of Kaliſh.

SLOBNICK, a town of the duchy of Warſaw; 24 miles N.N.W. of Poſen.

SLOBODSKAIA, a fortreſs of Ruſſia, in the government of Ekaterinoſlav; 64 miles N.E. of Ekaterinoſlav.

SLOBODSKOI, a town of Ruſſia, in the government of Viatka; 20 miles N.N.E. of Viatka. N. lat. 58° 40′. E. long. 50° 44′.

SLODTZ, RENÈ MICHAEL, in *Biography*, ſurnamed Michael Angelo, a ſculptor, was born at Paris in 1705. He ſtudied under his father, who was a native of Antwerp, after which he went to Rome, and upon his return was admitted a member of the Academy of Paris, where he died in 1764. One of his moſt conſiderable works is the monument of Languet, in the church of St. Sulpice.

SLOE, *Prunus Sylveſtris*, the Engliſh name for the wild plum. See PRUNUS.

The juice expreſſed from the fruit of the ſloe-buſh while unripe, inſpiſſated by a gentle heat to dryneſs, is called German acacia. It differs from the Egyptian moſt remarkably in this property, that it gives out its aſtringency in good meaſure to rectified ſpirit as well as to water, whereas that of the other is not at all diſſoluble in ſpirit.

A conſerve of this fruit has been prepared in the ſhops, by mixing the pulp, preſſed out through a ſieve after the ſloes have been ſteeped in water over the fire, till they are ſufficiently ſoft without burſting, with thrice its weight of double refined ſugar.

In ſome places, the unripe ſloes are dried in an oven, and then fermented with wines or malt liquors, for a reſtringent diet drink in alvine and uterine laxities. The bark, both of the branches and roots, is ſaid to be ſucceſsfully given in intermitting fevers, and it has been recommended by ſome as equal to the Peruvian bark. It is apparently a ſtrong ſtyptic. The watery infuſion of the flowers, ſweetened with ſugar, or made into a ſyrup, is ſaid to be a very uſeful purgative for children. Lewis's Mat. Med.

SLOE-*Worm*, in *Natural Hiſtory*, the name of an inſect found on the leaves of the ſloe, or black-thorn, and ſometimes on thoſe of the garden plum.

This, and a like worm, found on the leaves of the oak, both remarkable for the hairs which cover them, each of which is forked, or divided into two at the ends, are uſually eſteemed caterpillars, but they are in reality animals of a very different claſs: the caterpillar has, at the utmoſt, but ſixteen legs; theſe have twenty-two, and have all the other characters of that claſs of inſects called by the French naturaliſts *fauſſes chenilles*, or baſtard caterpillars.

All the animals of that claſs are very remarkable for the different figure they make after the laſt change of their ſkins; but this is in none ſeen ſo obviouſly, as in theſe two ſpecies: that of the oak is of a greeniſh colour, and its hairs, which are ſo ſtiff that they almoſt deſerve the name of ſpines, are black; that of the ſloe is of a greyiſh hue, and its ſpines longer, and of a deep brown: every one of theſe is, towards the extremity, divided into two, in the manner of the tines of a fork. Theſe give the animal a very remarkable figure, and are caſt off with the ſeveral ſkins, while the new ſkins have others in their place; but in the laſt change, before that into the nymph ſtate, the change made in the creature is ſuch, that it could never be ſuſpected to be the ſame animal by any one, who was not an eye-witneſs of the change.

The creature in this, throwing off its ſkin, becomes perfectly ſmooth, and of a dirty yellowiſh colour, with not the ſlighteſt variegation on it, nor the leaſt appearance even of the remains of the ſpines. In this ſtate it remains till it goes into the nymph ſtate; and from that, after about ſixteen days, it comes out in the ſhape of a four-winged fly. The whole proceſs of the change is the ſame, in the two ſpecies of the oak and the ſloe; but the flies they produce are very different. Reaumur's Hiſt. Inſ. vol. ix. p. 119. See PRUNUS, in *Gardening*.

SLOKUM'S ISLAND, in *Geography*, a ſmall iſland in Barnſtaple bay, near the coaſt of Maſſachuſetts.

SLOMIGRODEK, a town of Auſtrian Poland, in Galicia; 20 miles W. of Lemberg.

SLONEK, a town of the duchy of Warſaw, on the Viſtula; 15 miles N.W. of Ploczk.

SLONIM, a town of Lithuania, in the palatinate of Novogrodek; 32 miles S.S.W. of Novogrodek.

SLONITZ, a town of Bohemia, in the circle of Schlan; 4 miles S. of Schlan.

SLOOP, in *Sea-Language*, a ſmall veſſel furniſhed with one maſt, the main-ſail of which is attached to a gaff above, to the maſt on its foremoſt edge, and to a long boom below; by which it is occaſionally ſhifted to either quarter.

Sloops, ſmacks, barges, and lighters, that paſs through bridges, have the maſt confined in a trunk or wooden cup, above the deck, and faſtened in by an iron ſtrap on the aft-ſide. Some have a ſtrong iron hinge at the heel of the maſt, or a bolt through the heel; ſo that it can be lowered at pleaſure, by the ſtay-tackle eaſing away the fall by degrees. To raiſe the maſt, the fall is brought to the windlaſs, and hove upon, until the maſt is up in its place: the fall is then ſtopped to the windlaſs bitts.

Dutch ſloops are ſmall veſſels, uſed upon the canals in Holland, with one maſt, on which are hoiſted a ſprit-ſail and a fore-ſail, ſet cloſe to the ſtem. There are many fiſhing-boats in Holland, rigged in the ſame way, with the addition of a bow-ſprit and jib, and they are there called "pinks." Their ſails are generally tanned.

Sloop *of War*, is a name given to the ſmalleſt veſſels of war, except cutters. They are rigged either as ſhips or ſnows. See Rate and Ship.

SLOOTEN, or Sloten, in *Geography*, a town of Holland, in the department of Frieſland, capital of Weſtergoe, near a large lake called Slooter-Meer. Its fortifications, conſtructed by the confederates, and afterwards deſtroyed by the Spaniards, have been enlarged by the ſtates of the province, and defended by five baſtions. The magiſtracy is compoſed of four burgo-maſters and three ſenators; 10 miles E. of Bolſwaert. N. lat. 52° 55′. E. long. 5° 35′.

SLOP, Street, in *Agriculture*, that ſort of moiſt ſloppy ſubſtance, which is raked, ſweeped, and ſhovelled up from the ſtreets of large towns, for uſe as manure. It is a kind of material which is much made uſe of in this way, in the vicinity of the metropolis, in the neighbourhood of Mancheſter, and of ſeveral other places, where it is collected in large quantities. Near the firſt of theſe places the bargemen on the river are ſaid, in the agricultural report of the county, to convey to and deliver the ſlop of the ſtreets at any diſtance which is capable of being reached in one tide, at the price of about four guineas for ſeventeen or eighteen cart-loads, each load conſiſting of nearly two tons weight. This is called *cold* manure, in contradiſtinction to that of the ſtable littery ſort, which is denominated *hot* manure, and delivered at the expence of one guinea more.

Slop of this kind is alſo ſent from the different wharfs, by the barges, on the river Lea canal, which carry about thirty tons, or fifteen cart-loads; and delivered, as far as the towns and villages at about thirteen miles diſtance, for four pounds.

At Mancheſter, the value of this ſort of manure, from almoſt nothing, has increaſed to a very conſiderable ſum, in the courſe of the laſt twenty-five years.

Moſt other large towns might afford vaſt ſupplies of manure of this nature, and be of great advantage to agriculture; while, at the ſame time, they would derive an increaſed revenue from it. At preſent much neglect takes place in this reſpect, in many places. See Manure.

SLOPAN, in *Geography*, a town of Poland, in Volhynia; 52 miles N.E. of Lucko.

SLOPE-Holes, in *Canals*, are holes or marks made in the points E and L (*Plate* I. *Canals*, *figs.* 14 and 15.), to direct the navigators, or workmen, where to begin to cut or dig the ſides of a canal.

SLOPES, are ſuch parts of the ground as have been dug or left ſloping, as G I and K P (*Plate* I. *Canals*, *figs.* 3 and 6.) Some alſo denominate the ſides of the canal, as C B and H I, (*figs.* 14 and 15.) the ſlopes.

SLOPING Alley. See Alley.

Sloping *Banks*, in *Rural Economy*, the ſhelving borders of rivers and ſea-ſhores, which are highly uſeful and neceſſary for ſecuring and protecting them againſt ſtrong floods and tides. The more ſlow and gradual ſuch ſlopes are made, the more beneficial they will be in giving ſafety to ſuch banks. See River-*Banks, Securing of*, and Embankment.

SLOP-ROOM, in *Ship-Building*, an apartment on the orlop, appointed for the purſer to keep the ſhip's ſlops in.

SLOT, in *Agriculture*, a term uſed to ſignify any broad, flat, wooden bar.

Slot, in the *Sportſman's Language*, a term uſed to expreſs the mark of the foot of a ſtag, or other creature proper for the chace, in the clay or earth, by which they are able to gueſs how long the creature has been gone by, and which way he went. The ſlot, or treading of the ſtag, is very nicely ſtudied on this occaſion. If the ſlot be large, deep printed in the ground, and with an open cleft, and, added to theſe marks, there is a large ſpace between mark and mark, it is certain that the ſtag is an old one. If there be obſerved the ſlots, or treadings of two, the one long, and the other round, and both of one ſize, the long ſlot is always that of the larger beaſt.

There is alſo another way of knowing the old ones from the young ones by the treading; which is, that the hinder feet of the old ones never reach to their fore-feet, whereas thoſe of the young ones do.

Old ſtags alſo are long-jointed, and they never tread double or falſely, as the young ones do, becauſe the tendons, that hold the joints of their feet, are ſtronger; but the feet of the young ones are ſometimes forced, for want of theſe ſtrong ſinews, to turn away double.

It is to be obſerved alſo, that there is a great difference between the ſlot of a ſtag or hart, and that of a hind; for there is no hart of the ſecond head ſo young, but that he leaves a larger and wider ſlot than the hind, excepting when the hinds are big with young, for on that occaſion their claws will open as wide as thoſe of the hart.

Another method of knowing the age of a ſtag is by his fumets, though ſome general rules are to be known, before any thing can be judged from this article. Theſe are, that in April and May they caſt their fumets as it were in cakes; and in June and July they caſt them in thin, long, and large crotels; and from thence to the end of Auguſt they hold the ſame form and ſize; but they are in this laſt month always hard and knotty. In all theſe caſes, the largeſt and longeſt fumets are eſteemed to be the marks of the largeſt and oldeſt ſtags. If they have been diſturbed, or if they have received any hurt, they uſually caſt them ſharp at one end, and dry. This alſo is conſtantly the caſe, when their new horns are juſt grown to their hardneſs, and they rub them againſt the trees to get off the cracked membranes, which were the velvetings in their firſt ſtate.

There is always alſo a difference between the fumets of the morning and thoſe of the evening: thoſe made at night, when they go to relief, are better digeſted, and conſequently moiſter than thoſe made in the morning; becauſe having taken their reſt all day, there is a more perfect digeſtion made than can be in the night, as they are, during that time, ſeeking food.

There are alſo ſeveral other ways of judging of the growth and ſize of a ſtag, as by his carriage, or bearings, according to the huntſman's phraſe; that is, according to the breaking of the tender branches of trees which he makes with his horns in paſſing through. When the boughs are found bruiſed and broken very high, and to a good width, there is no doubt of his being an old one; but this judgment is not to be made in the months of March, April, May, and June, becauſe their horns are at that time either wholly wanting, or they are young and velvety. The height of the creature's entries into the woods is alſo another mark of his ſize; for the old ones are always proud and ſtately, and go in erect, but the young ones will creep.

The older the ſtag is, the ſooner he goes to fray, and the larger are the trees he chooſes for this uſe; the young ones go later into it, and always chooſe the weaker and lower trees. Notwithſtanding that, after the ſixth year, the age is not certainly known by the horns, as there is, after this time, no increaſe in the number of their branches; yet a probable gueſs may be made from their being all thicker and more robuſt, and the tops more open.

Slot, *Drawing on the.* See Drawing.

SLOTH, in *Zoology.* See Sloath.

SLOUGEA, in *Geography,* a town of Tunis, on the north ſide of the Mejerdah; 12 miles N.E. of Tuberſoke.

SLOUGH, a hamlet in the pariſhes of Upton and Stoke Pogeis, and hundred of Stoke, county of Buckingham, England, is 21 miles W. from London, and 1 mile N. of Eton. This place is ſeated on the great weſtern road, and has long been the reſidence of Dr. Herſchel, the celebrated aſtronomer, who manufactured here ſome of the largeſt reflected teleſcopes ever known. One of theſe, forty feet in length, ſtill remains in the garden attached to his houſe; and by the uſe of this very powerful inſtrument, the doctor has made ſeveral important diſcoveries in the planetary ſyſtem. A particular account of this teleſcope, with eighteen engravings, is publiſhed in the Philoſophical Tranſactions for 1795. Beauties of England, vol. i. by J. Britton and E. W. Brayley, 1801. Lyſons's Magna Britannia, vol. i. 4to.

Slough, a deep rut or hole in a road or carriage-way. The caſt ſkin of a ſnake, the damp of a coal-pit, and the ſcar of a wound, are alſo called by the ſame appellation.

Slough *of a wild Boar,* is the bed, ſoil, or mire, in which he wallows, or in which he lies in the day-time.

Slough-*Silver,* in *Old Writers,* a rent paid in ſome places in lieu of certain days work in harveſt, heretofore reſerved to the lord from his tenants.

SLOUTH, or Slought, in *Hunting,* is uſed for a company of ſome ſorts of wild beaſts: as, a ſlouth of bears.

SLOW Fevers. See Fever.

Slow *Pulſe.* See Pulse.

Slow-*Worm,* the Engliſh name of the *cæcilia,* or *anguis fragilis* of Linnæus, called alſo the *blind-worm,* and by ſome the *deaf adder,* which, in the Linnæan ſyſtem, is a ſpecies of the *anguis* or ſnake; the *cæcilia* being a diſtinct genus of ſerpents. See Serpentes.

It is diſtinguiſhed from all our ſnakes by its ſmallneſs, and by the ſhape of its tail, which runs out a great way beyond the anus, and yet is blunt and conſiderably thick at the end.

The colour of the back is cinereous, marked with ſmall lines compoſed of minute black ſpecks; the ſides are of a reddiſh caſt; the belly duſky; both marked like the back; the tongue is broad and forky; the teeth ſmall, but numerous, and the ſcales ſmall. It is ſlow in its motion, and inoffenſive in its nature.

Theſe ſnakes lie torpid in the winter, and are ſometimes found in vaſt numbers twined together.

It reſembles the viper in its manner of producing its young, which are brought forth alive.

Dale, from Geſner, gives an account of theriaca being prepared of this ſerpent and treacle water, for a ſudorific in the plague. James.

SLUCH, or Slutch, in *Agriculture,* a term often applied to ſignify a ſoft liquid muddy ſort of material, found in different ſituations where water ſtagnates.

SLUCHAU, or Tshluchow, in *Geography,* a town of Pruſſian Pomerelia; 44 miles S.S.W. of Dantzig.

SLUCK, or Sluckz, a town of Lithuania, in the palatinate of Novogrodek, in which are three Greek churches, one for Roman Catholics, one for Lutherans, and one for Calviniſts; 68 miles E.S.E. of Novogrodek. N. lat. 52° 50′. E. long. 27° 33′.

SLUDGE, in *Agriculture.* See Sluss.

SLUDKA, in *Geography,* a town of Ruſſia, in the government of Perm; 8 miles S. of Obvinſk.

SLUDS, a term uſed by the miners in Cornwall for half-roaſted ores.

SLUE, *To,* is to turn any cylindrical or conical piece of timber about its axis, without removing it. This term, in ſea-language, is generally applied to the movement by which a maſt or boom is turned about, in its cap or boom-iron.

SLUG. See Limax.

Slug, in *Agriculture* and *Gardening,* a deſtructive animal of the ſnail kind, which is highly miſchievous in the field, as well as the garden, by eating off the young ſtems of tender plants. There are ſeveral different kinds of theſe little animals. The white and brown leathery kind often even deſtroy the ſtrong ſtems of young cabbage, and other ſimilar plants. The deſtruction of them has been ſuggeſted to be effected by the uſe of tar-water, ſprinkled over the ground; and alſo by having recourſe to lime, in the preparation of the land for ſuch crops. They conceal themſelves in the holes and crevices, only making their appearance early in mornings and late in the evenings. The white ſlug or ſnail is likewiſe very deſtructive to young turnip crops, by riſing out of the holes of the ſoils, on wet and dewy mornings and evenings. Rolling the ground with a heavy implement, before the ſun riſes, has been adviſed as a means of deſtroying them in theſe caſes.

Slugs of this ſort are likewiſe very deſtructive, in ſome diſtricts, to the roots of corn crops, during the day-time, in the early ſpring months, while they lie concealed in the ground, by eating and devouring them; and by coming out in the evenings, and during the night-time, to commit ravages on the blades, and other parts above the ground. Numbers of them are ſometimes met with upon the ſame plant, and they may eaſily be extirpated and removed from the land by the above practice, while they are at work, eſpecially in moon-light ſeaſons, and any further injury to the crops be guarded againſt. Warm moiſt weather is always a great encouragement to their coming out of their hiding-places; and advantage ſhould conſtantly be taken of it for their extermination, as they ſuddenly retire under ground during the time of cold.

The ſtrong lands of other places are occaſionally much infeſted with them in the pea, bean, and rye crops and ſtubbles, as well as clover roots, when a wheat crop is put in upon them. The ſlugs, in ſome caſes, are of about half an inch in length, having their backs of a blueiſh caſt in the ſkin part, and their under parts wholly of a white appearance.

A mixture of ſulphur and lime, made ſo as to be conveniently applied, has been found to be highly deſtructive of ſlugs in general.

The uſe of lime-water has lately been adviſed as an excellent and cheap mode of deſtroying ſlugs in gardens, as well as fields, in the ſecond volume of the Tranſactions of the Horticultural Society of London. It is found to be far preferable, in this intention, to quick-lime, which is liable to become too ſoon ſaturated with moiſture, and rendered ineffectual. The manner of employing the water is after it has been newly made from ſtone lime, by means of hot water poured upon it, to pour it through the fine roſe of a watering-pot over the ſlugs, which have been collected by means of pea-haulm, or ſome other ſimilar ſubſtance, laid down on the ground in portions, at the diſtance of about a pole from each other. In proper weather, the ſlugs ſoon collect in this way, in great numbers, for ſhelter as well as to get food. When a boy takes up the ſubſtance, and by a gentle ſhake leaves the whole of the ſlugs on the ground, another perſon then pours a ſmall quantity of lime-water on them, and the boy removes the haulmy material to ſome intermediate place, in order that the ſame practice may be repeated. By perſevering in this method for a little while, the whole of the ſlugs may be deſtroyed, as the leaſt drop of the water ſpeedily kills them. This practice, it is ſuppoſed, will be found highly beneficial in the flower-garden, as by watering the edgings of box, thrift, or other kinds, the ſlugs will be killed with certainty, even when the weather is moiſt.

The application is conſidered ſimple, the effect certain, and the expence trifling, whether in the garden or the field; a few pots only being required, in the latter caſe, to the acre, which can be made with a very ſmall quantity of lime. And the labour is not of any material conſequence, ſo that the whole charge will not, it is imagined, exceed five ſhillings the acre.

SLUICE, a frame of timber, ſtone, or other matter, ſerving to retain and raiſe the water of a river, &c. and, on occaſion, to let it paſs.

Such is the ſluice of a mill, which ſtops and collects the water of a rivulet, &c. to let it fall, at length, in the greater plenty, upon the mill-wheel: ſuch alſo are thoſe uſed as vents or drains to diſcharge water off land. And ſuch are the ſluices of Flanders, &c. which ſerve to prevent the waters of the ſea overflowing the lower lands, except when there is occaſion to drown them.

Sometimes there is a kind of canal incloſed between two gates or ſluices, in artificial navigations, to ſave the water, and render the paſſage of boats equally eaſy and ſafe, upwards and downwards: as in the ſluices of Briare in France, which are a kind of maſſive walls built parallel to each other, at the diſtance of twenty or twenty-four feet, cloſed with ſtrong gates at each end, between which is a kind of canal, or chamber, conſiderably longer than broad; in which a veſſel being incloſed, the water is let out at the firſt gate, by which the veſſel is raiſed fifteen or ſixteen feet, and paſſed out of this canal into another much higher. By ſuch means a boat is conveyed out of the Loire into the Seine, though the ground between them riſe above one hundred and fifty feet higher than either of thoſe rivers.

The ſluice of a canal has generally a ſliding-board or door, but ſometimes folding or double doors moving on hinges, uſed to ſtop or let go water at pleaſure.

Sluice-gates ſometimes ſignify the lower gates of a lock, from the paddles or ſluices that are uſually fixed in them.

Sluices are made different ways, according to the uſe for which they are intended: when they ſerve for navigation, they are ſhut with two gates, preſenting an angle towards the ſtream; when they are made near the ſea, two pair of gates are made, the one to keep the water out, and the other in, as occaſion requires. In this caſe, the gates towards the ſea preſent an angle that way, and the others the contrary way; and the ſpace incloſed by thoſe gates is called the *chamber*. When ſluices are made in the ditches of a fortreſs, to keep up the water in ſome parts, inſtead of gates, ſhutters are made ſo as to ſlide up and down in grooves; and when they are made to raiſe an inundation, they are then ſhut by means of ſquare timbers let down in culliſes, ſo as to lie cloſe and firm.

The word ſluice is formed of the French *eſcluſe*, which Menage derives from the Latin *excluſa*, found in the Salic law in the ſame ſenſe. But this is to be reſtrained to the ſluices of mills, &c.; for as to thoſe ſerving to raiſe veſſels, they were wholly unknown to the ancients.

In *Rural Economy*, a ſluice is very convenient in many caſes. It ought to be ſtrongly framed in deep waters, particularly where a great height is neceſſary, ſo as to ſtand firm and immoveable againſt the ruſhing of heavy bodies; for a ſmall ſtrain makes it leaky, and a ſmall thing will occaſion this, unleſs ſufficiently guarded by proper abutments. Larch, green elm, or willow, are the beſt ſorts of timber to be always in water; but heart of oak, for the purpoſe of ſtanding above it, in wet and dry. The importance of ſluices is extremely evident on many occaſions, as when a preſſing neceſſity demands the diſcharge of a great quantity of water, either the expenſive mode of engines muſt be recurred to, the bank cut, or a ſluice drawn. If the bank be cut, the paſſage is interrupted, and there remain the trouble and charge of removing the earth, and re-embanking; but a ſluice vents the ſuperfluous water, without the leaſt inconvenience or charge. Their utility in many caſes of drainage and embankment, as well as irrigation, is alſo very great and indiſpenſable.

SLUIDENAIA Kopi, in *Geography*, a town of Ruſſia, in the government of Irkutſk. N. lat. 52° 42′. E. long. 113° 44′.

SLUIN, a town and fortreſs of Croatia, on the Korana; 34 miles S. of Carlſtadt. N. lat. 45° 15′. E. long. 16° 8′.

SLUIS. See Sluys.

SLUM, a town of Pruſſia, in Pomerelia; 8 miles S. of Marienburg.

SLUPCA, a town of the duchy of Warſaw; 15 miles S.S.E. of Gneſna.

SLUPECZ, a town of Poland, in the palatinate of Sandomirz; 16 miles N. of Sandomirz.

SLUPICK, a town of Holland; 3 miles N.E. of Goude.

SLUR, in *Muſic*, a mark like the arc of a circle, drawn from one note to another, comprehending two or more notes in the ſame or different degrees. If the notes are in different degrees, it ſignifies that they are all to be ſung to one ſyllable; for wind inſtruments, that they are to be made in one continued breath; and for ſtringed inſtruments, that are ſtruck with a bow, as a violin, &c. that they are made with one ſtroke. If the notes are in the ſame degree, it ſignifies that it is all one note, to be made as long as the whole notes ſo connected; and this happens moſt frequently betwixt the laſt note of one line, and the firſt of the next; which is particularly called *ſyncopation*.

SLUSE, René Francis, in *Biography*, an eminent mathematician, was born of a noble family at Viſe, a ſmall town in the biſhopric of Liege, in 1622. He was educated for the church, and was canon of St. Lambert in that city, was appointed abbot of Amaz, and grand chancellor and counſellor to the biſhop and prince; all which offices he retained with high reputation till his death in 1685, in the 63d year of his age. He was a man of great learning, not only in the particular line of his profeſſion, but in juriſprudence, and even in medicine. He was eminently ſkilled in the Greek, Hebrew, Arabic, and other Oriental languages; and on that account was employed by the pope, during his reſidence at Rome, and after his return to Liege, in tranſlating Greek, Armenian, and other writings. He was an excellent mathematician, and furniſhed ſome papers for the Tranſactions of the Royal Society, of which he was elected a member. As an author his principal work is entitled "Meſolabium et Problemata Solida," 4to. In this work M. Sluſe rendered great ſervice to the mathematical ſciences, by ſimplifying ſome parts of the analyſis of Des Cartes, which had engaged the attention of many eminent geometricians. He is author of a method, by which any ſolid equation being propoſed, it may be conſtructed in an infinite variety of ways, by means of the circle and any one of the conic ſections. He firſt gave a ſpecimen of this method in the above work, but concealed the analyſis till he publiſhed the ſecond edition of it in 1688. An account of it is given by Montucla, in his "Hiſtory of the Mathematics." This author remarks, that Sluſe's Geometrical Miſcellanies, which appeared in this ſecond edition, do honour to the author, and afford a proof of the great progreſs he had made in analyſis. Beſides the work here referred to, he wrote two letters on the ſuperiority of the Latin to the French language, which were tranſlated from the Latin to the French, and publiſhed with the letters of M. Le Laboureur, in which a contrary opinion is maintained, under the title of "Avantages de la Langue Françoiſe ſur la Langue Latin." Sluſe's Papers in the Philoſophical Tranſactions are, 1. "A ſhort and eaſy Method of drawing Tangents to all Geometrical Curves," vol. vii. 2. "A Demonſtration of the ſame," vol. viii. 3. "On the Optic Angle of Alhazen."

SLUSS, or SLUDGE, in *Agriculture*, a word applied to mud or mire. It is ſometimes written *ſluſh*.

SLUTCH. See SLUCH.

SLUTER, MATTHEW, in *Biography*, a patrician of Hamburgh, was born in that city in 1648. He ſtudied juriſprudence at Jena and Altdorf, and made a tour through Germany and Holland. In 1673 he took the degree of doctor at Roſtock. He practiſed the law in the chancery court of Güſtrau, and afterwards viſited France, and other places, from which he returned in 1679. He continued his profeſſional labours in his native place, where, in 1701, he became ſyndic, and in two years afterwards a member of the council. He died in 1719, in the 72d year of his age. Beſides various works on juriſprudence, he was author of one entitled "Sciagraphia Bibliothecæ Patrum maximæ," which was added to the "Propylæum Hiſtoriæ Chriſtianæ" of his brother Severus Walter. Sluter was a curious obſerver of the weather, and wrote an illuſtration of a treatiſe on Meteorology, publiſhed at London in 1690, by William Cock of Edinburgh. In this tract the author endeavours to eſtabliſh a connection between the changes of the weather and the heavenly bodies; and the object of Sluter in his illuſtration and commentary was to prove the truth of his theory from experience. The German edition of Cock's Meteorology was publiſhed at Hamburgh in 1691. Our author likewiſe publiſhed tracts, entitled "Cauſes of the ſevere Winter and continual Storms in the Years 1694 and 1695;" and "Indications of the Aſpects from the Years 1696 to 1703."

SLUYS, or L'ECLUSE, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Eſcaut. The place contains 1415, and the canton 4479 inhabitants, on a territory of 92½ kiliometres, in 6 communes. This was formerly one of the beſt ports on the coaſt of Flanders, and capable of conveniently receiving 500 veſſels; but it has been ſo much deteriorated, that it can now accommodate only ſmall veſſels. Its ancient name was "Lammens Vliet." It belonged to the comtes of Nevers, but was obtained in exchange for Bethune of William, comte of Namur, by Philip the Hardy, duke of Burgundy, who ſurrounded it with walls in 1385. In 1495 Philip de Cleves, lord of Ravenſtein, revolted againſt Philip le Beau, and retired to Sluys, which was beſieged by Albert, duke of Saxe, and after four months it ſurrendered. The city having taken part with the Hollanders, was beſieged by the prince of Parma in 1587, and the Engliſh garriſon was compelled to ſurrender, but upon honourable terms. Until the year 1604 it remained in the poſſeſſion of Spain; but being beſieged by prince Maurice of Naſſau, it was obliged to ſurrender after a defence of four months. The town is furniſhed with ſluices, by which the whole country may be inundated; and hence it derives its name. After ſeveral changes of maſters, the garriſon was ſummoned by the French republicans in July 1794; and on the 25th of Auguſt, after a gallant defence, became priſoners of war; 18 miles N.E. of Oſtend. N. lat. 51° 20′. E. long. 8° 14′.

SLYBZE. See SLEBEZE.

SLYME-HEAD, a cape on the weſt coaſt of Ireland, in that part of the county of Galway, called Ballinahinch. N. lat. 53° 24′, according to Beaufort, but 53° 29′, according to Arrowſmith's late map. W. long. 10° 12′.

SLYPE, a town of France, in the department of the Lys; 5 miles N.N.W. of Menin.

SLYRET, a town of Norway, in the province of Aggerhuus; 80 miles N. of Chriſtiania.

SMACK, is a ſmall veſſel only rigged as a ſloop, or hoy, and uſed in the coaſting or fiſhing trade; or as a tender in the king's ſervice. See SLOOP.

SMALAND, or SMOLAND, in *Geography*, a province of Sweden, about 100 miles long and 60 broad, formerly governed by its own kings; and, for a conſiderable time, included in Eaſt Gothland, and ſubject to the ſame laws. It is ſaid to have derived its name Smaland, *i. e.* ſmall parcels of land, from the circumſtance of its having been overſpread with woods and waſtes, which reſtricted the culture to a few intervening ſpots. Smaland is mountainous; nevertheleſs ſome parts are ſo improved by cultivation as to be very fertile, and its paſtures in particular are excellent, and of courſe profitable to the graziers. This province comprehends large foreſts of beech and other trees; and alſo ſilver, copper, and iron mines, a great quantity of iron-ore being found at the bottom of the lakes. A vein of gold-ore has likewiſe been diſcovered in Smaland. The chief employment of the inhabitants is agriculture, mining, and graziery. The articles of trade are alſo planks, beams, maſts, tar, pot-aſh, iron, grain, cattle, butter, cheeſe, fleſh, bacon, tallow, hops, and fiſh. In this province are 21 lakes, and its chief towns are Calmar, Wexio, and Jonkioping.

SMALBROKE, RICHARD, in *Biography*, an Engliſh prelate, was fellow of Magdalen college, Oxford; and in 1723 he was advanced to the biſhopric of St. David's, from whence he was tranſlated, in 1730, to Lichfield and Coventry. He died in 1749. He was diſtinguiſhed by a vindication of the miracles of Chriſt againſt Woolſton.

SMALCIUS, VALENTINE, a celebrated writer in favour of Unitarianiſm, was born in Thuringia, and died at Cracow, in Poland, in 1622. His principal work was "A Treatiſe on the Divinity of Chriſt," written in the Latin language, and printed in 1608.

SMALKALDEN, in *Geography*, a river of Germany, which runs into the Werra, 12 miles W. of Smalkalden.

SMALKALDEN, or *Schmalkalden*, a large, thriving, and populous town of Germany, in the county of Henneberg, on a river of the ſame name. In its vicinity are ſalt-pits, and mines of iron and ſteel. The Proteſtant princes have had ſeveral meetings in this town, preparatory to the league which was concluded here in 1531, and to their confirmation of the theological articles drawn up by Luther, which have given this town conſiderable celebrity in eccleſiaſtical hiſtory; 27 miles N.N.E. of Schweinfurt. N. lat. 50° 47′. E. long. 10° 40′.

SMALL *of an Anchor*, is that part of the ſhank, next under the ſquare, or anchor.

SMALL-*Craft*, in *Sea-Language*. See CRAFT.

SMALL *Fruits*, in *Gardening*, a term applied to thoſe which are produced by different plants of a low ſhrubby growth, as thoſe of the gooſeberry, currant, and raſpberry kinds, when grown alone, and in a ſeparate ſtate. See Standard *Fruit-Trees.*

Small *Key*, in *Geography*, a ſmall iſland in the Eaſt Indian ſea. N. lat. 10° 37′. W. long. 247° 16′.

Small *Oat*, in *Agriculture*, a name applied to a particular kind of black grain of this ſort, in ſome places. It is hardy, and capable of being grown with ſucceſs on poor land of the chalky and other kinds. Other names are alſo given to it; and there is a ſort of oat termed the ſmall ſhort, or ſmall ſhorts, in the farmer's language. See Oat.

Small *Point*, in *Geography*, a cape on the coaſt of Maine, forming the eaſt point of Caſco bay.

Small *Repeat*. See Repeat.

Small *Sallad Herbs*, or *Sallading*, in *Gardening*, are ſuch young tender herbs as are made uſe of through the year, for the purpoſe of furniſhing ſallads. For this uſe, ſeveral young ſeedling herbs of a warm nature are in requeſt to mix with the larger principal ſallad herbs, as lettuces, endive, and celery, in order to improve their flavours and wholeſome qualities. The ſorts moſtly in uſe are creſſes, muſtard, raddiſh, rape, and turnep; alſo ſometimes cabbage-lettuce for winter and early ſpring uſe; all of which, for this uſe, are in perfection when quite young, that is, while not more than a week, or ten or twelve days old, whilſt they remain moſtly in the ſeed-leaf, being then cut up cloſe to the ground for uſe; for, being moſtly of a warm reliſh, in which conſiſts their chief excellence for winter and ſpring ſallads, if ſuffered to grow large, and run into the rough leaf, they become of a diſagreeable, ſtrong, hot taſte; but when uſed as above, they are exceedingly criſp and tender, with an agreeable warm flavour. For the purpoſe of ſallading, theſe plants may be obtained young at all times of the year, in the ſpring and ſummer in the open ground, and in winter under the ſhelter of frames and glaſſes, and occaſionally on hot-beds. This ſort of ſallading is procured by ſowing the ſeeds of the different plants at different times, throughout the whole year.

Winter and Spring Culture.—In the winter and ſpring it may be raiſed either in hot-beds, or in the open borders, and, according as it may be required, early or late; but when it is required as early as poſſible, it muſt be ſown in hot-beds, under frames and lights, &c. or in a bed or border of natural earth under glaſſes. The ſowing ſhould be made on hot-beds any time in December, January, or February; and where a conſiderable ſupply is daily required, it may be continued ſowing every week or fortnight, in hot-beds, till March, or during the cold weather, for which a moderate hot-bed of dung ſhould be made for one, two, or more garden-frames; but only half a yard or two feet depth of dung, according to the temperature of the ſeaſon, as the heat is only required to bring up the plants quickly, and forward them a week or two in growth, placing a frame directly thereon, and moulding the bed all over with light rich earth, five or ſix inches thick, making the ſurface level and ſmooth: when, if it is to be forwarded as much as poſſible, directly ſow the ſeed, which may be done either in drills as ſhallow as poſſible, about two or three inches broad, and flat at the bottom, and three inches aſunder, ſowing the ſeeds of each ſort ſeparately, and very thick, ſo as almoſt to cover the ground, only juſt covering them with earth; or, to make the moſt of the bed, it may be ſown all over the ſurface, previouſly ſmoothing it lightly with the back of the ſpade, the different ſorts ſeparately, and all very thick; and after preſſing them all even and lightly down with the ſpade, covering them very thinly with earth, by ſifting over as much light mould as will only juſt cover the ſeed; and as ſoon as the ſowing is performed in either method, putting on the lights. The ſeeds ſoon come up, as in two or three days, or leſs, being careful at this time to give vent to the ſteam ariſing in the bed, as well as to indulge the plants with plenty of free air daily, either by tilting the lights in the back or front, according to the temperature of the weather, or by drawing the lights a little down, or taking them quite off occaſionally in mild days at firſt; for the hot-bed being yet new, there will be a conſiderable ſteam ariſing; and the ſallading coming up very thick, unleſs due vent be given to paſs off the ſteam, and admit freſh air, the plants will be apt either to burn or fog, (as the gardeners term it,) and mould off as faſt as they come up. Such hot-beds, however, as are not freſh made, do not require this precaution; but in new-made beds it muſt be ſtrictly obſerved, till the ſallading is all fairly come up, and as long as the ſtrong ſteam continues. The plants will moſtly be fit for uſe in a week, or ten or twelve days, from the time of ſowing the ſeed.

But in order to have a proper ſucceſſion, the ſowing in the hot-beds ſhould be repeated every week or fortnight during the cold weather; the ſame hot-bed ſometimes retaining its heat, will admit of two ſowings, by ſowing again as ſoon as the firſt crop is gathered: however, to obtain a regular ſupply daily, it is neceſſary to continue making freſh hot-beds occaſionally. Where only a ſmall quantity may be wanted at a time, and there is the convenience either of cucumber and melon hot-beds, or a hot-houſe, &c. ſome ſeed of each ſort may be ſown in pots or boxes, and placed in theſe hot-beds, or the ſtove, juſt to bring up the plants fit for uſe. And where there are not frames and glaſſes, hand or bell-glaſſes may be uſed, or the bed be arched over with low hoop-arches, in order to cover it with mats every night, and in bad weather.

Where, however, there are no hot-beds, in cold weather, early in the ſpring, part of a warm border, or a bed of light earth in a ſunny ſituation, may be prepared for garden-frames and lights, hand-glaſſes, &c. raiſing the ground ſomewhat to the ſun; and having dug it, and raked it fine, ſow the ſeed as above, covering it lightly with earth; and having ſet on the frames and glaſſes, the ſeeds will ſoon come up, and the ſallading be ready a conſiderable time ſooner than in the open ground.

Culture in the full Ground.—From about the end of February, or beginning of March, according to the forwardneſs or mildneſs of the ſeaſon, ſmall ſallading may be ſown in the open ground, repeating the ſowings every week or ten days; the firſt ſowing being performed on a warm border; continuing the ſowings in that ſituation till the beginning or middle of April, when it may be ſown in any of the open quarters, and in which the ſowings may be repeated weekly, or once a fortnight, as required; but according as the hot weather approaches, ſowing in a ſomewhat ſhady ſituation. The ground for each ſowing in the different ſituations ſhould be properly dug, and the ſurface raked ſmooth and even.

Theſe ſowings are moſtly made in ſhallow drills, which ſhould be drawn with a ſmall hoe, either with the corner, or held edgeways downward, horizontally, drawing the drills along evenly, as ſhallow as poſſible, and flat or level at bottom, at three or four inches aſunder, in which the ſeeds ſhould be put evenly all along the bottom, each ſort ſeparately, and very thick, covering them in evenly with the fineſt of the mould, not more than a quarter of an inch deep; or if the ſmaller ſeeds are but juſt covered, it is ſufficient;

for when ſown very thick, if deeply covered with mould, the plants do not riſe regularly. In theſe early ſpring ſowings, on cold nights, and in all bad weather, it is proper to cover the ground, both before and after the plants begin to riſe, with large mats; which will be better, if ſupported on low hoop-arches, or ranges of pegs ſtuck in the ground juſt high enough to ſupport the mats a little from the earth, by which a more effectual as well as forward crop is produced.

But in the latter ſowings, when dry warm weather commences, it is proper to give occaſional waterings. It is likewiſe ſometimes neceſſary, where the ſurface of the ground becomes cruſted from wet, &c. as the plants riſe thick, to ſlightly bruſh over the ſurface with the hand or a ſoft broom, ſo as to reduce the ſurface mould a little, and promote their coming up.

Summer Sowings.—When the ſowings are practiſed in ſummer, they ſhould be made more frequently, and the ground be kept watered occaſionally, both before and after the plants are come up.

Autumn Sowings.—The ſowings may be continued in the open ground all September and October, alſo occaſionally in November, in mild ſeaſons; and until towards the middle of October, they may be made in any open ſituations; but from the middle or latter end of October, and in November, they muſt be on warm ſouth borders, performing the ſowings as above; and in cold nights, beſtowing a covering of mats or hand-glaſſes, &c. repeating the ſowings every week or ten days, or a fortnight, as required.

In gathering young ſallading, it ſhould be cut carefully cloſe to the ground, while quite young; in performing which, a large pair of ſciſſors is very convenient.

In order to have good ſeed, ſome plants ſhould be preſerved annually for the purpoſe.

SMALL *Stones*, among *Jewellers*, denote diamonds under the weight of a carat.

SMALL-*Work*, is uſed to denote the ſtar and ſhell-facets of diamonds.

SMALLAGE, in *Botany*, a ſpecies of *apium;* which ſee.

Smallage grows naturally by the ſides of ditches, in many parts of England, and is therefore rarely cultivated in gardens: it is biennial, and flowers in Auguſt. Care ſhould be taken to diſtinguiſh ſmallage from the poiſonous water-hemlock, which grows naturally in the ſame places with it: the latter has its leaves deeply divided, quite to the pedicle, into three long narrow ſharp-pointed ſegments; whereas thoſe of ſmallage are only ſlightly cut into three roundiſh obtuſe ones.

The root is that part which was formerly uſed in medicine: it is about the thickneſs of a thumb, whitiſh, fibrous, of a warm taſte, and a fragrant ſmell; and was reckoned one of the five greater openers of the ſhops. It was reputed to be grateful and detergent, to promote urine, and to diſlodge gravel; and it was alſo recommended in diſorders of the breaſt, and for promoting expectoration.

The freſh roots, eſpecially when produced in their native watery places, are ſuppoſed to participate, in ſome degree, of the ill quality of thoſe of the hemlock kind, and to be particularly hurtful to epileptic perſons and pregnant women.

Its ſeed was alſo of the number of the leſſer hot ſeeds, and was thought to poſſeſs greater virtues as a carminative and aperient than the root; its leaves having been given in decoction, or the expreſſed juice of them in nephritic complaints. The root was greatly recommended againſt ſuppreſſions of the menſes, and of the lochia, and was even ſaid to be alone a remedy for the king's evil; but this wants proof.

Smallage is now wholly exploded from the materia medica.

SMALL-POX, in *Medicine*, the *Variola* of authors, a highly contagious and formidable eruptive fever, which occurs in general but once during the life of any individual, and is diſtinguiſhed by the appearance of puſtules on the ſkin, on the third or fourth day of the fever.

As we have already entered into a brief detail of the little that is known reſpecting the origin and early propagation of ſmall-pox, (ſee INOCULATION,) it may be ſufficient to mention in this place, that it is generally believed that this contagious malady exiſted in China and Hindooſtan, perhaps for ſome centuries previous to its appearance in Europe; but that there are no very authentic records of its travelling to the weſt, until the period of the ſiege of Mecca by the Abyſſinians, in the year 572, when it deſtroyed the invading army. Alexandria being at that time the great mart of Indian commerce, was ſoon infected with the contagion, and the firſt deſcription of the diſeaſe was given by Ahron, a phyſician of that city, in the beginning of the following century. From that time it accompanied the Arabs or Saracens in their progreſſive expeditions, and Europe was contaminated by their invaſions of Spain, Sicily, Italy, and France in the eighth century. Previous to this period, it is generally believed that this deſtructive peſtilence was unknown in Europe. This is principally inferred from the ſilence of all the ancient phyſicians, Greeks and Romans, who have left us accurate deſcriptions of many of the diſeaſes, with which we are now familiar, but who have not deſcribed the ſtriking and peculiar ſymptoms which characterize this ſevere and often fatal malady. Some authors, however, and not without a ſhow of probability, have maintained that ſuch an inference is not ſtrictly deducible from this circumſtance. For the ancients were apt to confound every ſpecies of fatal fever under the term *peſtilence*, and were miſled, by their hypothetical doctrines about the four humours, to make no diſtinctions from a view of the ſymptoms. Some of the ancient plagues, and particularly that of Athens, deſcribed by Thucydides, were manifeſtly not *the plague* properly ſo called, but were connected with extenſive ſores and eruptions on the ſkin. (See PLAGUE.) It has been urged, too, that in a fragment of the works of one Herodotus of Rome, preſerved by Aëtius, there is a deſcription of various fevers, accompanied by eruptions, in which the ſmall-pox appears to be diſtinctly included. It is remarkable, too, that the firſt Arabian phyſicians, even Ahron of Alexandria, do not mention the diſeaſe as a new malady, but ſpeak of it as one familiarly known; and Rhazes refers to Galen, as having mentioned many of its ſymptoms. The evidence in ſupport of this opinion is certainly very imperfect, and ſcarcely ſufficient to build a controverſy upon; nor is it of any farther importance than as an object of curious inquiry.

All that relates to the hiſtory and practice of *inoculation* (which, indeed, ſhould now be ſuperſeded by vaccination) has been alſo detailed in the article already referred to. At preſent, therefore, our object is to give only the medical hiſtory of ſmall-pox, as it occurs in the caſual, or, as it is often called, the natural way; deſcribing, firſt, its ſymptoms, with the prognoſtics, and various tendencies of the diſeaſe, and afterwards the beſt methods of treatment.

The term *variola*, which is of modern origin, is ſuppoſed to be derived from *vari*, which are ſmall inflamed tumours of the face, occurring about the period of puberty, and noticed firſt by Celſus under that appellation. The words *pock*, *pocks*, and *pox*, from the Anglo-Saxon *pocca*, ſignifying a pouch or pocket, and applicable to any puſtule or puſtular diſeaſe, were appropriated early to this formidable malady; and the epithet *ſmall* was ſubſequently added to diſtinguiſh it from a ſtill more recent diſeaſe, the *lues venerea*, to which the ſame appellation was applied.

Several varieties of the ſmall-pox have been noticed by different writers, but they may be all included under the two principal forms, which were ſo ably pointed out by Sydenham, and which ſince his time have been commonly recognized under the appellations of the *diſtinct* and the *confluent* ſmall-pox. Although originating from the ſame contagion, and not differing from each other eſſentially, they exhibit a different ſeries of ſymptoms, purſue a ſomewhat different courſe, and require a different mode of treatment, and therefore it is convenient to treat of them ſeparately.

1. *Of the Diſtinct Small-Pox:—Variolæ Diſcretæ.*—In this form of the diſeaſe, the eruptive fever is moderate, and not eaſily diſtinguiſhed from an ordinary attack of common inflammatory fever. It generally begins about mid-day, with a chillineſs and ſhivering, accompanied by a conſiderable languor, and drowſineſs, which are ſoon followed by a great heat, pains in the head and back, ſickneſs at the ſtomach, with a ſoreneſs or preſſure in that part, and in adults, eſpecially if they are kept in bed, with a great diſpoſition to perſpiration. In children the ſweating does not occur; but they are liable to frequent ſtartings from their ſlumbers, and on the third day are ſometimes affected with one or two fits of convulſion. Sydenham conſidered this ſymptom as rather favourable; having obſerved that it was commonly ſucceeded by an eruption of a large and mild ſmall-pox. On the evening of the third, or the morning of the fourth day, the eruption appears, and gradually increaſes during the fourth and fifth days, ariſing firſt on the face, and ſucceſſively on the inferior parts, ſo as to be completed over the whole body on the laſt-mentioned day. With the appearance of the eruption, the febrile ſymptoms abate, and nearly or altogether ceaſe on the following day, with the completion of the eruption. This appears firſt in ſmall red ſpots, ſcarcely eminent, but which, by degrees, riſe into minute pimples, which are ſeparate and diſtinct from each other, and generally not very numerous. The day after their appearance, a ſmall veſicle, containing a clear or ſlightly whey-coloured fluid, ſhews itſelf on each of the ſpots. For two days theſe veſicles increaſe in breadth only, and there is a ſmall depreſſion in their centre. As they extend, they continue to be ſurrounded with an exactly circular inflamed margin, which, when the puſtules are numerous, covers the greater part of the intervening ſkin, and diffuſes ſomewhat of a damaſk hue over the ſpaces between the puſtules. Under the touch they are hard, and rather painful, and give the impreſſion of ſmall round ſeeds under the cuticle to the finger; a circumſtance which tends to diſtinguiſh them from the veſicles of chicken-pox, which feel like ſmall ſeeds flattened by preſſure.

About the *eighth* day, the eruption is elevated into ſpheroidal puſtules; and if theſe are numerous, the increaſe of their ſize and the fullneſs of the ſurrounding parts occaſion a conſiderable ſwelling of the whole face, and eſpecially of the eye-lids, which are ſo diſtended as entirely to cloſe the eyes, and often ſhine like an inflated bladder. Sometimes, where numerous puſtules fix upon the eye-lids, the blindneſs comes on before the eighth day. The eruption now aſſumes a whiter appearance; for, as the diſeaſe proceeds, the matter in the puſtules becomes by degrees more opaque, and at length, as the ſuppuration increaſes, of a yellowiſh colour. A ſimilar progreſs is obſerved in the hands, but a little later; ſo that when the face is becoming rough and yellow, the extremities are becoming ſmoother and whiter. On the *eleventh* day the ſwelling of the face is much abated, and the inflammation diminiſhed: the puſtules are now at their height, and ſeem quite full. On the top of each a darker ſpot appears; and at this place the puſtule, on the eleventh day or ſoon after, is ſpontaneouſly broken, and a portion of the matter oozes out; in conſequence of which the puſtule is ſhrivelled and ſubſides, while the matter oozing out dries, and forms a cruſt upon its ſurface. Sometimes very little of the matter oozes out, but remains in the puſtule, becoming thick, and even forming a hard little ſcab. After ſome days, generally about the fourteenth or fifteenth, both the cruſts and the hardened puſtules fall off, leaving the ſkin on the points which they covered of a brown red colour; and it is only after many days that theſe red marks are effaced. The diſtinct ſmall-pox ſeldom leaves any pits in the ſkin; but in ſome caſes, where the matter of the puſtules has been more liquid, the cruſts formed by it are later in falling off, and the points which they covered undergo ſome degree of ulceration, which partially deſtroys the ſubſtance of the ſkin, and produces a ſmall excavation or pit. Sydenham and Cullen aſcribe this erroneouſly to the deſquamation which enſues.

As the eruption is ſucceſſive, ſo the maturation on the body and extremities follows the ſame courſe as above deſcribed, but a little later. On the tenth and eleventh days, as the ſwelling of the face ſubſides, a ſwelling ariſes in the hands and feet, which again ſubſides, as the puſtules come to maturity. In the puſtules of the hands and arms, indeed, the matter is frequently abſorbed; ſo that at the height of the diſeaſe, theſe puſtules appear as empty veſicles.

When the puſtules on the face are numerous, ſome degree of feveriſhneſs appears on the tenth and eleventh days, but it ceaſes again after the puſtules are fully maturated, or continues only in a very ſlight degree till the laſt puſtules on the feet have finiſhed their courſe. In the diſtinct ſmall-pox this ſecondary fever is never conſiderable, and ſeldom continues longer than the period juſt mentioned. Under the ſame circumſtances, an abundant crop of puſtules on the face, ſome uneaſineſs in the throat, and a hoarſeneſs of voice, occur about the ſixth or ſeventh day, and a thin fluid is poured out from the mouth. Theſe ſymptoms increaſe with the ſwelling of the face; and the diſcharges from the mouth and throat becoming thicker and more viſcid, are more difficultly ejected. Some difficulty of ſwallowing alſo occurs; ſo that liquids taken in to be ſwallowed are frequently rejected, or thrown out by the noſe. But all theſe affections of the fauces abate as the ſwelling of the face ſubſides.

Some varieties of the diſtinct ſmall-pox have been deſcribed by different authors under ſpecific appellations, ſuch as the *contiguous*, the *coherent*, the *warty*, &c. ſmall-pox (ſee Walker's Inquiry into the Small-pox, chap. viii. and Roe's Treatiſe on the Natural Small-pox, chap. i.); but theſe are merely more violent degrees of the diſeaſe, partaking more or leſs of the character of the confluent ſpecies, and requiring to be treated accordingly.

2. *Of the Confluent Small-pox.*—This form of the ſmall-pox follows a ſimilar courſe with the preceding ſpecies, but the ſymptoms of every ſtage are more violent, and ſeveral of the circumſtances are alſo different. The eruptive fever eſpecially is much more violent; the pulſe is more frequent, ſharp, and contracted; the head-ache, and the pain and anxiety at the præcordia, the ſickneſs and vomiting, are more ſevere; the coma is more conſiderable, and there is frequently a delirium. In adults there is leſs diſpoſition to perſpiration than in the other ſpecies, and ſometimes a diarrhœa occurs; and in children epileptic fits are frequent on the firſt days of the diſeaſe, and ſometimes prove fatal before any eruption

appears, or they uſher in a very confluent and malignant ſmall-pox.

The eruption appears more early than in the benign ſmall-pox; commonly early on the third day, or on the evening of the ſecond, and ſcarcely ever ſo late as the fourth day; except, as Sydenham remarks, in a few rare caſes, where it appears to be delayed by ſome violent ſymptom, ſuch as an acute pleuritic or rheumatic pain, or a violent pain in the ſtomach, with ſickneſs and vomiting, which manifeſtly indicate the confluent and dangerous nature of the forthcoming diſeaſe. The eruption too is often preceded by an extenſive erythematous efflorеſcence, like a commencing eryſipelas; and ſometimes it comes out in little irregular cluſters, like the meaſles, conſiſting of many crowded red points or pimples. The pimples are always moſt numerous on the face, and at the ſame time ſmaller and leſs eminent. The little veſicles which form on the tops of the pimples, appear ſooner than in the diſtinct ſpecies, and while their diameters extend, they do not retain a circular form, but are of very irregular figures. Many of them run into one another, forming a flat irregular ſurface, ſo that the face very often appears to be covered rather with one extended veſicle, than with a number of puſtules. And when there is any diſtinct ſeparation of the puſtules, they do not riſe to a ſpheroidal form, but remain flat, and their circumference is not bounded by an inflamed margin, the part of the ſkin that is free from puſtules being commonly pale and flaccid, and not exhibiting the damaſk hue of the diſtinct ſmall-pox. The fluid included within the puſtules changes about the eighth day from a clear to an opaque appearance, being firſt whitiſh and now browniſh, but never acquires the yellow colour and thick conſiſtence that appear in the mild ſpecies.

In the confluent ſmall-pox, the ſwelling of the face, which is ſometimes abſent from the diſtinct ſpecies, but is generally preſent when the puſtules are numerous, never fails to appear, and it comes on more early, and ariſes to a greater degree, ſometimes annihilating every appearance of the features. It abates, however, on the tenth day, and on the eleventh ſtill more. At this time the puſtules or veſicles, or rather the extended pellicle, which from the eighth day had become rough and brown, is ruptured; and, ſhrivelling, pours out a fluid, which concretes into brown or black cruſts, which do not fall off for many days, even till after the twentieth day; and, in conſequence of the ulceration which takes place under them, pretty certainly leave the ſurface of the face conſiderably pitted. On the other parts of the body, and on the extremities, eſpecially the hands and feet, ſtill more than on the trunk, the puſtules of confluent ſmall-pox are larger and more diſtinct than upon the face; but they never acquire the ſame maturity and conſiſtence of pus as in the properly diſtinct kind.

The confluent ſmall-pox is attended by two other ſymptoms of conſiderable importance, the one in adults, the other in children. The former is ſalivation, or exceſſive ſecretion of ſaliva, which never fails to accompany the confluent form of the diſeaſe in grown perſons, and is ſometimes ſeen in a ſlight degree in the diſtinct kind. It ſometimes begins as ſoon as the eruptions appear; and ſometimes not till a day or two after. The ſaliva is for ſome time thin and copious, and eaſily diſcharged, having very much the appearance of the ptyaliſm excited by mercury, except that it does not ſmell ſo offenſively; but about the eleventh day it becomes thick and more viſcid, and is expectorated with great difficulty. The patient is very thirſty, and coughs while he attempts to drink, expelling the liquor through his noſtrils. The affection of the throat is alſo generally aggravated at the ſame time. The ſalivation often ceaſes after the eleventh day, about which time the hands commonly ſwell (or at leaſt, Sydenham ſays, ought to do ſo); but ſometimes, after a complete ceſſation for a day or two, it returns again.

In children, a diarrhœa occurs frequently in the place of the ſalivation; but it does not ſeize them ſo early as the ſalivation attacks grown perſons. Whenever it begins, however, unleſs it be checked by art, it attends the diſeaſe to its termination.

In the diſtinct ſmall-pox, as we have already ſtated, the fever commonly ceaſes with the completion of the eruption on the fifth day; but it is not ſo in the confluent ſpecies. In the latter, the febrile ſymptoms only ſuffer a remiſſion at the time of the eruption, which continues to the period of complete maturation, that is, to the eleventh day, in the latter part of which day it is often renewed with conſiderable violence, conſtituting what has been called the *ſecondary fever*, which is the ſource of much danger, and is of various duration. The pulſe quickens, the heat of the body increaſes greatly, much thirſt, with great anxiety and reſtleſſneſs, ſevere head-ache, ſhort and confuſed ſlumbers, delirium, and ſometimes coma, enſue. Theſe ſymptoms, indeed, are often ſo ſudden and violent, being accompanied alſo with ſuppreſſion of the ſalivation, and a difficulty of breathing and of deglutition, that, if nothing has been done to alleviate the early inflammatory action, death ſoon follows. Whence Sydenham ſpeaks ſo often about the danger of the eleventh day. In other caſes, however, this fever is protracted to the fourteenth and ſeventeenth days, and ſometimes even later, and yet terminates fatally. In ſome inſtances, theſe ſevere forms of confluent ſmall-pox are accompanied by ſymptoms of great malignancy or putreſcency, as it has been called: purple ſpots, or *petechiæ*, appear in the interſtices of the ſkin between the puſtules; and ſometimes ſmall black ſpots, ſcarcely ſo large as pins' heads. ariſe on the top of the eruptions in different places: or a diſpoſition to gangrene under ſerous veſicles ſhews itſelf: or laſtly, various ſpontaneous hæmorrhages take place from the internal parts, as from the kidneys and bladder, whence bloody urine is diſcharged; or from the lungs, in bloody expectoration; and ſometimes from the inteſtines, in bloody ſtools.

From a conſideration of the preceding detail of the various circumſtances which accompany the different forms and ſtages of the ſmall-pox, the degree of danger under the various ſymptoms, and the probable event in particular caſes, may be eſtimated. The following points of prognoſis will be obviouſly inferred. In general, the more exactly the diſeaſe retains the form of the diſtinct kind, it is the ſafer; and the more it approaches or takes the form of the confluent kind, it is the more dangerous. It is only, indeed, when the diſtinct kind exhibits a great number of puſtules in the face, which are contiguous or coherent, that it is attended with any danger: for it muſt be obſerved, that it is chiefly from the crowd of puſtules on the face, and not from thoſe on the body, that the danger of the diſeaſe is to be apprehended. Particular ſymptoms will enable us to anticipate particular occurrences. Thus, if the previous or eruptive fever be very violent in its attack, and be accompanied with great proſtration of ſtrength, anxiety, and lowneſs of ſpirits, with ſevere head-ache, weeping and redneſs of the eyes, great pains in the back, a burning heat of ſkin, and a quick hard pulſe;—the occurrence of a confluent eruption may be expected. The more early the eruption, the more danger is to be anticipated; but a retardation of the eruption beyond the fourth day, alſo implies a probability of a confluent diſeaſe. The more gradual the eruption of the puſtules, the more favourable; provided the time of their riſing be not protracted beyond the uſual limits by diarrhœa, pain, or depreſſing paſſions. The more diſtinctly ſuppuration takes place about the eighth day, and the more roſy the interſtices around the puſtules, the leſs danger is to be apprehended. A ſudden ceſſation of the ſwelling of the face about the eleventh day, and the non-appearance of that ſwelling about the eighth day, when the puſtules are very numerous, are indicative of great danger; as are alſo a ſudden ſuppreſſion of the ſalivation in adults, and of the diarrhœa in children, at the former period; eſpecially if the hands and feet have not exhibited any ſwelling about that time. If, in the diſtinct ſmall-pox, convulſions occur in children after the eruption is come out, or after incruſtation has taken place, death commonly enſues; or, if the patient ſurvives, a paralyſis of ſome of the limbs often remains. The diſcharge of pale and clear urine, with frequent urging to paſs it, in any period of the diſeaſe, denotes great danger.

On the other hand, regular gentle ſweats, and a free diſcharge of urine, which depoſits a ſediment, are favourable ſymptoms in every ſpecies of ſmall-pox. If, in the turn of the confluent ſmall-pox, the puſtules, which were before pale and flat, ſhould acquire a redneſs or damaſk-roſe colour round their baſes, and ſuppuration come on, the patient generally recovers.

When the ſmall-pox attacks women in a ſtate of pregnancy, it is attended with conſiderable danger, and commonly produces miſcarriage or premature labour. It has been a queſtion among pathologiſts, whether the connection between the child in the womb and the mother was ſuch as to admit of the infection of the former with the ſmall-pox under theſe circumſtances. Whatever hypothetical differences might exiſt upon this topic, experience has proved that ſuch infection often takes place in the fœtus *in utero*, though not invariably. It would appear, too, that the child is not affected at the ſame moment with the mother, but ſoon afterwards by ſubſequent infection. For, in a caſe related by Dr. Laird, a woman in the fifth month of her pregnancy paſſed through a ſevere ſmall-pox, which commenced about the end of Auguſt: ſhe felt the motion of the child till the month of October, on the 28th of which month ſhe was delivered of a child, which was thought to be of ſix months' growth, and which had been dead ſome days. "On the back, ſhoulders, and ſide, and particularly about the upper part of the thighs, where the integuments were perfectly ſound, there were ſeveral puſtular elevations, with central depreſſions, ſtrikingly characteriſtic of the appearances which diſtinguiſh ſmall-pox. The fœtus was placed in the muſeum of Guy's Hoſpital, and ſtill diſtinctly exhibits the characters of the eruption." See Edinburgh Med. and Surg. Journal, for April, 1807.

A ſtill more extraordinary circumſtance, in reſpect to the infection of the child in the womb, occaſionally occurs; namely, the production of ſmall-pox in the child, in conſequence of the mother's expoſure to the contagion, although the latter may have been prevented from ſuffering the diſeaſe herſelf, by having previouſly undergone that diſeaſe, or the cow-pox, and therefore eſcapes the influence of the infection. Dr. Jenner relates the following caſe, which came under his obſervation, in the inſtance of a lady in London. "A few days previous to her confinement, ſhe met a very diſguſting object, whoſe face was covered with the ſmall-pox. The ſmell and appearance of the poor creature affected her much at the time; and though ſhe mentioned the circumſtance on her return home, ſhe had no idea that her infant could ſuffer from it, having had the ſmall-pox herſelf when a child. During a few days after its birth the little one ſeemed quite well; but on the fifth day it became indiſpoſed, and on the ſeventh the ſmall-pox appeared. The puſtules, which were few in number, maturated completely. Dr. Croft, who attended her, being curious to know the effect of inoculation from one of the puſtules, put ſome of the matter into the hands of a gentleman eminently verſed in that practice, which produced the diſeaſe correctly. Mrs. W. was not ſenſible of any indiſpoſition herſelf from this expoſure, nor had ſhe any appearance of the ſmall-pox." Another caſe is mentioned by Dr. Jenner, in which the child *in utero* was infected with ſmall-pox contagion, and born with the eruption upon it, five weeks after the mother had been vaccinated, and a month after ſhe had been expoſed to the contagion of ſmall-pox from three of her children. Whence, as Dr. Jenner juſtly infers, it is obvious, "that the ſmall-pox virus may affect the human frame, even to its inmoſt receſſes, although apparently ſecured from its effects, and yet give no evidence of its preſence by exciting any perceptible diſorder." (See Medico-Chirurgical Tranſactions, vol. i. p. 272. Alſo, Van Swieten, Comment. ad Aphor. 1381; and Dr. Mead's Diſcourſe on Small-pox, chap. iv.) Dr. Mead ſtates the following analogous fact. "A certain woman, who had formerly had the ſmall-pox, and was now near her reckoning, attended her huſband in the diſtemper. She went her full time, and was delivered of a dead child. It may be needleſs to obſerve, that ſhe did not catch it on this occaſion; but the dead body of the infant was a horrid ſight, being all over covered with the puſtules; a manifeſt ſign that it died of the diſeaſe before it came into the world."

Though the confluent ſmall-pox ſhould not be immediately fatal, yet the more violent kinds are often followed by a morbid ſtate of the body, under which various diſagreeable and dangerous complaints ariſe. Whether theſe conſequences may be aſcribed, with Dr. Cullen, ſometimes to an acrid matter, generated by the preceding diſeaſe, and depoſited in different parts, and ſometimes to an inflammatory diatheſis produced, and determined to particular organs of the body, is a theoretical inquiry, which we are not diſpoſed to puzzle ourſelves and our readers by purſuing. It is manifeſt, in general, that the conſtitution is often left in a ſtate of great debility; does not thrive under the ordinary nutrition; and in many caſes exhibits a great tendency to ſcrofulous inflammation, eſpecially of the glandular ſyſtem, to chronic derangements of the lungs, meſentery, and other viſcera, and to various local affections of the ſkin, membranes, and bones. Another ſeries of evils, which the confluent ſmall-pox is liable to inflict, is the various degrees of injury and deſtruction which it occaſions in the organs of ſenſe, eſpecially in the eyes and ears. Deafneſs of one or both ears, and the loſs of ſight in one or both eyes, is no uncommon reſult of this formidable malady. It appears indeed, from the records of the humane "Inſtitution for the indigent Blind," that a very large proportion of all that claim its protection have been blinded by the ſmall-pox.

Cauſes of Small-pox, and of its Varieties.—The only exciting cauſe of ſmall-pox is the ſpecific contagion, generated in the puſtules of the diſeaſe itſelf. In what manner, or at what period of time, this great depopulator of the human race was generated, or what phyſical circumſtances concurred to give it exiſtence, hiſtory affords us no means of aſcertaining. The abſurd ſpeculations of the Arabian phyſicians, reſpecting the origin of the diſeaſe from ſome contamination of the fœtus with the menſtrual impurities of the mother, deſerve no notice. The obvious origin of a diſeaſe, (ſo analogous to ſmall-pox, as to ſuperſede the influence of its contagion on man,) from a diſeaſe of the ſkin of the heels of a horſe, of which the cow-pox has recently afforded an example, has led ſome ſpeculators to the more probable conjecture, that the poiſon of ſmall-pox may have been communicated to the human from ſome domeſticated animal. The camel has been ſuggeſted: but it was forgotten, that, though Arabia was the country from which Europe probably received the contagion; yet that that country appears to have received it from the moſt eaſtern nations, by its early commerce, among whom it had previouſly exiſted from remote antiquity. (See Moore's intereſting "Hiſtory of the Small-pox," 1815.) At preſent we can only attend to the operation of this contagion, and inveſtigate its qualities from the effects which it produces.

It is evident, that the contagion of ſmall-pox is capable of being communicated, and of exciting the diſeaſe in others, both by the actual contact of the fluid of the puſtules, and the dried cruſts, and by diffuſion in a ſtate of ſolution in the atmoſpheric air. It may be alſo fixed and adherent to various ſubſtances, ſuch as woollen, linen, cotton, and other materials of clothing, as well as to wood, and other articles of furniture; from which alſo it may exhale in a ſtate of vapour. Whence a perſon may be infected, without actual contact either of the diſeaſed, or of *fomites*, that is, of infected ſubſtances. We have already ſtated, however, at great length, under the article CONTAGION, (which ſee,) the proofs and experiments by which it is rendered manifeſt, that the influence of this, and probably of moſt other contagions, by diffuſion in the atmoſphere, is limited to a very ſmall diſtance from the ſource of infection. We refer eſpecially to the experiments of Dr. O'Ryan, of Montpellier, upon that ſubject, which are related in the article juſt referred to. See alſo Dr. Haygarth's Plan for the Extermination of Small-pox in Great Britain.

One property of the contagion of ſmall-pox, which it poſſeſſes in common with the contagion of meaſles, ſcarlet fever, and chicken-pox, but which does not belong to the contagion of gaol-fever, or typhus, nor to that of the plague, nor to the chronic contagious maladies, ſyphilis, and ſcabies, is its power of affecting the conſtitution *but once during the life of the individual.* The occurrence of the diſeaſe, under the mildeſt or the moſt ſevere form, equally renders the body incapable of receiving the diſeaſe again. This is the general fact; but in regard to none of theſe eruptive fevers can it be affirmed, without many exceptions: and the ſmall-pox preſents many anomalies in this reſpect. The extreme rarity of a ſecond attack of ſmall-pox was noticed by the Arabian writers; and their admiſſion of ſuch a fact would ſcarcely be admitted as a proof of its occurrence, ſince they deemed the ſmall-pox and meaſles to be but varieties of the ſame diſeaſe. They attempted to explain the occaſional recurrence of the diſeaſe upon their abſurd theory of its origin, ſuppoſing that the whole of the menſtrual blood, which contaminates the child, is not thoroughly depurated and expelled by the firſt attack. Even Boerhaave ſeems to have believed, that the *diſtinct* ſmall-pox did not invariably ſecure the individual from a ſubſequent attack of the *confluent* form; though the latter effectually prevented a recurrence. (See his Praxis Medica, § 1381.) This, however, is not conſiſtent with fact: for ſome of the moſt formidable and even fatal attacks of *ſecond* ſmall-pox have occurred in perſons previouſly much pitted and diſfigured by the diſeaſe. It will not be neceſſary to enter, in this place, into a very minute detail of the caſes of ſecondary ſmall-pox: it will be ſufficient to ſtate the fact, and to refer to ſome of the authorities on the ſubject of recent date, ſince the diſtinctions between chicken-pox, and the modifications of ſmall-pox, have been fully eſtabliſhed. The celebrated Dr. De Haen has related ſeveral very clear inſtances of ſecond ſmall-pox, which occurred in his own practice. One young man, a ſtudent of law, received the contagion twice within three years; the firſt attack left him pitted, and the ſecond proved fatal. (See his Ratio Medendi, p. ix. ch. 7: alſo his Epiſt. Apolog. Reſponſ. ad B. L. Tralles.) One of the moſt ſtriking caſes of this ſort, is that of Mr. Langford, whoſe countenance was "remarkably pitted and ſeamed" by a former malignant ſmall-pox, "ſo as to attract the notice of all who ſaw him:" yet at the age of fifty, he was attacked again with confluent ſmall-pox, which proved fatal to him, and to another member of his family, five of whom received the infection from him. (See Memoirs of the Medical Society of London, vol. iv.) A caſe of diſtinct recurrence of ſmall-pox is related by Dr. Laird, in the Edinburgh Journal, already referred to; another by Dr. Bateman, in the Medico-Chirurgical Tranſactions, vol. ii. p. 31; and Mr. Ring has collected a great number, to the amount of ſixty or ſeventy, in his Treatiſe on Cow-pox, and in various numbers of the London Medical and Phyſical Journal, eſpecially in volumes 12, 14, and 15. We may add, that the recurrence of meaſles, in ſeveral caſes, has been lately authenticated, by the firſt medical authority now living, (we mean by Dr. Baillie,) in a paper publiſhed in the third volume of the Tranſactions of a Society for the Improvement of Medical and Chirurgical Knowledge. The ſcarlet fever appears to be alſo ſubject to the ſame anomalies occaſionally. The exceptions, however, are rare in all theſe eruptive fevers, and the general rule will ſtill hold good. Yet the conſiderations of theſe exceptions ſhould remove our ſurpriſe, that the cow-pox ſhould not invariably ſecure the conſtitution from a ſubſequent ſeizure by the ſmall-pox; ſince its influence on the ſyſtem is commonly leſs conſiderable, than that of the mildeſt diſtinct ſmall-pox. We believe, however, that the ſmall-pox, which, under the exceptions, has been occaſionally ſeen to follow the cow-pox, has *always* been much mitigated by the prior operation of the vaccine *virus*, both in the violence and duration of the ſymptoms, and that it has never, in theſe caſes, terminated fatally.

It appears, from the preceding hiſtory of the ſymptoms, that the ſafety and danger of the ſmall-pox depends almoſt entirely upon the ſmaller or larger number of the puſtules: it becomes very important, therefore, both with a view to the prevention and to the treatment of the diſeaſe, to inveſtigate the origin of this difference in the eruption, and in the ſymptoms which accompany it.

From the difference in the appearance, conſiſtence, colour, &c. of the matter produced, as well as in the number and form of the puſtules, and from the various degrees of fever, and other ſymptoms, which accompany the different ſpecies of ſmall-pox, it might be readily ſuſpected, that the contagion itſelf was different. Experience, however, has completely refuted this ſuppoſition: for there are innumerable inſtances of the contagion, ariſing from a perſon affected with the mild and diſtinct ſmall-pox, producing the confluent kind in others; and, on the other hand, it is extremely common to ſee the diſtinct kind produced by expoſure to the contagion ariſing from a perſon affected with the worſt confluent ſmall-pox. The practice of inoculation has ſtill farther demonſtrated this fact. For the ſame matter was not unfrequently obſerved to produce in one perſon the diſtinct, and in another the confluent ſmall-pox. And in order that no time ſhould be unneceſſarily loſt, where perſons have been in the moſt imminent danger from complete expoſure to the contagion, inoculation has been immediately performed from a confluent ſubject; yet the ſubſequent diſeaſe has been diſtinct and mild. We remember to have heard Dr. Gregory, the able profeſſor of the practice of phyſic at Edinburgh, aſſert, in his lectures, that he had once taken matter from the confluent ſmall-pox of a dying child, with which he inoculated two of its brothers: they had both a very mild diſeaſe: one of them, however, had previouſly taken the caſual infection, for he ſickened in three days from the time of inoculation. Indeed we could ſtate other facts, from the ſame authority, to prove that matter, taken from the puſtules of the dead body, has produced even the mildeſt form of ſmall-pox. It is manifeſt, therefore, notwithſtanding the prejudices of mankind, that the nature of the original contagion has no influence in modifying the diſeaſe which it inflicts: and we muſt infer, that the various forms which the diſeaſe aſſumes, originate from ſome particular ſtate of the conſtitution in the individuals whom it thus variouſly handles. And this condition of the conſtitution muſt be the reſult of external cauſes, ſuch as the ſeaſons, and ſtate of the atmoſphere; or of internal and perſonal cauſes, ſuch as plethora, obeſity, irritability, or the contrary, depending on original conformation, or upon indulgence, intemperance, affections of the mind, and ſo forth. It is not the contagion of ſmall-pox alone, which is variouſly modified in this way by the exiſting condition of the conſtitution; almoſt all external agents are ſo modified. The ſcratch of a thorn will not be felt for an hour by one perſon; while in another it will inflame and form an abſceſs, even excite the abſorbents, and produce a bubo and fever; or it may run on to gangrene, and occaſion death. In like manner, if ſeveral people are expoſed to cold, by falling into water, for inſtance, and remaining wet: the effects will be very different individually. Many will eſcape without inconvenience; ſome with a common coryza or ſore-throat; another will be confined to bed for weeks with an univerſal rheumatiſm; another will be attacked with pleuriſy, or a ſpitting of blood, or an inflammation in the bowels. It is preciſely the ſame with the varieties of ſmall-pox: they are not the reſult of a difference in the cauſe, but ſolely of a difference in the ſtate of individual conſtitutions.

The effect of different ſeaſons upon the human conſtitution does not admit of very ſatisfactory explanation. Sydenham and Boerhaave, both able obſervers of nature, remarked, that the regular and diſtinct ſmall-pox uſually appears about the vernal equinox, when it is epidemic, increaſing through the ſummer, and attaining its height and ſeverity in the autumn, and commonly diſappearing with the approach of the winter's cold. They both alſo obſerved, that if it commences early, as in January or February, (and Boerhaave adds, more particularly if it has been abſent from the place ſix years,) the following ſummer will be diſtinguiſhed by an epidemic of a ſevere and fatal kind, ſparing none who have not previouſly undergone the diſeaſe, and proving extenſively deſtructive.

The internal peculiarities of conſtitution, which modify the operation of morbific cauſes in general, and of the contagion of ſmall-pox in particular, are more obvious and intelligible. Various hypotheſes about the fermentation excited in the blood, and the free exit or depoſition in the ſkin of the contagious matter, thus multiplied by that proceſs, have been formed to explain this point: and even Dr. Cullen has adopted this abſurd humoral notion, and endeavours to point out the circumſtances "which determine more or leſs of the variolous matter to *ſtick in the ſkin*, or to paſs freely through it." (Firſt Lines, § 598.) But theſe notions are inconſiſtent with facts. In the firſt place, there is no evidence that the contagion acts like leaven upon the blood, "and aſſimilates a great part of it to its own nature." (Cullen, loc. cit.) The blood, as far as its properties are cognizable by the ſenſes, poſſeſſes no qualities which are not common to all inflammatory diſeaſes. There does not appear, indeed, to be any thing analogous to fermentation in the proceſs. The pus that is generated is the reſult of the inflammatory action of the veſſels of the ſkin, and is generated in the ſkin only; it is not floating in the maſs of circulating fluids, and detained in the ſkin, as by a ſieve. Whatever, therefore, increaſes the inflammatory action, increaſes the number of puſtules. Thus, parts of the body that are much heated, as by lying upon them, or keeping them in long and cloſe contact, have a greater number of puſtules than others; and parts that are covered with plaſters, eſpecially thoſe of a ſtimulant kind, are always more thickly beſet with puſtules. If we extend this principle to the conſtitution generally, we ſhall find, that thoſe perſons who are by nature, their period of life, their mode of living, previous indiſpoſition, the ſeaſon of the year, or other cauſes of a more irritable and inflammatory habit, will be more liable to ſuffer ſeverely from the influence of ſmall-pox. An intelligent writer has ſtated, from his own obſervation, that perſons of a ſwarthy complexion, of a dry rigid fibre, not much diſpoſed to perſpire, with brown or black hair, which is of a ſtrong texture and in great quantity, are more liable to a ſevere ſmall-pox than thoſe of a fair complexion, with thin, weak, and light hair, and who are moderately fat, but perſpire freely. He remarks, too, that "perſons afflicted with the palſy, ague, dropſy, and rickets, have commonly a favourable ſmall-pox; and thoſe afflicted with the two former frequently recover from both." (Roe on the Small-Pox, p. 57.) But the natural irritability may be much augmented or diminiſhed by various circumſtances, and thus the danger from the attack of ſmall-pox in like manner increaſed or leſſened. Thus, to uſe the words of the ſame author, "if a perſon ſhould live intemperately, uſe violent exerciſe, drink much ſpirituous liquors, or give any occaſion whatſoever to inflammation, before the attack of the ſmall-pox, the diſeaſe will prove more virulent, although the natural habit be good. On the contrary, if a perſon be of an indifferent habit, and an unpromiſing temperament, but live temperately, eat little animal food, and lead a ſober and ſedentary life, before the diſeaſe attacks him, he bids fair for a happy recovery." We may add, that, upon the ſame principle, the adult age, as more robuſt and more connected with full living, is more liable to ſuffer the diſeaſe ſeverely than childhood.

It ſeems, therefore, ſatisfactorily proved, "that an inflammatory ſtate of the whole ſyſtem, and more particularly of the ſkin," is the cauſe of the multiplication of the puſtules, as well as of the other circumſtances, which belong to the confluent ſmall-pox, ſuch as the early eruption, the erythematous raſh, the continuance of the fever, the effuſion of a more ichorous matter, and from thence the peculiar form, hue, incruſtation, &c. of the puſtules. See Cullen, Firſt Lines, § 600.

Different cauſes have been aſſigned for the ſuperior mildneſs of the diſeaſe, when produced by inoculation, over that which occurs in the caſual way. Some have ſuppoſed that this advantage aroſe from having the choice of the matter of infection in the former caſe; and others have imagined that it was owing to the ſmall quantity of matter which was introduced by the lancet. But from what has been ſaid above, it is manifeſt that the choice of the matter is of no importance; and we know not how ſmall a quantity is received when infection is communicated in the caſual way. But it is very obvious, that, by avoiding the cauſes of an inflammatory diatheſis, by leſſening this condition when it exiſts, by ſhunning the concurrence of other diſeaſes with the ſmall-pox, and by chooſing the proper ſeaſon and time of life, we gain many advantages; and probably theſe were the principal advantages which inoculation poſſeſſed.

Seat of the Small-pox.—It has been a ſubject of much diſpute, though eaſily determined by obſervation, whether the puſtules of the ſmall-pox affect the viſcera and other internal parts. The moſt reſpectable teſtimony in favour of their exiſtence internally, is that of Wriſberg, in the New Gottingen Commentaries, vol. lxvi: but ſome others have alſo maintained that they had ſeen the puſtules, upon diſſection, upon the internal organs. There is no doubt, however, that ſuch obſervations have originated in miſtake. For all the diſſections made by recent and more accurate anatomiſts have demonſtrated, that, beyond the extenſion of the cuticle, no variolous puſtules ever ariſe. Cotunnius, an Italian profeſſor of anatomy, diſſected above forty perſons, who died of ſmall-pox, for the expreſs purpoſe of aſcertaining what parts or organs were inveſted with the puſtules. Theſe examinations were conducted with great attention and accuracy, and in the preſence of a number of ſtudents: and the reſult was, that, though the mouth, tongue, palate, and top of the pharynx, were often full of puſtules, and in ſome few caſes the internal membrane of the trachea was inflamed, and exhibited ſome effuſion; yet not the leaſt veſtige of puſtules was found upon any of the internal parts, even in the œſophagus. "Etenim quod ſpectat interiores partes,—certè non viſcus, non membrana, non glandula, non pars demum interior ulla fuit, quæ in tot exemplis apparuerit puſtulata." (Cotun. de Sedibus Variolarum, § xxxix.) The truth is, as we have already obſerved, the puſtules are little *cutaneous* abſceſſes, the reſult of inflammation in the ſkin alone, and not depoſitories of contagious matter diſtilling from the blood.

Diagnoſis.—It is not eaſy, in general, to diſtinguiſh the fever, which is about to uſher in the ſmall-pox, from common ſimple fever, or from ſome other febrile diſeaſes; ſince its early ſymptoms are not materially different from theſe. It may be preſumed to be variolous fever, when the ſmall-pox is a prevailing epidemic, provided the individual has not undergone the diſeaſe; and eſpecially if he may have been in circumſtances which rendered the communication of infection probable, or if his expoſure to it were well aſcertained. On children, the occurrence of a convulſive fit, on the evening of the ſecond, or on the third day, will lead to a ſuſpicion that the ſmall-pox is about to appear. In all caſes, however, this doubt will commonly be cleared up by the fourth day, when the ſmall-pox will have appeared.

It is not eaſy to confound the eruption of ſmall-pox with any other febrile eruption, except the chicken-pox, which, indeed, has not been demonſtrated as a diſtinct diſeaſe more than fifty or ſixty years. It had been called *variolæ ſpuriæ*, *baſtard* ſmall-pox; and even Dr. Heberden, who has the merit of having given the firſt clear deſcription of the chicken-pox, (ſee Medical Tranſactions of the College of Phyſicians, vol. i. p. 433.) ſtill applied the term *variola* to it; calling it *variolæ puſillæ*. See his Commentarii de Morbis, cap. 96.

The eruption of ſmall-pox is ſlower and of longer duration than that of chicken-pox, the latter being commonly completed in three days, and being covered with ſlight brown ſcabs on the fifth day, at which time the ſmall-pox is at the height of ſuppuration. The inflammation round the chicken-pox is very ſmall, and the contents of them do not ſeem to be owing to ſuppuration, as in ſmall-pox, but rather to what is extravaſated immediately under the cuticle by the ſerous veſicles of the ſkin, as in a common bliſter; whence this fluid appears in a veſicle on the ſecond day, and, upon the cuticle being broken, is preſently ſucceeded by a ſlight ſcab. On the third and fourth days, the ſhrivelled or wrinkled ſtate of the veſicles which remain entire, and the radiating furrows of others, the ruptured tops of which have been cloſed by a ſlight incruſtation, fully characteriſe the chicken-pox, and diſtinguiſh its eruption from the firm and durable puſtules of ſmall-pox. Another circumſtance is alſo to be added to the diagnoſis of theſe two diſeaſes. If the whole eruption of chicken-pox on the face, breaſt, and limbs, be inſpected on the fifth or ſixth day, every gradation of the progreſs of the veſicles will appear at the ſame time, which cannot take place in the ſlow and regulated progreſs of the ſmall-pox. (See Willan on Vaccine Inoculation, p. 95.) We have already noticed the difference in the ſenſation excited by touching the early eruption of the two diſeaſes with the point of the finger, pointed out by the laſt-named author.

Since the introduction of the practice of vaccination, which may be deemed one of the greateſt benefits ever conferred upon mankind by any individual, the diagnoſis between ſmall-pox and chicken-pox has, however, been rendered a little more difficult. For in ſeveral caſes in which the ſmall-pox has occurred in perſons who had undergone the cow-pox (and we have ſeen that even ſmall-pox and meaſles are not always ſecurities againſt themſelves), a mitigated and modified ſmall-pox has commonly enſued, of a veſicular character, or of a ſmall horny appearance, which has not gone through the uſual ſtages; but, inſtead of proceeding to full ſuppuration, has begun to ſubſide and dry away on the ſixth day from the commencement of the eruption. It requires conſiderable attention, therefore, to diſcriminate between this variety of mitigated ſmall-pox and the chicken-pox; and deciſion cannot always be obtained without the experiment of inoculation with the matter of the puſtules. The impreſſion under the finger, the form, and regular progreſs of the ſmall-pox, may be generally recognized, however, up to the ſixth day, by careful obſervation.

Treatment of Small-pox.—Until the year 1798, when Dr. Jenner immortalized his name by the announcement of his great diſcovery of the properties of the cow-pox, no means of *prevention* could be ſuggeſted to any individual, by which he could avoid or protect himſelf from the ſmall-pox. In all large towns, and eſpecially ſince the introduction of the practice of inoculation, a conſtant collection of contagion ſubſiſted, which operated upon every one who viſited them, even for a ſhort time, from their more inſulated ſituations in the country, if they remained ſuſceptible of the diſeaſe. A preventive, however, is now diſcovered, and every one may be rendered ſecure from the influence of this baneful contagion. (See Cow-pox.) At preſent, however, this valuable preventive is not yet univerſally adopted, and the ſmall-pox has carried off in this metropolis, during the year which has juſt terminated (1815), no leſs than one hundred and twenty-nine perſons. We have ſtill, therefore, occaſion to ſtudy the beſt mode of treating the diſeaſe, under the different forms which it aſſumes, when it occurs in the caſual way.

From a view of the hiſtory of the diſeaſe, as above detailed, it appears very evident, that the danger and violence of the ſymptoms are nearly in proportion to the quantity of the eruption; which is again much connected with the degree of fever that accompanies and precedes it. The firſt indication, therefore, is, to moderate the eruptive fever.

In the caſe of inoculated ſmall-pox, this proceſs may be commenced in the interval between the inſertion of the matter and the beginning of the diſorder, that is, ſeveral days previous to the origin of the fever; when, by a light and cooling diet, and by the uſe of laxative medicines, if the habit be full, the body may be brought into a leſs inflammatory ſtate; and thus rendered leſs ſuſceptible of violent inflammatory diſeaſe. But in the caſual ſmall-pox, we have commonly no warning of the malady, until the eruptive fever actually commences; nor, when it has already begun, can we be certain, from any peculiar ſymptoms, that it is any thing but an ordinary fever; unleſs it occurs in perſons who, not having previouſly undergone the diſeaſe, have been notoriouſly expoſed to the infection. It is fortunate, however, that our inability to diſtinguiſh the fever which is about to uſher in the ſmall-pox from common inflammatory fever, is of no moment; ſince the ſame remedies are the moſt appropriate in both caſes. The older practitioners, indeed, miſled by their humoral hypotheſes, about a fermentation in the blood, a ſtruggle of the conſtitution to rid itſelf of the ſcum and dregs that were ſeparated, and a ſalutary effort to diſcharge them by the ſkin, which was ſuppoſed to be manifeſt in the puſtules, unfortunately took an oppoſite view of the ſubject. They thought it neceſſary to aſſiſt and encourage the fever, and very dangerous to repreſs it; and therefore they excluded the cool air, kept the patient in a hot bed, and adminiſtered warm drinks and cordial medicines. The pernicious influence of this practice (which was extended to all febrile complaints) was firſt detected by the ſagacity of our great countryman, Sydenham, in ſpite of the hypothetical doctrines, in which he had himſelf been educated; and his prophecy, that, after his death, his opinion and practice would prevail, has been amply verified. In fact it is now univerſally admitted, that the more the previous fever is moderated, the more all the enſuing ſymptoms will be mitigated. According to the degree of violence with which the fever commences, the activity of the meaſures for moderating it will be various. If the ſymptoms are not ſevere, the patient may be recommended not to keep his bed, but to remain, according to the advice of Sydenham, in a cool apartment, having the benefit of cool air; and at the ſame time to diſcard animal food, and adopt that of a cooling nature, vegetable decoctions, acidulous fruits, and diluent drinks, ſuch as plain cold water, lemonade, whey, &c. All his drinks ſhould be given cold; and the bowels ſhould be freely opened by ſome cooling purgative, as by the neutral ſalts, with a little calomel. If theſe meaſures are adequate to keep down the fever, and if, at the ſame time, the eruption appears early, and in ſmall numbers, the ſafety of the patient may be conſidered as aſcertained; and no farther treatment, except a continuance of the antiphlogiſtic ſyſtem, is neceſſary. The practice of continuing to give purgatives as the eruption declines, appears to be altogether unneceſſary, and may in ſome caſes be hurtful; and it ſeems to be continued rather in compliance with the exploded hypotheſis of ſeparating the contagious matter from the blood, than from any rational inference of experience.

Where the fever comes on, however, with great violence, manifeſting early its character, by a quick, hard pulſe, intenſe heat, and thirſt, a fluſhed countenance, inflamed eyes, ſevere head-ache, a quick and oppreſſed reſpiration, with delirium, eſpecially in adult perſons, and in thoſe of vigorous or plethoric habits, very active meaſures ſhould be immediately adopted. In perſons of the latter deſcription, the firſt object would be to let ſome blood, the quantity of which muſt be determined by a conſideration of the patient's age, conſtitution, and habits of life, and of the violence of the ſymptoms. At the ſame time, although he cannot obey Sydenham's injunction of ſitting up, the cooling plan muſt be adopted to the fulleſt extent in reſpect to his apartment, which ſhould be freely ventilated by the admiſſion of the external air, through open windows and doors, and to his bed, which ſhould be a mattraſs, and as lightly covered as the ſeaſon and his feelings will permit. If the ſkin is intenſely hot and dry, much benefit will be obtained, in the moſt expeditious manner, by ſponging the ſurface occaſionally with cold water, or even by the uſe of the cold affuſion. We have known ſeveral inſtances, in which this fever, not being ſuſpected to be the variolous fever, was treated by the cold affuſion, with the moſt decided alleviation of the fever, and of the ſubſequent eruption. The benefits of this practice in ſcarlet fever, even during the extenſion of the eruption over the whole ſkin, are now generally acknowledged by all phyſicians who have witneſſed the ſalutary and rapid change which it produces, both in the feelings and in the malady of the patient; being, in fact, the moſt efficacious phyſical agent, as well as the moſt expeditious and grateful, that the whole art of medicine is poſſeſſed of; and the only expedient fully entitled to the commendation of the ancient empiric, that of curing "citó, tutó, et jucundé." It is, in truth, but the perfection of the cooling ſyſtem recommended by Sydenham; and when united with cool air, cool drinks, and light coverings, it affords the moſt certain means of controlling the inflammatory fever.

An active purgative will alſo contribute to relieve inflammatory action, and ſhould be ſpeedily adminiſtered, and repeated according to circumſtances. Diaphoretics are alſo recommended, and if they are not of a ſtimulating kind, they may be given with advantage: but the moſt effectual mode of inducing perſpiration is by reducing the dry and burning heat of the ſkin, by cool air and waſhing.

If, however, theſe ſalutary meaſures have been omitted, or have proved inadequate to prevent a numerous eruption, eſpecially upon the face; if the puſtules are not diſtinct; and particularly, if, on the fifth day, the fever does not ſuffer a conſiderable remiſſion; the diſeaſe will ſtill require a great deal of attention. It will ſtill be neceſſary to avoid heat and a heating regimen, and to continue to admit the free acceſs of cool air, although the more active applications of cold, by ſponging or affuſion with water, need not be continued. The beneficial influence of cool and freſh air, indeed, at all periods of the diſeaſe, is very manifeſt; and in order to impreſs this truth more ſtrongly, it may not be improper to relate a caſe or two, from among many that have been recorded, to ſhew the extent of that influence, even in the later ſtages. Sir George Baker, in his "Enquiry into the Merits of a Method for inoculating the Small-pox, &c." obſerves, "The hiſtory recorded by Sydenham, of a young man at Briſtol, who owed his recovery to his being laid out on a table, as if dead, is ſufficiently known. To this hiſtory there is a great reſemblance in a caſe which is mentioned by Dr. Kirkpatrick, as having happened in Carolina. Mr. Benjamin Marych had a violent natural confluent ſmall-pox in the hot weather. His attendants thought him dead; upon which the ſaſhes were immediately ſet open, and a freſh quantity of air, or poſſibly a wind, ruſhing in, produced a freſh reſpiration and motion in the perſon who was thought dead. When this was obſerved, they went to put them down again. The patient who ſaw it, and was ſpeechleſs, but ſenſible of the alteration and benefit, beckoned with his hand to prevent them; and by degrees entirely recovered." Another caſe of the ſame kind is related by a gentleman of great veracity and experience. "In the year 1736, a man who lived as ſervant with Mrs. Broderep, one of the daughters of archbiſhop Wake, in Great Ormond-ſtreet, had the confluent ſmall-pox; and on the evening of the fifteenth or ſixteenth day, his life was entirely deſpaired of. On the next morning, when I went rather to enquire after him than to viſit him, the nurſe's report was, that he had grown worſe and worſe till two or three o'clock in the morning, at which time he ceaſed to breathe, became inſenſible and motionleſs, and appeared to be abſolutely dead. About five or ſix o'clock, the body was removed and placed on a large table, near an open window, with no covering except only a ſhirt. No ſign of life appeared, but the body continued hotter than is common after death. This heat, however, the nurſe attributed to the weather. In this ſtate he had remained about an hour, when the nurſe heard a ſort of ſigh, or faint breathing; and it was obſerved that he had moved his arm acroſs his ſtomach. Being raiſed up with ſome difficulty, he took a ſpoonful of a cordial medicine, ordered for him on the preceding day; and as ſoon as he was able to ſpeak, he ſaid the cold air was very refreſhing. Being carried back to the bed, he fell into a ſweat, and ſlept three or four hours. About this time I ſaw him. His pulſe was now equal and ſtrong; his reſpiration better than it had been for ſeveral days before; and his ſenſes perfect. The door and windows were left open, and in a few days the man was quite out of danger." (See ſir G. Baker's Eſſay, above quoted; and Dr. Walker's work on Small-pox.) Theſe facts require no comment. They demonſtrate the beneficial influence of cool air at all periods of the diſeaſe. It is, however, particularly beneficial at the period of which we are now ſpeaking, when a thick eruption is coming out, and the fever does not remit. At this time the expoſure to cool air, with the other antiphlogiſtic meaſures, will often greatly leſſen the indiſtinct crowd of puſtules that is ſpreading over the face, and occaſion a few regular ones to ariſe, the head will loſe its confuſion, and the breathing become leſs oppreſſed,

At this period of the diſeaſe, too, under the ſame circumſtances, it may be neceſſary, in adult and plethoric ſubjects, to take away ſome blood. This, however, ſeldom requires to be repeated. But a cooling purgative ſhould be adminiſtered and repeated, or aided by a frequent repetition of laxative glyſters; and the free uſe of diluent drinks ſhould be permitted.

Moſt writers from Sydenham downwards, and Boerhaave and Cullen among the reſt, have recommended the adminiſtration of an *opiate*, every night, under this febrile condition, that continues after the eruption of confluent ſmall-pox has appeared. Sydenham, however, only gave it to patients whoſe age exceeded fourteen years: but Boerhaave and Cullen ſpecify the fifth day as the time for the commencement of opiates, and mention no exception. It does not appear, that modern experience has confirmed the views of theſe great phyſicians: indeed, when Sydenham ſpeaks of uſing opium or bleeding to effect the ſame purpoſe, we are unable to conjecture what powers he aſcribed to the former remedy. "Jam non aliis auxiliis (cum in propinquo mors ſit) ægro ſubveniri poſſe autumo, quam vel *narcotica* affatim exhibendo, vel *ſanguinem* liberaliter *extrahendo*," &c. (Obſ. Medicæ, ſect. iii. cap. 2.) Dr. Walker has juſtly animadverted on this practice, which, however it may alleviate reſtleſsneſs and pain, in ſlight caſes, unaccompanied by acute fever, is well known to accelerate the circulation, to harden the pulſe, to augment the heat and thirſt, to increaſe delirium, to diminiſh the ſecretions; in a word, to aggravate all the ſymptoms of inflammatory fever, while it fails to produce the anticipated reſt, or rather baniſhes it more effectually. Such we know to be the effects of an opiate in all the *phlegmaſiæ*, or acute and viſceral inflammation; as well as in the active ſtages of common fever; and we know no circumſtance in the early ſtage of ſmall-pox, which conſtitutes any exception to this fact, or which modifies the ordinary operation of the medicine. A ſteady purſuit of the antiphlogiſtic plan is a much more effectual ſoother of the irritation which the patient ſuffers. Sydenham and other writers urge the impropriety of interfering with the ptyaliſm, that uſually occurs in confluent ſmall-pox ſoon after the eruption is out, and deem the ſuppreſſion of it highly dangerous. Yet the tendency of opium to leſſen the ſecretions is well underſtood: but the principal injury to be apprehended from it is the excitement which it produces. In the later periods of the diſeaſe, however, when the febrile excitement is low, and much irritation is kept up by the hardening cruſts, the moderate uſe of opiates is to be recommended.

The antiphlogiſtic practice, above recommended, ſhould be continued during the progreſs of the eruption to maturation, unleſs ſome particular ſymptoms of failure of the *vis vitæ* ſhould enſue. For in every caſe of ſmall-pox, where the eruption of puſtules is numerous, although ſome abatement of the fever is diſcernible upon the complete eruption of the ſpots, yet there is ſeldom a perfect remiſſion of the fever, the pulſe rarely deſcending below 90 or 100 in the minute. The *ſecondary fever*, therefore, which occurs about the eleventh day, upon the complete ſuppuration of the puſtules, or at leaſt when theſe are perfectly full and ſtretched to their utmoſt extent, whatever may be the nature of the fluid which they contain, is rather an augmentation of the exiſting fever than a new fever. The origin of this fever, in the opinion of Sydenham and moſt of the writers who followed him, was the re-abſorption of the virus of the puſtules into the blood, as well as the retention of the ordinary perſpirable matter, which could not paſs off by the ſkin. Whence they recommended blood-letting, which, they believed, was the moſt effectual mode of depurating the blood thus contaminated, as the means of cure for this fever. But not only was their theory very bad, (for ſurely drawing a few ounces of blood from the circulating maſs could have no effect in removing the corruption from that which remained in the veſſels,) but their practice was often injurious, by reducing the ſtrength of the patient, at a time when the powers of life were about to fail, and require all poſſible ſupport. Dr. Freind had the merit of pointing out the ſuperior advantages of gentle purgatives in mitigating the ſecondary fever. The bowels ſhould be gently but ſteadily opened, in all caſes, at the commencement of this fever, provided no diarrhœa has occurred. According to the ſtate of the pulſe, and the appearance of the matter in the eruptions, the ſtrength of the patient, and other ſymptoms, more or leſs of a cordial plan of treatment muſt, however, be combined with the laxatives. Light liquid nouriſhment, with a little wine and water as drink, ſhould be frequently adminiſtered; and a decoction or infuſion of cinchona, with the mineral acids and a ſlight aromatic, will be given with advantage. If the diſeaſe put on a more malignant character, with petechiæ and hæmorrhages, the cordial treatment muſt be increaſed both in quantity and ſtrength; but the ſtate of the bowels muſt ſtill be regulated. Under this cordial plan, the petechiæ will ſometimes diſappear; the empty veſicles will become filled with matter; and the ichorous fluid of others be changed into white thick pus; the other ſymptoms of courſe improving in a ſimilar degree.

Such is the general plan of cure which experience has ſanctioned in the ſmall-pox. But in particular caſes particular ſymptoms are very urgent, modifying the character of the diſeaſe, and requiring ſome modification of the method of treatment.

Little can be done to controul effectually the *ſalivation*, when that diſcharge is exceſſive, nor to reſtore it when it ſuddenly ſubſides. In the former caſe, and when the patient is in danger of ſuffocation from the viſcidity of the ſaliva, and the difficulty of diſcharging it, the mouth and throat may be frequently waſhed or ſyringed with a gargle containing oxymel, or ſome of the mineral acids. And, as the ſaliva often begins to thicken on the eleventh day, Sydenham recommended a bliſter (which has been often found beneficial) to be applied between the ſhoulders, on the evening of the tenth day, by way of prevention. The *diarrhœa*, when it occurs ſpontaneouſly, being by all writers deemed rather ſalutary than injurious, ſhould not be interfered with. The *ſwelling of the head, face,* and *fauces*, when it is exceſſive, is highly dangerous, and commonly accompanied by viſcidity or ſuppreſſion of the ſalivary diſcharge. The ſteady purſuit of the antiphlogiſtic ſyſtem is the beſt preventive of this danger, and the free diſcharge occaſioned by laxatives affords the beſt means of drawing off the determination of the fluids to thoſe parts.

The *head-ache* and *delirium*, when violent and accompanied with intolerance of light, and other phrenitic ſymptoms, mark the violence of the fever from the beginning, as well as the too great fulneſs of the veſſels of the head, and therefore demand, not only the moſt rigid purſuit of the antiphlogiſtic plan, the free admiſſion of cool air, and active purgation, but alſo the particular application of cold to the head; the detraction of blood by leeches or cupping from the temples or nucha; or even general blood-letting. The pediluvium is ſometimes recommended for the purpoſe of relieving the head on the principle of revulſion; but we have more than once expreſſed our doubts both of the truth of the hypotheſis and of the advantages of the practice. When the determination to the head is ſuch as to produce actual *coma*, during the eruptive fever, a moſt dangerous ſmall-pox is to be apprehended; and the cooling evacuating meaſures juſt recommended ſhould be carried as far as diſcretion and experience will juſtify, and a bliſter ſhould be applied to the neck.

Inflammation of the throat is a common attendant on all the varieties of ſmall-pox, even the mildeſt; but in the latter it is ſlight, and eaſily relieved by any acidulous and mucilaginous gargle, ſuch as an infuſion of figs, acidulated with lemon-juice, apple-tea, or lemonade. But the angina, which accompanies the worſt kinds of ſmall-pox, is more acute and obſtinate, and from extending to the *glottis*, it frequently produces a conſiderable degree of hoarſeneſs. It is alſo increaſed by the general inflammation and tumefaction of the contiguous parts, and continues till theſe ſubſide. This ſymptom is moderated by the antiphlogiſtic regimen, by blood-letting in inflammatory habits, and eſpecially by the early courſe of laxatives, which contribute to prevent and diminiſh all the inflammatory ſymptoms.

Difficulty of breathing is an alarming ſymptom in ſmall-pox, and ſeldom occurs except in the worſt kinds, and in the laſt ſtage of the diſeaſe, eſpecially when it is left to nature, or improperly treated in the preceding periods. In caſes where the cheſt is narrow and contracted, or there is a conſtitutional prediſpoſition to diſeaſe in the lungs, this ſymptom may occur at an earlier ſtage. Its appearance implies a threatening or preſent inflammation or peripneumony, and requires more than any other ſymptom the free uſe of blood-letting, as well as the exhibition of cooling purgatives, and the whole antiphlogiſtic plan.

Some degree of *ſuppreſſion of urine* not unfrequently takes place in ſevere caſes of ſmall-pox, eſpecially from bad management in the beginning of the diſeaſe; it is commonly attended by coſtiveneſs, and is moſt effectually relieved by promoting the inteſtinal diſcharge, eſpecially by laxative glyſters. An immediate evacuation is ſometimes produced, as Sydenham remarked, by taking the patient out of bed, and ſupporting him expoſed to the cool air in his ſhirt, but ſtill more effectually by placing his feet on a cold floor or hearth, which commonly induces a ſpeedy diſpoſition in the bladder to contract and expel its contents.

It only remains that we allude to the means which have been deviſed to prevent the deformity which is too often produced by ſmall-pox by the *pits* which it leaves behind. As the pits have been aſcribed to the retention of the acrid matter under the cuticle, and the conſequent corroſion of the true ſkin; ſo it has been propoſed to open the puſtules, in order to allow the ichor to be diſcharged. (See Van Swieten, Comment. ad Aph. 1402.) This plan, however, has not proved ſucceſsful, and the theory is probably erroneous. Others have propoſed the covering of the face in the laſt ſtage of the diſeaſe, to ſecure it from the air, and the uſe of fomentations at the ſame time with warm milk, and inunctions with unſalted butter, hog's-lard, or oil. Dr. Walker, in his valuable work already often quoted, adopts a ſimilar method, but at a ſomewhat earlier period. He maintains that the pits do not originate either from the acrimony of the contained matter, from ulceration, or from any loſs of ſubſtance of the ſkin; but that they are, in fact, merely *impreſſions*, made in the tender ſkin by the preſſure of the hardened and deſiccated puſtules, or ſcabs, as a ſeal impreſſes melted wax. This, however, may be juſtly queſtioned; for the ſkin, tender as it may be, is probably not capable of receiving any impreſſions ſo permanent, and muſt be partially ulcerated, and loſe a portion of its ſubſtance by ſloughing, under each hardening puſtule. It is true, however, that the face is chiefly liable to be pitted, from the greater drying and hardening of the crowd of puſtules which cover it, and that this may probably be owing to its greater expoſure to the air. Whence the early prevention of ſuch expoſure, and the ſoftening of the drying puſtules, certainly promiſe the beſt ſecurity againſt ſevere pitting. About the tenth day of the diſeaſe, ſometimes ſooner, according to the kind of ſmall-pox, the apices of the puſtules on the face change colour, feel rough, and begin to harden, eſpecially about the mouth and chin, which are more chafed by the bed-clothes. At this time, therefore, Dr. Walker ſpread over the face a maſk, of fine old cambric, thinly ſmeared with a mild liniment, compoſed of oil, ſpermaceti, and a little wax. This maſk he renewed three or four times in twenty-four hours, and ſometimes oftener, eſpecially when urged by the patient, who generally felt an agreeable and refreſhing coolneſs for ſome time after each application. On removing the maſk, the face was gently touched with a ſoft cambric handkerchief, and expoſed to the air for as ſhort a time as poſſible. By this expedient, he affirms, the variolous matter is ſeen through the tranſparent maſk to be preſerved in a ſtate of fluidity as long as it remains in that ſtate on other parts of the body, or until it is gradually diſcharged by oozing out. The maſk is to be continued till the puſtules are perfectly emptied, which happens in the courſe of ten, twelve, or fifteen days, and in ſome kinds of ſmall-pox in a longer time. Dr.

Walker affirms, "in the application of this theory of pits, in the varieties of ſmall-pox that have come under my care, I have conſtantly found the above mode of treatment to anſwer my higheſt expectation, not only in preventing pits in the worſt caſes of this diſeaſe; but muſt obſerve an agreeable and unexpected effect, which I have conſtantly found to accompany it, namely, a preſervation of the natural features. Many have experienced ſuch an alteration in the countenances of their friends and children, from the effects of this diſeaſe, that they could ſcarcely know them again. This diſagreeable effect has been completely prevented, in every caſe that I have met with, by the method above directed." (Loc. cit. p. 398.) He adds, however, that the ſucceſs of this application ſtands connected with the antiphlogiſtic and evacuant plan of treatment, which he judiciouſly recommends, and which accords with that which we have above detailed.

In ſome conſtitutions, as we have already ſtated, the diſturbance excited by the ſmall-pox is ſuch as to leave the patients in a ſtate of great prediſpoſition to diſeaſe, eſpecially in the glandular ſyſtem, and all the forms of ſcrofula are occaſionally ſeen to follow its ravages, as well as ſome other cachectic conditions. One of the moſt formidable conſequences, however, of confluent ſmall-pox is the loſs of ſight, which it frequently occaſions, and which is ſo common indeed in this country, that a large majority of the blind who are ſeen in the ſtreets owe their loſs of viſion to the ſmall-pox. This, however, is rather the reſult of the extenſion of inflammation to the eyes during the attack of the confluent ſmall-pox, than a *ſequela* of the diſeaſe, and therefore is to be prevented rather by the proper practice during the eruption above detailed, than by any ſubſequent treatment. With a view to anticipate the morbid conſequences, upon the ſuppoſition that they ariſe from the remains or dregs of the contagion ſtill contaminating the blood, it is uſual to adminiſter a ſucceſſion of purgatives, to clear the circulating fluids of theſe impurities. We do not profeſs to underſtand how, by exciting the actions of the exhalents of the inteſtines, we can draw out of the blood juſt the impure portion, leaving the reſt unpolluted; and conſider both the contamination and the purification of the blood as equally gratuitous ſuppoſitions. Where the patient comes out of the diſeaſe with every appearance of returning health, we do not perceive the neceſſity of reſorting to theſe hypothetical cleanſers, which, if violent, may do harm, and can only be productive of benefit by aſſiſting the digeſtion and propulſion of the aliments in a gentle way. And where there are appearances of a bad habit of body, or a ſlow convaleſcence, more advantages are probably to be obtained by a proper attention to diet and regimen, with a judicious courſe of alterative and gently tonic medicine, than by the repetition of cathartics. A diet of milk and vegetables, or very light animal fluids, with appropriate exerciſe, change of air, the tepid bath, and other means which medicine affords of regulating the functions and gradually reſtoring the ſtrength, ſhould be purſued with diligence, eſpecially where there is a diſpoſition to hectic fever connected with the debility. Some forms of ſcrofula and cachexia, however, which are more local and unaccompanied by fever, require a more nutritious and cordial plan of treatment, to be determined by the age and other circumſtances of the patient.

An able and ingenious project was propoſed ſeveral years ago by Dr. Haygarth for the extermination of ſmall-pox in Great Britain, turning upon the principle of a general inoculation. (See his Sketch of a Plan, &c. in 2 vols. 1793.) It is unneceſſary, however, now to enter into any diſcuſſion reſpecting the efficacy or importance of ſuch a plan; ſince the diſcovery of the influence of the cow-pox, by the immortal JENNER, has afforded us an antidote, which requires only a general adoption to ſuperſede altogether that fatal and formidable malady, and to preſerve mankind from all the miſeries and evils which it has ſpread over the earth for many centuries paſt. See COW-POX and INOCULATION.

SMALLS, THE, in *Geography*, rocks in the Iriſh ſea, on which a light-houſe is erected for the guidance of ſeamen, about 15 miles S.W. from St. David's Head. N. lat. 51° 44′. W. long. 5° 33′.

SMALRIDGE, GEORGE, in *Biography*, a learned Engliſh prelate, was the ſon of a dyer at Litchfield, in which city he was born in 1663. He was educated at Weſtminſter ſchool, where his fine talents and excellent diſpoſition rendered him a general favourite. In 1682 he was elected to a ſtudent's place in Chriſt's college, Oxford, in which he became in due time a tutor; and his reputation cauſed him, at an early age, to be ſelected, with others, as managers of the controverſy with Obadiah Walker, maſter of the Univerſity college, a convert to popery. In this connection he publiſhed, in 1687, "Animadverſions on the Eight Theſes laid down, and the Inferences deduced from them, in a Diſcourſe entitled 'Church Government,'" &c. About this period he diſtinguiſhed himſelf as a votary of polite literature, of which he gave ſpecimens in the "Muſæ Anglicanæ." He entered into holy orders in 1692, and was appointed miniſter of Tothill-fields chapel, and he alſo obtained a prebend in the cathedral of Litchfield. In 1700 he took the degree of D.D., and frequently acted as deputy to Dr. Jane, regius profeſſor of divinity at Oxford. On the death of Dr. Jane, in 1707, he was ſtrongly recommended by the univerſity for his ſucceſſor, but the Whig intereſt carried it againſt him. Being now a celebrated preacher, he was choſen, in 1708, lecturer of St. Dunſtan's in the Weſt, London, and he was alſo appointed a member of the lower houſe of convocation, and exerted himſelf very much to procure for his friend, Dr. Atterbury, the prolocutor's chair, on which occaſion he pronounced an elegant Latin panegyric on his friend, touching with much feeling and delicacy, as an apologiſt, upon the heat in controverſy imputed to him. Dr. Smalridge, though of the party, avoided the animoſities too prevalent in its diſputes. He held alſo a friendly correſpondence with Dr. Clarke and Whiſton, and was extremely uſeful in moderating the violent proceedings inſtituted by the convocation againſt them. He aſſiſted Whiſton in his tranſlation of the Apoſtolical Conſtitutions. He propoſed a conference with Dr. Clarke on the ſubject of the Trinity, which was held at the ſeat of Mr. Cartwright, at Aynho, in Northamptonſhire, and in which Dr. Smalridge was the advocate of orthodoxy. Theſe connections cauſed him to be ſuſpected of an inclination towards Arianiſm, from which he deemed it neceſſary to vindicate himſelf by a letter to biſhop Trelawny, a ſhort time before his death. In 1711, Dr. Smalridge was made a canon of Chriſtchurch, Oxford, and afterwards dean of Carliſle. When Dr. Atterbury was promoted to the biſhopric of Rocheſter in 1713, his friend ſucceeded him as dean of Chriſtchurch. In the following year he was raiſed to the epiſcopal bench as biſhop of Briſtol, and very ſoon after he was nominated lord-almoner to queen Anne. Upon the acceſſion of George I. he refuſed to ſign the declaration made by ſome of the biſhops, on occaſion of the rebellion in 1715, becauſe it contained a reflection on ſome of the clergy who had joined the jacobites. This ſtep cauſed the poſt of almoner to be taken from him, but he poſſeſſed the eſteem of the princeſs of Wales, afterwards queen Caroline, with whom he continued in favour till his death, which happened in 1719, at Chriſtchurch, where he was interred, and where, ſome years after, a handſome monument was erected to his memory, with an elegant Latin inſcription. He left a widow and two children, who were much befriended by the generoſity of the princeſs of Wales. A collection of 60 of his ſermons was printed after his death, which ſoon came to a ſecond edition. Biog. Brit.

SMALT, the laſt produce of cobalt, a kind of mineral matter, prepared and purified abroad, and brought hither, ſometimes in form of a blue powder, and ſometimes in lumps; chiefly uſed along with ſtarch, to give linens the finer and clearer caſt; and beſt known by the name of powder-blue. See Cobalt.

The preparation of ſmalt, as practiſed in Hermanduria, we find deſcribed in the Philoſophical Tranſactions by Dr. Krieg; who tells us, that the matter it is made of is the mineral ſtone called cobalt, or cadmia mineralis; which being pulverized, and the lighter ſtuff waſhed away, the remainder is laid on a furnace, and by a fire underneath and aſide it, the flames of which are reverberated over it, a matter is ſeparated from it in form of a ſmoke; which, ſticking to the walls, makes what we call arſenic.

When the cobalt has done ſmoking, it is cooled, mixed with pot-aſhes and powder of white flint-ſtones; the mixture is put in pots, and melted for five or ſix hours in a furnace. By this means, the matter is formed into a blue glaſs, which being put in cold water, cracks and grows tender; and is, at length, powdered by an engine, the fineſt part ſeparated by a ſieve, put into a mill, and ground in water into a very fine powder; which, by waſhing, is ſtill farther ſeparated from the coarſer, then dried in warm chambers, barrelled up, and ſent away.

There is not a more precarious proceſs in all metallurgy than the preparation of this fine blue glaſs from cobalt, nor any manufacture in which ſo expert workmen are neceſſary. The carrying the heat to too great a degree, in the roaſting of the cobalt, is a very miſchievous error; and the ſuffering as much of the arſenic as may be to remain in the earth, is greatly to the advantage of the ſmalt; and its colour may be greatly heightened by adding common arſenic to it while it is in fuſion.

It is always neceſſary to make careful and repeated experiments on a new ore, or a kind of cobalt which has not been worked before; by trying it with various degrees of heat in the roaſting, and with different proportions of the flints and pot-aſh in the fuſion. On comparing the ſeveral products of theſe experiments, it will eaſily be ſeen which yields the fineſt colour, and this muſt be always after followed in the great operations.

It is well known, that the beautiful blue glaſs, called ſmalt, is prepared from the fixed earth of cobalt; but experiments have proved, that this earth alone will not acquire that fine colour. Dr. Link tried ſome of it, by keeping it eight hours in the moſt intenſe heat; yet on taking it out, it was only a grey glaſs, excepting that there were a few blue ſpecks in it near the edges of the crucible. Theſe ſpecks make no objection to this doctrine, when properly conſidered; for they were owing, doubtleſs, to the ſame ſubſtance which is found neceſſary to be uſed, in order to procure the blue colour.

Flints are the neceſſary addition to cobalt for the making of the blue glaſs, or ſmalt; and the crucible being made of earth, might eaſily contain ſome particles of ſand. Every piece of ſand is a ſmall ſtone, of the nature of flint; that is, a piece of cryſtal debaſed by earth; and theſe ſmall flints mixing with the glaſs of the cobalt earth, while in fuſion, rendered the ſmall ſpecks, where they were mixed, true ſmalt, while the reſt remained grey and unaltered.

This earth of cobalt evidently contains ſome portion of copper, though ſo ſmall in quantity, that it can never be diſcerned by the common ſigns, and ſo intimately blended with the earth, that it can never be procured ſeparate. The lightneſs of this earth alſo, in which the copper reſides after the ſublimation of the arſenic, is a proof that its quantity muſt be very ſmall; yet that it exiſts there is evident from the colours it affords.

Copper is well known to yield a green colour with acids, and a fine blue with alkalies. Thus, a ſolution of this earth in aqua fortis is of a deep green, and its glaſs, when mixed with the alkali of flints and of pot-aſh, is the deep blue ſmalt: nor is it wonderful, that the vitrified earth of cobalt will never become blue by calcination alone, ſince, if it owes this colour to copper, it cannot be ſuppoſed to ſhew itſelf till called forth by an alkali.

Some cobalt yields ſmalt before roaſting, even better than it would afterwards: this is a peculiar kind of cobalt, but is ſo like the reſt, that it cannot be diſtinguiſhed by the eye; but experiment alone ſhews this property in it.

Though cobalt in general requires roaſting, in order to fit it for yielding the ſmalt, yet its different kinds require ſome more, and ſome leſs roaſting; and the degree can never be judged of by the inſpection of the mineral, but is only known by the experienced artiſt in the proceſs. Hence it is, that expert and intelligent perſons are neceſſary in the ſmalt-works more than in almoſt any other branch of this ſort of buſineſs.

The addition of a ſmall quantity of arſenic, or of the arſenical flowers, during the time that the ſmalt is in fuſion, adds greatly to the beauty of the colour: this is a practice kept ſecret by the workmen of ſome places; and by this means their ſmalt is always rendered better than that of their neighbours.

It is eaſy to ſee from this, that the roaſting of cobalt is the neceſſary beginning of the ſmalt-work, not the diveſting it of its arſenic, which only happens accidentally in that proceſs; and it would be much better if it did not happen, ſince we find the arſenic added afterwards exalts the colour. From hence it is evident, that thoſe cobalts which will make ſmalt without previous roaſting, muſt, as they are found to do, make the very fineſt ſmalt, becauſe their arſenic is yet left in them in great part; and from this alſo appears the neceſſity of having expert workmen for the ſmalt-making; ſince the knowing the degree of fire neceſſary to the ore is a moſt eſſential article, and after the roaſting has been carried to a ſufficient degree, every moment's heat diveſting it of more of its arſenic than was neceſſary, makes the colour of the ſmalt to be made afterwards ſo much the worſe. From this alſo appears the reaſon why the blue, made by precipitation from a ſolution of cobalt, is ſo much ſuperior to the common ſmalt made by fire; becauſe in this the arſenic is all preſerved, whereas, in the common way of preparing it by fire, it is driven off. Philoſ. Tranſ. N° 396. See Azure and Zaffre.

SMAMLEVO, in *Geography*, a town of Ruſſia, in the government of Viatka, on the Kama; 16 miles S. of Sarapul.

SMARA, a name of Kama, the Hindoo cupid. (See Kama.) Smara means the ideal, and in the fanciful mythology of the Eaſt, is the reputed ſon of Maya, or illuſion. See Maya.

SMARAGD, σμαραγδος, a precious ſtone of a green colour, very beautiful and brilliant; called alſo the *emerald*; which ſee. See alſo Gems.

lying upon, the ſegments of the calyx, and about half as long. *Stam.* Filaments ten, awl-ſhaped, ſmooth, the length of the calyx, five of them inſerted into the receptacle, five into the nectaries; anthers incumbent, nearly orbicular, of two cells burſting in front. *Piſt.* Germen ſuperior, ſmall, roundiſh, villous, in five diſtinct lobes; ſtyles five, vertical, erect, cylindrical, ſmooth, ſhorter than the ſtamens; ſtigmas ſmall, obtuſe. *Peric.* Capſules five, ſpreading in the form of a ſtar, obovate, coriaceous, of one cell and two valves. *Seeds* ſeveral, winged.

Eſſ. Ch. Calyx five-cleft. Petals five. Nectary of five orbicular depreſſed lobes, oppoſite to the calyx, alternate with the petals, and bearing five of the ſtamens. Capſules five, ſuperior. Seeds numerous, winged.

1. S. *emarginata.* Chili Soap-bark. (Smegmadermos emarginatus; "Ruiz et Pavon. Syſt. Veg. v. 1. 288. Quillaja ſaponaria; Molin. Chil. ed. Germ. 150.")—Native of woods in Chili, about Puchacay, where it is known by the name of *Quillay.* Our ſpecimen was ſent by the late abbé Cavanilles. The *tree* is ſaid to be twenty ells in height, bearing abundance of leafy branches, which are round, much ſubdivided, knotty, finely downy when young. *Leaves* an inch long, alternate, on ſhort broad ſtalks, broadly elliptical, obtuſe, coriaceous, evergreen, ſmooth, ſhining, veiny, entire in our ſpecimen, though reported to be ſometimes toothed. *Stipulas* minute, awl-ſhaped, membranous, in pairs, deciduous. *Flowers* few together, on axillary or terminal, ſhort, downy ſtalks. *Calyx* expanding more than half an inch, thickly clothed all over with ſhort, denſe, white pubeſcence, as in *Grewia* and *Tilia,* to which we at firſt ſuſpected this genus might be allied; as perhaps is the caſe, though it will not anſwer to Juſſieu's definitions of his *Tiliaceæ,* or indeed any other order. The *petals* are probably white or pink, but of this we have no information. *Capſules* near an inch long, externally downy; their inner coat ſmooth, cracking tranſverſely with age, but we can diſcern nothing like the ſeparate elaſtic tunic of the true *Rutaceæ.*—Nothing but error and inconvenience can reſult from placing this genus in the claſs *Polygamia.*

SMELBURG, in *Geography,* a town of the duchy of Warſaw; 50 miles N. of Gneſna.

SMELL, Odor, with regard to the organ, is an impreſſion made on the noſe by little particles continually exhaling from odorous bodies.

Smell, with regard to the object, is the figure and diſpoſition of odorous effluvia, which, ſticking on the organ, excite the ſenſe of ſmelling.

Smell, with regard to the ſoul, is the perception of the impreſſion of the object on the organ; or the affection in the ſoul reſulting from it.

Smell, like taſte, conſiſts altogether in the arrangement, compoſition, and figure of the parts, as appears from the following experiments of Mr. Boyle.

1. From a mixture of two bodies, each of which is, of itſelf, void of all ſmell, a very urinous ſmell may be drawn: this is done by the grinding of quicklime with ſal ammoniac.

2. By the admixture of common water, which of itſelf is void of ſmell, or inodorous, another inodorous body may be made to emit a very rank ſmell. Thus, camphor diſſolved in oil of vitriol is inodorous, yet mixed with water it immediately exhales a very ſtrong ſmell.

3. Compound bodies may emit ſmells, which have no ſimilitude to the ſmells of the ſimples of which they conſiſt. Thus, oil of turpentine, mixed with a double quantity of oil of vitriol, and diſtilled; after diſtillation, there is no ſmell but of ſulphur; and what is left behind in the retort, being again urged by a more violent fire, yields a ſmell like oil of wax.

4. Several ſmells are only to be drawn forth by motion and agitation. Thus, glaſs, ſtones, &c. which, even when heated, yield no ſmell; yet, when rubbed and agitated in a peculiar manner, emit a ſtrong ſmell: particularly beechwood, in turning, yields a kind of roſy ſmell.

5. A body that has a ſtrong ſmell, by being mixed with an inodorous one, may ceaſe to have any ſmell at all. Thus, if aqua fortis, not well dephlegmated, be poured on ſalt of tartar, till it ceaſe to ferment; the liquor, when evaporated, will yield inodorous cryſtals, much reſembling nitre; yet theſe, when burnt, will yield a moſt noiſome ſmell.

6. From a mixture of two bodies, one of which ſmells extremely ill, and the other not well, a very pleaſant aromatic odour may be gained, *viz.* by a mixture of aqua fortis, or ſpirit of nitre, with an inflammable ſpirit of wine.

7. Spirits of wine, by mixing with an almoſt inodorous body, may gain a very pleaſant aromatic ſmell. Thus, inflammable ſpirits of wine and oil of Dantzic vitriol, mixed in equal portions, then digeſted, and at laſt diſtilled, yield a ſpirit of a very fragrant ſmell.

8. A moſt fragrant body may degenerate into a fetid one, without the admixture of any other body. Thus, if the ſpirit mentioned in the former experiment be kept in a well-cloſed receiver, it will ſoon acquire the rankneſs of garlic.

9. From two bodies, one of which is inodorous, and the other fetid, a very pleaſant ſmell may ariſe, much reſembling muſk, *viz.* by putting pearls into ſpirit of vitriol; for, when diſſolved, they yield a very agreeable ſmell. See Smelling.

Smell is uſed as a name for a peculiar ſort of wine, of which there are two ſpecies; the one ſort is very fragrant, muſcatelline, and aromatic; this is called ſimply the *ſmell-wine:* but the other, which is very rank and offenſive to the noſe, is called by the Germans *ſmell-bruntzer.* Many have been the conjectures about the occaſion of the rank ſmell of this wine.

The ſmell is truly urinous, and is that of a volatile alkali; which not being embodied in, or ſubdued by the acid of the grape in this imperfect fermentation, vents itſelf in this rank manner.

It is evident, that the ſmell is of a volatile nature, for it is often loſt in the drawing of the wine ſeveral times out of one veſſel into another, evaporating during the time of drawing it out.

SMELLIE, William, M.D., in *Biography,* an eminent teacher and practitioner of midwifery, was a native of Scotland. After having ſucceſſively practiſed this art in a ſmall town of that country for a period of nineteen years, he removed to London, and in 1741 was living in Pall-Mall, where Dr. William Hunter reſided with him. This circumſtance implies, that he had already riſen to conſiderable eminence in his line, and he was in fact in high repute as a lecturer, being attended by a numerous concourſe of pupils of both ſexes. This reputation, indeed, he appears to have merited by his talents and aſſiduity; for he was the firſt in propoſing many of the practical improvements, which modern experience has admitted into the practice of midwifery, and by his mechanical ſkill he contributed materially to the improvement of the inſtruments employed to facilitate delivery in difficult caſes, and to the diſuſe of thoſe which were leſs ſafe and convenient; and he eſtabliſhed ſome uſeful rules for their application. He was the firſt writer, who, by accurately determining the ſhape and ſize of the pelvis, and of the head of the fœtus, and comparing their proportions, and the true poſition of the fœtus in utero, pointed out clearly the whole progreſs of the child during parturition: and his opinions were ſubſequently confirmed, eſpecially by Dr. Hunter, from obſervations made after death, where parturition had not been completed. The improvement which he made in the forceps, which has ſince been univerſally adopted, is well known, and he taught the preſent manual mode of uſing them. He aboliſhed many ſuperſtitious notions and erroneous cuſtoms that prevailed in the management of parturient women and of the children; and he had the ſatisfaction to ſee the greater part of his maxims adopted, not only in this iſland, but by many of the moſt reſpectable practitioners in Europe.

In the year 1752, he publiſhed the ſubſtance of his lectures, in the improvement and correction of which he affirms, that he had ſpent ſix years, in one volume 8vo., under the title of "A Treatiſe on Midwifery;" to which, in 1754, he added a ſecond volume of caſes, intended to illuſtrate the precepts laid down in the former. An additional volume of caſes, which he promiſed in his preface, did not appear till about five years after his death, in 1768. The whole formed the moſt complete ſyſtem of the art of midwifery, which had then appeared, and was regarded as the beſt authority: it was, in fact, the reſult of an extenſive experience of forty years, and contained a very comprehenſive view of the various circumſtances that uſually occur, with inſtructions reſpecting the beſt means of obviating them. In 1754, Dr. Smellie likewiſe publiſhed a ſet of anatomical plates, of a large folio ſize, and thirty-ſix in number, which were intended farther to elucidate the doctrines of his lectures. In eleven of theſe he acknowledges the aſſiſtance of the late profeſſor Cowper. Like other ingenious men of original character, Dr. Smellie was aſſailed by ſome critics and opponents, eſpecially by Dr. Burton of York, and by Dr. W. Douglas, with great acrimony; but he ever maintained the character of a man of ingenuity and judgment; he was remarkably candid and modeſt in his demeanour, and upright and diſintereſted in all his concerns. His reputation and ſucceſs were the reſult of his merit alone; for his awkwardneſs of perſon and unpoliſhed manners prevented him from riſing to the higheſt line of practice; but he was much eſteemed by his pupils, and by thoſe who employed him. He ultimately retired to Lanark, where he ſpent the latter years of his life, and died in 1763, at an advanced age. Hutchinſon Med. Biog. Gen. Biog.

SMELLING, the act whereby we perceive ſmells, or by which we become ſenſible of odorous bodies, by means of certain effluvia, which, ſtriking on the olfactory organ, briſkly enough to have their impulſe propagated to the brain, excite a ſenſation of the ſoul.

The principal organs of ſmelling are the noſtrils and the olfactory nerves; the minute ramifications of which latter are diſtributed throughout the whole concave of the former. See NOSE.

Smelling is performed by the odorous effluvia, floating in the air, being drawn into the noſtrils, in inſpiration, and ſtruck with ſuch force againſt the fibrillæ of the olfactory nerves, which the figure of the noſe, and the ſituation of the little bones, render oppoſite thereto, as to ſhake them, and give them a vibratory motion; which action, being communicated hence to the common ſenſory, occaſions an idea of a ſweet, or fetid, or ſour, or an aromatic, or a putrefied object, &c.

The matter in animals, vegetables, foſſils, &c. which chiefly affect the ſenſe of ſmelling, Boerhaave obſerves, is that ſubtile ſubſtance, inherent in the oily parts of them, called *ſpirits:* becauſe, when this is taken away from the moſt fragrant bodies, what remains has ſcarcely any ſmell at all; but this, poured on the moſt inodorous bodies, gives them a fragrancy.

Willis obſerves, that brutes have, generally, the ſenſe of ſmelling in much greater perfection than man; as by this alone, they diſtinguiſh the virtues and qualities of bodies unknown before; hunt out their food at a great diſtance, as hounds and birds of prey; or hid among other ſubſtances, as ducks, &c.

Man, having other means of judging of his food, &c. did not need ſo much ſagacity in his noſe; yet have we inſtances of a very conſiderable degree of it, even in man. In the Hiſtoire des Antilles, we are aſſured, there are Negroes, who, by the ſmelling alone, can diſtinguiſh between the footſteps of a Frenchman and a Negro.

It is found that the laminæ, with which the upper part of the noſtrils is fenced, and which ſerve to receive the divarications of the olfactory nerves, are always longer, and folded up together in greater numbers, as the animal has this ſenſe more accurate: the various windings and turnings of theſe laminæ detain and fetter more of the odoriferous particles.

The ſenſe of ſmelling may be diminiſhed or deſtroyed by diſeaſes; as the moiſture, dryneſs, inflammation or ſuppuration of the olfactory membrane, the compreſſion of the nerves which ſupply it, or ſome fault in the brain itſelf at their origin. A defect, or too great a degree of ſolidity of the ſmall ſpungy bones of the upper jaw, the caverns of the forehead, &c. may likewiſe impair this ſenſe; and it may be alſo injured by a collection of fetid matter in theſe caverns, which is continually exhaling from them, and alſo by immoderate uſe of ſnuff. When the noſe abounds with moiſture, after gentle evacuations, ſuch things as tend to take off irritation, and coagulate the thin ſharp ſerum, may be applied, as the oil of aniſe, mixed with fine flour, camphor diſſolved in oil of almonds, &c. the vapours of amber, frankincenſe, gum-maſtic, and benjamin, may likewiſe be received into the noſe and mouth. For moiſtening the mucus when it is too dry, ſome recommend ſnuff made of the leaves of marjoram, mixed with oil of amber, marjoram, and aniſeed; or a ſternutatory of calcined white vitriol, twelve grains of which may be mixed with two ounces of marjoram water, and filtrated. The ſteam of vinegar upon hot iron, and received up the noſtrils, is alſo of uſe for ſoftening the mucus, removing obſtructions, &c. If there be an ulcer in the noſe, it ought to be dreſſed with ſome emollient ointment, to which, if the pain be very great, a little laudanum may be added. If it be a venereal ulcer, twelve grains of corroſive ſublimate may be diſſolved in a pint and a half of brandy, and a table-ſpoonful of it taken twice a-day. The ulcer ought likewiſe to be waſhed with it, and the fumes of cinnabar may be received up the noſtrils.

If there be reaſon to ſuſpect that the nerves, which ſupply the organs of ſmelling, are inert, or want ſtimulating, volatile ſalts, or ſtrong ſnuffs, and other things, which occaſion ſneezing, may be applied to the noſe; the forehead may likewiſe be anointed with balſam of Peru, to which may be added a little oil of amber. See BRAIN, LIFE, and NERVOUS *Syſtem.*

SMELNITZ, or SZOMOLNOK, in *Geography*, a town of Hungary; 14 miles S. of Kapſdorf.

SMELT, *Apua Phalerica*, or *Salmo Eperlanus* of Linnæus, in *Ichthyology*, a fiſh which is claſſed, by the generality of writers, among the truttaceous kinds, and is acknowledged to have a general external reſemblance to the ſalmon. See SALMO *Eperlanus*.

It inhabits the ſeas of the northern parts of Europe, and, Mr. Pennant apprehends, is never found as far ſouth as the Mediterranean.

Theſe fiſh will live almoſt any where, but they are very apt to degenerate. They are common in the rivers of New England, and are as large as with us, often weighing two ounces and a half; but a pailful of theſe being taken from one of their rivers, and put into an adjoining pond, they all degenerated in ſuch a manner, that they were afterwards found ſo ſmall, that the largeſt did not weigh more than five pennyweights. Though thus ſmall, however, they are much valued, and are better taſted than the others. Philoſ. Tranſ. N° 374. p. 232.

They are called ſmelts, becauſe they melt, as it were, or diſſolve between the fingers in handling them; or, as others ſay, on account of their ſcent, *quaſi ſmell it*. The name *ſparling*, by which they are called in Wales and the north of England, is taken from the French *eperlan:* ſmelts are often ſold in the ſtreets of London ſplit and dried, and called *dried ſparlings*.

SMELT *Fiſhing*. See FISHING, *Smelt*.

SMELT, among the fiſhermen in Yorkſhire, and ſome other parts of England, is alſo a name given to the ſalmon, while in its firſt year. See SALMON.

SMELTING, among *Metalliſts*, the melting of a metal from the ore in a ſmelting furnace; in order to ſeparate the metallic parts from the ſulphur and arſenic, and the earthy and ſtrong ſubſtances of all kinds with which they are combined.

Smelting, in propriety, is reſtrained to large works, in which ores from the mines are melted down and ſeparated.

In ſpeaking of works in a leſſer way, we do not ſay ſmelting, but *melting*.

In the more precious metals this is called *refining;* which ſee. And ſmelting is moſt commonly applied to the reduction of iron ores.

The art of ſmelting the ores of all metallic ſubſtances was, probably, at firſt very imperfect; hence the uſe of iron has every where been of a more recent date than that of the other metals, becauſe it requires the application of a much ſtronger fire to ſmelt the ores of iron than thoſe of any other metal. We have no certain accounts when, or by whom, the ſeveral metals were diſcovered. Wallerius ſays, that, as far as he knew, Pliny was the firſt who enumerated the ſix metals; but they were certainly known long before his age, and were mentioned both by Homer and by Moſes, a much more ancient author. (Numb. xxxi. 22.) From this teſtimony we may certainly infer, that all the metals, anciently mentioned, were known, at leaſt in the country of the Midianites, above fourteen hundred and fifty years before the birth of Chriſt, or near nine hundred years after the deluge. Moreover, iron and copper were, without doubt, known before the deluge, and probably all the other metals, which are more eaſily extracted from their ores than the former.

In the time of Abraham, however, gold and ſilver were eſteemed, as they are at preſent, precious metals (Gen. xxiii. 16. Gen. xiii. 2.); and hence it is reaſonable to conclude, that Noah was able to inſtruct his deſcendants in the art of ſmelting metallic ores; this art was afterwards loſt among the various colonies, which quitted the plains of Aſia in ſearch of ſettlements; and as the earth, ſoon after the deluge, and long before it could have been peopled by the poſterity of Noah, muſt have become covered with wood, and in proceſs of time different countries might have been cleared by ſetting the wood on fire, which might flux metallic ores contiguous to the ſurface of the earth, it is not improbable, that the firſt idea of ſmelting ores might have been thus ſuggeſted to many nations. See Creech's Lucretius, vol. ii. p. 572.

We may hence conjecture, that the firſt rude proceſs, by which metals were extracted from their ores, was that of putting a quantity of ore upon a heap of wood, and ſetting the pile on fire, in conformity to the manner, in which ores were ſmelted during the burning of foreſts; but as the force of the fire is greatly diminiſhed by the diſperſion of its flame, and as the air acts more forcibly in exciting fire, when it ruſhes upon it with greater velocity, it is likely that the heap of wood and ore would ſoon be ſurrounded with a wall of ſtone, in which ſufficient openings would be left for the entrance of the air, and thus a kind of furnace would be conſtructed.

The Peruvians, we are told, had diſcovered the art of ſmelting and refining ſilver, either by the ſimple application of fire, or where the ore was more ſtubborn, and impregnated with foreign ſubſtances, by placing it in ſmall ovens or furnaces on high grounds, ſo artificially conſtructed, that the draught of air performed the function of a bellows, a machine with which they were totally unacquainted. This method of ſmelting ores on high grounds, without the aſſiſtance of a bellows, or at leaſt of bellows moved by water, ſeems to have been formerly practiſed in other countries as well as in Peru. There are ſeveral places in Derbyſhire, called *boles* by the inhabitants, where lead has been anciently ſmelted, before the invention of moving bellows by water; theſe boles were always ſituated upon high grounds, and moſtly upon that ſide of a hill which faces the weſt, probably becauſe the wind proceeds moſt frequently from that quarter.

From a pig of lead, dug up in 1766 at one of theſe boles near Matlock, and bearing an inſcription in relievo, from which it appears to have been ſmelted in the age of Adrian; many of the boles in Derbyſhire ſeem to be of high antiquity. However, this method of ſmelting ore by the variable action of the wind, being a very troubleſome and precarious proceſs, has been univerſally diſuſed, and the more regular blaſt of a bellows has been introduced in its ſtead.

The invention of the bellows is attributed by Strabo to Anacharſis, the Scythian; but he was probably the improver of this machine; for Homer, who lived long before his time, deſcribes Vulcan as employing twenty pair of bellows at once in the formation of the ſhield of Achilles. Iliad, lib. xviii. v. 470.

When the art of moving bellows by means of a water-wheel was firſt diſcovered, is uncertain; the ancients ſeem to have been unacquainted with it; but we learn from Agricola (De Re Metal. publiſhed in 1550, pp. 165. 338.) that it was very generally known, at leaſt among the Germans, in his time; for he ſpeaks of it often, without hinting at its being a recent invention. By this advantageous contrivance, however, the moderns have, in many inſtances, worked over again, with conſiderable profit, the heaps of iron and other kinds of ſlag, from which the metal has been but imperfectly extracted, before the moving of the bellows by water was diſcovered.

About fifty years ago, the blaſt, or hearth-furnace, was the only one in uſe for ſmelting lead-ore in Derbyſhire. In this furnace, ore and charcoal, or ore, and what is called *white coal*, which is wood dried but not charred, being placed, in alternate layers, upon a hearth properly conſtructed, the fire is raiſed by the blaſt of a bellows, moved by a water-wheel; the ore is ſoon ſmelted by the violence of the fire, and the lead, as it is produced, trickles down a proper channel, into a place contrived for its reception. Theſe ore-hearths are now very rare; though they are frequently applied to the extracting lead from the ſlag which is produced, either at the ore-hearth, or the cupola furnace, and they are then called *ſlag-hearths*, and the lead thus obtained is called *ſlag-lead;* the fire in a ſlag-hearth is made of the cinder of pit-coal inſtead of charcoal; the furnace called a *cupol*, or *cupola*, and *reverberatory* furnace, and by the Germans a *wind-furnace*, in which ores are ſmelted by the flame of pit-coal, is ſaid to have been invented about the year 1698, by a phyſician named Wright; though Becher may, perhaps, be thought to have a prior claim to its invention, or introduction from Germany. But whoever was the firſt inventor of the cupola, it is now in general uſe, not only in Derbyſhire and other counties for the ſmelting of ores of lead, but both at home and abroad, where it is called the *Engliſh furnace*, for the ſmelting of copper ores. This furnace is ſo contrived, that the ore is melted, not by coming into immediate contact with the fuel, but by the reverberations of the flame upon it. The bottom of the furnace, on which the lead-ore is placed, is ſomewhat concave, ſhelving from the ſides towards the middle; its roof is low and arched, reſembling the roof of a baker's oven: the fire is placed at one end of the furnace, upon an iron grate, to the bottom of which the air has free acceſs; at the other end, oppoſite to the fire-place, is a high perpendicular chimney; the direction of the flame, when all the apertures in the ſides of the furnace are cloſed up, is neceſſarily determined, by the ſtream of air which enters at the grate, towards the chimney, and in tending thither it ſtrikes upon the roof of the furnace, and being reverberated from thence upon the ore ſoon melts it. This furnace does not require the uſe of bellows, and may, therefore, be conſtructed any where. In ſmelting lead-ore, they generally put into the cupola furnace a ton of ore, previouſly beat ſmall and dreſſed, at one time, which quantity they call a *charge;* and they work off three charges of ore in every twenty-four hours. In about ſix hours from the time of charging, the ore becomes as fluid as milk. In order to obtain the lead free from the ſlag which ſwims over it, the ſmelters uſually throw in about a buſhel of lime, which dries up the ſlag, and prevents its running out with the lead. The ſlag, thus thickened, is raked up towards the ſides of the furnace, and the lead guſhes out through a hole in one of the ſides of the furnace, which having been properly ſtopped during the ſmelting of the ore, is opened for this purpoſe into an iron pot, from which it is laded into iron moulds, containing what they call a pig of lead; the pigs, when cold, being ordinarily ſtamped with the maker's name, are ſold under the name of *ore-lead.* After the lead has all flowed out of the furnace, they ſtop up the tap-hole, and drawing down the ſlag and lime into the middle of the furnace, they raiſe the fire, till the mixture of ſlag and lime, which they ſimply term *ſlag*, is rendered very liquid; upon this maſs they throw another quantity of lime, and proceed as before. When the lead thus obtained, amounting generally to twenty or thirty pounds, is let out of the furnace, a new charge of ore is put in and the operation renewed.

In order to ſpare the time and expence of fuel, they have, in ſome furnaces, lately contrived a hole, through which they ſuffer the main part of the liquid ſlag to flow out, before they tap the furnace for the lead; upon the little remaining ſlag they throw a ſmall portion of lime, and draw the mixture out of the furnace without ſmelting it. This kind of furnace they have nicknamed a *maccaroni.*

Dr. Watſon has ſuggeſted ſome improvements in the conſtruction of this furnace, and in the proceſs of ſmelting above deſcribed. He propoſes to ſubſtitute an horizontal chimney in the place of the perpendicular one now in uſe, and that the end fartheſt from the fire ſhould be turned up by a tube of earthen-ware, or otherwiſe; ſo that the ſulphureous acid, ſet at liberty during the burning of the ſulphur, may iſſue out in a direction parallel to the flue of the chimney, and at the diſtance of about one foot and a half above it. Let a number of large globular veſſels be made either of glaſs or lead, each of which muſt have two necks, ſo as to be capable of being inſerted into one another: let theſe veſſels be placed in the flue of the chimney, the neck of the firſt being inſerted into the above-mentioned tube, and the neck of the laſt being left open, for fear of injuring the draught of the furnace. Let each of theſe globular veſſels contain a ſmall quantity of water, in which caſe, he apprehends, that the heat of the flue will raiſe the water into vapour, and that this watery vapour will be the means of condenſing the ſulphureous acid vapour, in ſuch a degree as to render the undertaking profitable. When the ſulphur is all conſumed, the draught of the furnace may be ſuffered to have its ordinary exit at the end of the horizontal chimney, by a very ſlight contrivance of a moveable damper.

The ſame ingenious writer alſo obſerves, that very ſulphureous ore ſhould be roaſted for a long time with a gentle heat. He alſo propoſes to leave as little lead as poſſible in the ſlag; for this purpoſe he ſuggeſts, that it might be uſeful to throw a quantity of charcoal-duſt upon the liquid ſcoria in the cupola furnace, in order that the calcined lead might be converted into lead, by uniting itſelf to the inflammable principle of the charcoal; and that it might be alſo uſeful to flux ſulphureous lead-ores in conjunction with the ſcales or other refuſe pieces of iron, or even with ſome ſorts of iron-ore.

The ſmelter might farther find it worth his while to reduce the ſlag into a powder by a ſtamping mill, or to grind it by any other contrivance, and then he may ſeparate the ſtony part of the ſlag from the metallic, by waſhing the whole in water, inaſmuch as the metallic part is heavier than the other. Watſon's Chem. Eſſ. vol. iii. p. 253, &c.

The other furnaces uſed in ſmelting are ſupplied with large bellows, moved by the arbor of a wheel, which is turned round by a current of water. Theſe have obtained different names, according to ſome difference in their conſtruction. Their greater or leſs height gives occaſion alſo to the diſtinction of *high furnaces* and *middle furnaces.* The high furnaces are of modern invention; they were firſt introduced at Mansfelt in 1727, and are now uſed in almoſt all countries where ores are ſmelted, as in Saxony, Bohemia, Hungary, &c. They contribute, by their great height, being above eighteen feet high, which allows the ore to undergo a roaſting by different degrees of heat before it is melted, to ſimplify and diminiſh the labour. They are chiefly employed for crude fuſions, and particularly for the ſlate copper-ore.

In order to facilitate the extraction of metallic ſubſtances from the ores and minerals containing them, ſome operations, previous to the fuſion or ſmelting of theſe ores and minerals, are generally neceſſary. Theſe operations conſiſt of, 1. The *ſeparation* of the ores and metallic matter from the adhering unmetallic earths and ſtones, by hammers, and other mechanical inſtruments, or by waſhing with water. 2. Their *diviſion* or reduction into ſmaller parts by contuſion and trituration, that by another waſhing with water they may be more perfectly cleanſed from extraneous matters, and rendered fitter for the ſubſequent operations. 3. *Roaſt-*

ing, or *calcination*, the uſes of which operation are to expel the volatile, uſeleſs, or noxious ſubſtances, as water, vitriolic acid, ſulphur, and arſenic; to render the ore more friable and fitter for the ſubſequent contuſion and fuſion; and, laſtly, to calcine and deſtroy the viler metals; for inſtance, the iron copper-ores, by means of the fire, and of the ſulphur and arſenic. Stones, as quartz and flints, containing metallic veins or particles, are frequently made red-hot, and then extinguiſhed in cold water, that they may be rendered ſufficiently friable and pulverable, to allow the ſeparation of the metallic particles.

Roaſting is unneceſſary for native metals; for ſome of the richer gold and ſilver-ores; for ſome lead-ores, the ſulphur of which may be ſeparated during the fuſion; and for many calciform ores, as theſe do not generally contain any ſulphur and arſenic.

In the roaſting of ores, the following attentions muſt be given: 1. To reduce the mineral previouſly into ſmall lumps, that the ſurface may be increaſed; but they muſt not be ſo ſmall, nor placed ſo compactly, as to prevent the paſſage of the air and flame. 2. The larger pieces muſt be placed at the bottom of the pile, where the greateſt heat is. 3. The heat muſt be gradually applied, that the ſulphur may not be melted, which would greatly retard its expulſion; and that the ſpars, fluors, and ſtones, intermixed with the ore, may not crack, fly, and be diſperſed. 4. The ores not thoroughly roaſted by one operation muſt be expoſed to a ſecond. 5. The fire may be increaſed towards the end, that the noxious matters more ſtrongly adhering may be expelled. 6. Fuel which yields much flame, as wood and foſſile coals free from ſulphur, is ſaid to be preferable to charcoal or coaks. Sometimes cold water is thrown on the calcined ore at the end of the operation, while the ore is yet hot, to render it more friable.

No general rule can be given concerning the duration or degree of the fire, theſe being very various according to the difference of the ores. A roaſting during a few hours or days is ſufficient for many ores; while ſome, ſuch as the ore of Rammelſberg, require that it ſhould be continued during ſeveral months.

Schlutter enumerates five methods of roaſting ores. 1. By conſtructing a pile of ores and fuel placed in alternate ſtrata, in the open air, without any furnace. 2. By confining ſuch a pile within walls, but without a roof. 3. By placing the pile under a roof, without lateral walls. 4. By placing the pile in a furnace conſiſting of walls and a roof. 5. By roaſting the ore in a reverberatory furnace, in which it muſt be continually ſtirred with an iron rod.

Several kinds of *fuſions of ores* may be diſtinguiſhed. 1. When a ſulphureous ore is mixed with much earthy matter, from which it cannot be eaſily ſeparated, by mechanical operations, it is frequently melted, in order to diſengage it from theſe earthy matters, and to concentrate its metallic contents. By this fuſion, ſome of the ſulphur is diſſipated, and the ore is reduced to a ſtate intermediate betwixt that of ore and of metal. It is then called a *matt* (lapis ſulphureo-metallicus), and is to be afterwards treated like a pure ore by the ſecond kind of fuſion, which is properly the ſmelting, or extraction of metal by fuſion. 2. By this fuſion or ſmelting, the metal is extracted from the ore previouſly prepared by the above operations, if theſe be neceſſary.

The ores of ſome very fuſible metals, as of biſmuth, may be ſmelted by applying a heat ſufficient only to melt the metals, which are thereby ſeparated from the adhering extraneous matters. This ſeparation of metals by fuſion, without the vitrification of extraneous matters, may be called *eliquation*. Generally, a complete fuſion of the ore and vitrification of the earthy matters are neceſſary for the perfect ſeparation of the contained metals. By this method, metals are obtained from their ores, ſometimes pure, and ſometimes mixed with other metallic ſubſtances, from which they muſt be afterwards ſeparated. To procure this ſeparation of metals from ores, theſe muſt be ſo thinly liquefied, that the ſmall metallic particles may diſengage themſelves from the ſcoria; but it muſt not be ſo thin as to allow the metal to precipitate before it be perfectly diſengaged from any adhering extraneous matter, or to pervade and deſtroy the containing veſſels and furnace. Some ores are ſufficiently fuſible; but others require certain additions, called *fluxes*, to promote their fuſion, and the vitrification of their unmetallic parts; and alſo to render the ſcoria ſufficiently thin to allow of the ſeparation of the metallic particles.

Different fluxes are ſuitable to different ores, according to the quality of the ore, and of the matrix, or ſtone adherent to it.

The matrixes of two different ores of the ſame metal frequently ſerve as fluxes to each other; as, for inſtance, an argillaceous matrix with one that is calcareous; theſe two earths being diſpoſed to vitrification when mixed, though each of them is ſingly infuſible. For this reaſon, two or more different ores to be ſmelted are frequently mixed together.

The ores alſo of different metals require different fluxes. Thus, calcareous earth is found to be beſt ſuited to iron ores, and ſpars and ſcoria to fuſible ores of copper.

The fluxes moſt frequently employed in the ſmelting of ores, are calcareous earth, fluors or vitreous ſpars, quartz, and ſand, fuſible ſtones, as ſlates, baſaltes, the ſeveral kinds of ſcoria, and pyrites.

Calcareous earth is uſed to facilitate the fuſion of ores of iron, and of ſome of the poorer ores of copper, and, in general, of ores mixed with argillaceous earths, or with felſpar. This earth has been ſometimes added with a view of ſeparating the ſulphur, to which it very readily unites: but by this union, the ſulphur is detained, and a hepar is formed, which readily diſſolves iron and other metals, and ſo firmly adheres to them, that they cannot be ſeparated without more difficulty than they could from the original ore. This addition is therefore not to be made till the ſulphur be previouſly well expelled.

Fluors, or fuſible ſpars, facilitate the fuſion of moſt metallic minerals, and alſo of calcareous and argillaceous earths, of ſteatites, aſbeſtus, and of ſome other infuſible ſtones, but not of ſiliceous earths without a mixture of calcareous earth.

Quartz is ſometimes added in the fuſion of ferruginous copper ores, the uſe of which is ſaid chiefly to be, to enable the ore to receive greater heat, and to give a more perfect vitrification to the ferruginous ſcoria.

The fuſible ſtones, or ſlates, baſaltes, are ſo tenacious and thick when fuſed, that they cannot be conſidered properly as fluxes, but as matters added to leſſen the too great liquidity of ſome very fuſible minerals.

The ſcoria obtained in the fuſion of an ore is frequently uſeful to facilitate the fuſion of an ore of the ſame metal, and ſometimes even of the ores of other metals.

Sulphurated pyrites greatly promotes the fuſibility of the ſcoria of metals, from the ſulphur it contains. It is chiefly added to difficultly fuſible copper ores, to form the ſulphureous compounds called *matts*, that the ores thus brought into fuſion, may be ſeparated from the adhering earthy matters, and that the ferruginous matter contained in them may be deſtroyed, during the ſubſequent calcination and fuſion, by means of the ſulphur.

As in the ores called *calciform,* the metallic matter exiſts in a calcined ſtate; and as calcination reduces the metals of mineraliſed ores (excepting the perfect metals) to that ſtate alſo; therefore all calciform and calcined ores require the addition of ſome *inflammable ſubſtance* to reduce them to a metallic ſtate. In great works, the charcoal or other fuel uſed to maintain the fire, produces alſo this effect.

Metals are ſometimes added in the fuſion of ores of other more valuable metals, to abſorb from theſe ſulphur and arſenic. Thus, iron is added to ſulphurated cupreous and ſilver ores. Metals are alſo added in the fuſion of ores of other more valuable metals, to unite with and collect the ſmall particles of theſe diſperſed through much earthy matter, and thus to aſſiſt their precipitation. With theſe intentions, lead is frequently added to ores and minerals containing gold, ſilver, and copper.

Ores of metals are alſo ſometimes added to aſſiſt the precipitation of more valuable metals. Thus, antimony is frequently added to aſſiſt the precipitation of gold intermixed with other metallic matters. Macquer's Chem. Dict. Eng. edit. art. *Smelting,* note *m.* See COPPER, GOLD, IRON, LEAD, SILVER, TIN, &c. See alſo Schlutter's Treatiſe on the Smelting of Ores, tranſlated from the German into French by M. Hellot, and Chem. Dict. art. *Smelting,* Eng. ed. notes *n, o, p, q.*

The following ſimple method of ſmelting is practiſed by the natives of the province of Mekran in Perſia; which, although it may, at times, leave a trifling portion of the earth mixed with the metal, is, from its ingenuity, worthy of notice. When a ſufficient quantity of the ore is collected, it is placed upon a pile of wood, which is ſet on fire, and conſtantly repleniſhed with freſh fuel, until the ore melts and falls to the bottom, when it is ſeparated from the aſhes, and found to be conſiderably clearer than when firſt taken from the mine. It is then placed in a pit, made of earthen tiles, ſo conſtructed as to admit a fire under it. The ore is again melted in this pit, and a conſiderable quantity of the droſs and dirt removed, by ſkimming the ſurface. After this proceſs, the metal is lifted out in a liquid ſtate, poured into hollow cylinders of clay, and then ſold.

SMELTING-*Houſe,* a houſe where they run and melt the ore into lead: one of theſe will run a ton in ten or twelve hours; but a fodder is their uſual day's work, that is, twenty-two hundred and an half weight.

SMELTZ, in *Geography,* a river of Pruſſian Lithuania, which runs into the Curiſh Haff, two miles S. of Memel.

SMENUS, in *Ancient Geography,* a river of the Peloponneſus, in Laconia. It had its ſource in mount Taigetes, and its mouth on the left of a very elevated promontory, upon which was a temple of Diana Dictymna, according to Pauſanias.

SMERWICK, in *Geography,* a ſmall town of the county of Kerry, Ireland, ſituated on a bay to which it gives name; 7 miles N.W. from Dingle, and 173 S.W. by W. from Dublin.

SMEW, in *Ornithology,* the Engliſh name of the common mergus, known among authors by the names of *albellus,* and *mergus cirratus.*

SMICH, in *Geography,* a river that runs into the Danube, 3 miles W. of Sigmaringen.

SMIDARY, a town of Bohemia, in the circle of Konigingratz; 3 miles N. of Biezow.

SMIHANJE, a town of Croatia; 40 miles E. of Bihacs.

SMILA, in *Ancient Geography,* a town of Greece, in the country of Croſſæa, on the confines of Thrace and Macedonia.

SMILACINA, in *Botany,* a name which, with all our reſpect for its excellent author, profeſſor Desfontaines, we cannot admit, as being fabricated from another exiſting generic name, *Smilax,* and therefore contrary to ſound Linnæan laws, and to right reaſon. The eſtabliſhment indeed of the genus itſelf, which is ſeparated from *Convallaria* merely on account of the deep diviſions of the corolla, revives an old queſtion, long ago ſet at reſt, as we preſume, by Linnæus. It would be more deſirable to diſcover a character by which the Linnæan *Convallaria,* including the *Polygonatum* and *Smilacina* of other authors, could be clearly diſtinguiſhed from one or two of its neighbours. See CONVALLARIA, the third ſection of which compriſes the *Smilacinæ* of Desfontaines, Ann. du Muſ. d'Hiſt. Nat. v. 9. 51. Purſh North Amer. v. 1. 232. The eſſential character is thus given by the author laſt cited.

Corolla inferior, in ſix deep ſpreading ſegments. Stamens diverging, inſerted into the baſe of each ſegment. Berry globoſe, of three cells. Flowers terminal, panicled, or ſomewhat umbellate.

SMILAU, in *Geography,* a town of Bohemia, in the circle of Czaſlau; 5 miles N. of Polna.

SMILAX, in *Botany,* σμιλαξ of the Greeks, a name originally belonging to the Yew, *Taxus;* but likewiſe applied by Dioſcorides, with different epithets, to ſome other plants of a climbing nature. One of theſe he terms τραχεια, *rough,* and as the name of *Smilax* remains with this, among modern botaniſts, De Theis ſuppoſes the word to originate from σμιλη, *a ſcraper.* We cannot preſume to offer any conjecture reſpecting its etymology or meaning. The σμιλαξ of Dioſcorides, ſimply ſo denominated, is ſtigmatized by him as a moſt dangerous poiſon; while his σμιλαξ τραχεια is celebrated as an antidote, ſo powerful, that if given to a new-born infant, he can never be poiſoned as long as he lives!—Linn. Gen. 524. Schreb. 692. Willd. Sp. Pl. v. 4. 773. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 387. Sm. Prodr. Fl. Græc. Sibth. v. 2. 259. Purſh 249. Brown Prodr. Nov. Holl. v. 1. 293. Juſſ. 24. Lamarck Illuſtr. t. 817. Gærtn. t. 16. (Ripogonum; Forſt. Gen. t. 25. Brown Prodr. Nov. Holl. v. 1. 293.) —Claſs and order, *Dioecia Hexandria.* Nat. Ord. *Sarmentaceæ,* Linn. *Aſparagi,* Juſſ.

Gen. Ch. Male, *Cal.* Perianth widely bell-ſhaped, of ſix oblong leaves, approximated at the baſe, reflexed and ſpreading at the extremity. *Cor.* none, unleſs the calyx be taken for ſuch, (which, from the analogy of *Aſparagus, Convallaria,* &c. it ſurely ought to be.) *Stam.* Filaments ſix, ſimple; anthers oblong.

Female, *Cal.* as in the male, deciduous. *Cor.* none. *Piſt.* Germen ſuperior, ovate; ſtyles three, minute; ſtigmas oblong, reflexed, downy. *Peric.* Berry globoſe, of three cells. *Seeds* ſolitary in each cell, globoſe, one or two of them generally abortive.

Eſſ. Ch. Male, Calyx of ſix leaves. Corolla none.

Female, Calyx of ſix leaves, inferior, deciduous. Corolla none. Styles three. Berry of three cells. Seeds one, two, or three.

Obſ. Mr. Brown defines the calyx *permanent;* we find it, as Linnæus ſays, *deciduous.* RIPOGONUM (ſee that article) has the ſtamens and piſtils in the ſame flower.

Of this ample genus, Linnæus in Sp. Pl. has only thirteen ſpecies; Willdenow has forty-one. To theſe, four North American ones are added by Purſh, and Mr. Brown has four from New Holland, excluſive of the ſecond ſpecies of *Ripogonum.* They are all climbing perennial plants, with ſimple, alternate, ribbed, entire leaves, with or without tendrils; the ſtem moſtly ſhrubby, ſmooth or prickly, round or angular; flowers generally umbellate. The following examples may ſuffice.

Sect. 1. *Stem prickly, angular.* Fourteen ſpecies in Willdenow.

S. *aſpera.* Red-berried Rough Smilax. Linn. Sp. Pl. 1458. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 959, unpubliſhed. Matth. Valgr. v. 2. 551. Ger. Em. 859. (S. aſpera, rutilo fructu; Cluſ. Hiſt. v. 1. 112.)—Stem angular, very prickly. Leaves oblong-heart-ſhaped, ſomewhat haſtate, with ſeven or nine ribs, coriaceous, bordered with ſpinous teeth.—Native of hedges and thickets, throughout the ſouth of Europe. Dr. Sibthorp found it abundantly in marſhy and rough ſtony ground, in Greece and all the neighbouring iſlands, flowering late in autumn. The *ſtems* climb, by means of tendrils, like our Bryony, and hang in feſtoons from the tops of hedges. They are woody, perennial, branched, zig-zag, plentifully armed with ſtrong, ſcattered, hooked prickles, as are likewiſe the *footſtalks* and edges of the evergreen *leaves.* *Flowers* white, with a fleſh-coloured tint extended to their ſtalks, in ſmall umbellate tufts, diſpoſed in terminal, zig-zag, ſmooth *cluſters.* *Berries* of a dull ſcarlet red, the ſize of currants, umbilicated, with three ſeeds in each.—This is doubtleſs the *σμιλαξ τραχεια* of Dioſcorides; the Lofty, or Woody, Bramble of the modern Greeks.

The figure in Plukenet's *Phytographia*, t. 110. f. 3, indicated as a variety, is hardly ſuch, but exhibits nearly the uſual form of the *leaves;* what has been generally taken for *S. aſpera* being in fact the following ſpecies, whoſe *leaves* are always broader.

S. *nigra.* Black-berried Rough Smilax. Willd. n. 2. Prodr. Fl. Græc. n. 2313, unpubliſhed. (S. aſpera β; Linn. Sp. Pl. 1458. S. aſpera nigro fructu; Cluſ. Hiſt. v. 1. 113. S. aſpera luſitanica; Ger. Em. 860.)—Stem angular, prickly. *Leaves* oblong-heart-ſhaped, ſeven-ribbed, coriaceous, ſmooth at the edges.—Native of hedges in Spain, Portugal, and the ſouth of France. Dr. Sibthorp obſerved it about Pruſa, in Bithynia. The *ſtems* are leſs prickly than in the former; the *leaves* broader, not at all dilated at the ſides, nor contracted in the middle, ſo as to approach a haſtate form; their edges very ſlightly, or not at all, prickly; and the *berries* are black.

S. *excelſa.* Tall Smilax. Linn. Sp. Pl. 1458. Willd. n. 5. Ait. n. 2. Prodr. Fl. Græc. n. 2314, unpubliſhed. (S. orientalis, ſarmentis aculeatis, excelſas arbores ſcandentibus, foliis non ſpinoſis; Tourn. Cor. 45. Buxb. Cent. 1. 18. t. 27.)—Stem angular, prickly. Leaves ovate, ſlightly heart-ſhaped, with five or ſeven ribs, and no marginal prickles.—Native of the country near Conſtantinople. Gathered by Dr. Sibthorp in woods at the village of Belgrad. Buxbaum ſays it is frequent in hedges about villages in Thrace, as well as in Pontus and Cappadocia, and that it is very uſeful for fences and ſhade. The *flowers* are yellowiſh-green; the *berries* red.

Whether *S. aſpera,* Alpin. Egypt. 141, cited with doubt by Linnæus, be this plant, is not clear to us. Willdenow thinks it a diſtinct ſpecies, not yet deſcribed by ſyſtematic writers.

S. *Sarſaparilla.* Medicinal Smilax, or Sarſaparilla. Linn. Sp. 1459. Willd. n. 9. Ait. n. 4. Purſh n. 5. Woodv. Med. Bot. t. 194. (S. peruviana, Salſaparilla; Ger. Em. 859.)—Stem prickly, ſomewhat quadrangular. Leaves elliptical, pointed, abrupt, three-ribbed; without prickles; ſlightly glaucous beneath. Common flower-ſtalk longer than the footſtalk.—Common in the hedges and ſwamps of North America, flowering in June and July. *Purſh.* The *ſtem* is ſtout, a little zig-zag, roundiſh, with about four ſlight unequal angles, and a few ſcattered hooked prickles. Full-grown *leaves* nearly orbicular, two and a half inches broad, abrupt or contracted at each extremity, with a ſhort terminal point; their ſurface finely reticulated with veins, and marked with three ſtrong ribs, the lateral ribs deſcribed by Willdenow hardly deſerving to be ſo denominated. *Footſtalks* ſhort, broad, channelled, each crowned with two tendrils, ſubſequently deciduous. *Flowers* yellowiſh-white, in axillary, ſolitary, ſtalked umbels. *Berries* red, according to Woodville, whoſe figure, the only one extant, has not been noticed, his work being never quoted by Mr. Aiton, though it ſurely ranks high as an uſeful medical book, and the plates, by Mr. Sowerby, are, as far as poſſible, original. It is much to be wiſhed that what are merely done from dried ſpecimens, or from other authors, had been every where ſo acknowledged, by which the authority of the publication would have been unimpeachable, and on a par with any whatever. For the hiſtory, and medical qualities, of the root, ſee SARSAPARILLA.

S. *melaſtomifolia.* Rough-ribbed Smilax.—Stem with many angles, denſely and minutely prickly; as well as the ſeven ribs of the ovate, pointed, ſlightly heart-ſhaped, rough-edged leaves.—Gathered by Mr. Menzies, in the Sandwich iſlands. A fine new ſpecies, whoſe *branches* are zig-zag, nearly round, with numerous angles, all copiouſly beſet with minute, ſtraight, rigid prickles. *Leaves* three inches long, and near one and a half broad, with five principal ribs, and a pair of ſlender, wavy marginal ones. Theſe all bear underneath copious prickles, like thoſe of the *branches* and *footſtalks,* ranged in ſeveral rows on the larger ribs. The reticulated veins are alſo rough with prickles, ſo that the leaf altogether reſembles that of ſome ſpecies of *Melaſtoma.* *Umbels* axillary, ſtalked, one or more from each leaf, accompanied by large concave, ſheathing *bracteas.*

Sect. 2. *Stem prickly, round.* Nine ſpecies in Willdenow.

S. *auſtralis.* Strong-veined New Holland Smilax. Br. n. 1.—Stem round, with copious prickles. Leaves ovate-oblong, acute, five-ribbed, ſmooth, without prickles. Tendrils in pairs on the footſtalks.—Gathered by Mr. Brown, near Port Jackſon, New South Wales. We received from Kew garden, in 1798, a ſpecimen in flower of what we preſume to be this ſpecies. It is diſtinguiſhed by the copious, ſtrong, ſtraight prickles, of its round, ſlightly ſtriated, zig-zag *branches.* The *leaves* are rigid and coriaceous, ſmooth, with five ribs, and innumerable prominent reticulated veins; their baſe ſomewhat heart-ſhaped; the *footſtalks* ſhort, broad, channelled, bearing from the middle two long ſpiral *tendrils.* *Flowers* white, numerous, in axillary umbels, whoſe ſtalks rather exceed the footſtalks.

S. *China.* Chineſe Smilax, or China-root. Linn. Sp. Pl. 1459. Willd. n. 15. Ait. n. 5. Woodv. Med. Bot. t. 236. (Sankira, vulgò Quáquara; Smilax minùs ſpinoſa, fructu rubicundo, radice virtuoſâ, *Chinæ* dictâ; Kæmpf. Amoen. 781. t. 782. Frutex convolvulaceus ſpinoſus ſinicus, &c.; Pluk. Amalth. 101. t. 408. f. 1. China vulgaris officinarum; Ger. Em. 1618.)—Stem roundiſh, with ſcattered prickles. Leaves roundiſh-ovate, acute at each end, with three principal ribs.—Native of China and Japan; ſaid to have been cultivated by Miller, in 1759. The *ſtem* is ſtrongly zig-zag. *Leaves* one and a half or two inches long, and nearly as broad, ſmooth, with three ſtraight principal ribs, and two wavy, more ſlight, lateral ones. *Footſtalks* bearing two, or more, long twiſted *tendrils.* *Flowers,* according to Kæmpfer, greeniſh-yellow, in umbels, on ſlender, ſolitary, axillary ſtalks, longer than the footſtalks. *Berries* the ſize of black currants, ſcarlet, mealy, auſtere like a medlar, ſaid to contain four, five, or ſix *ſeeds*, a greater number than uſual in this genus. We ſtrongly ſuſpect that more than one ſpecies is confounded under the hiſtory of this ſpecies. The Linnæan Chineſe ſpecimens have more heart-ſhaped *leaves* than any of the figures exhibit, nor is their *ſtem* prickly. Very poſſibly, however, theſe do not belong to the officinal China-root.

This root was brought into Europe, towards the middle of the 16th century, with ſtrong recommendations of its virtues, as a cure for the venereal diſeaſe, as well as for various chronic, cutaneous, or rheumatic diſorders. Theſe are neither confirmed by experience, nor rendered probable by the ſenſible qualities of the root itſelf, which is farinaceous and nearly inſipid.

S. *caduca*. Deciduous Smilax. Linn. Sp. Pl. 1460. Willd. n. 22. Ait. n. 9. Purſh n. 12.—Stem round, with diſtant ſtraight prickles; branches angular. Leaves ovate, pointed, five-ribbed. Common flower-ſtalks hardly longer than the footſtalks. Tendrils capillary, much ſhorter than the leaves.—In dry fields, from Canada to Virginia, flowering in June. *Purſh*. The *ſtem* is rather ſtout, quite round when full-grown, but the *branches* are decidedly angular, and ſtrongly zig-zag. *Prickles* diſtant, ſtout, tipped with black. *Leaves* broadly ovate, or ſlightly heart-ſhaped, ſmooth, green on both ſides, very finely veined, their lateral ribs often obſolete. *Tendrils* very ſmall and ſlender, from the middle of each footſtalk. *Flowers* few, greeniſh, in ſolitary *umbels*.

S. *ſpinuloſa*. Briſtly Smilax.—Stem round, with crowded, capillary, curved prickles; branches ſomewhat angular. Leaves ovate-oblong, pointed, five-ribbed; glaucous beneath. Tendrils capillary.—Sent from Pennſylvania, by the late Rev. Dr. Muhlenberg, who thought it had been improperly confounded with *S. caduca*. The quantity of fine ſetaceous prickles, on the *ſtem* or *branches*, ſeems to be variable; but the more oblong *leaves*, opaque and glaucous beneath, are very different from the laſt. We cannot refer this to any of Mr. Purſh's ſpecies.

Sect. 3. *Stem without prickles, angular.* Seven ſpecies in Willdenow.

S. *latifolia*. Broad-leaved Smilax. Br. n. 4. Ait. n. 11. —"Stem angular, without prickles. Leaves ovate, five-ribbed, ſmooth; ſomewhat heart-ſhaped or obtuſe at the baſe. Footſtalks bearing the tendrils."—Gathered by Mr. Brown in the tropical part of New Holland. Sent to Kew, in 1791, by ſir Joſeph Banks. It is there treated as a greenhouſe plant, but has not yet flowered.

S. *herbacea*. Herbaceous Smilax. Linn. Sp. Pl. 1460. Willd. n. 27. Ait. n. 12. Purſh n. 16. (S. claviculata hederifolia tota lævis, e terrâ Marianâ; Pluk. Phyt. t. 225. f. 3, marked 4.)—Stem herbaceous, angular, ſimple, erect. Leaves oval, ſeven-ribbed. Tendrils from the baſe of the long footſtalks. Common flower-ſtalks very long, compreſſed.—In dry fields, on the edges of woods, from New York to Carolina, flowering in June and July. *Purſh*. The *root* is perennial. *Stems* annual, browniſh-purple, ſmooth, with a pair of revolute *tendrils* to each leaf. *Umbels* globoſe, of numerous *flowers*, on axillary ſtalks, near ſix inches long. *Berries* dark purple, depreſſed.—Plukenet's figure, if rightly quoted, is a very bad one, the *leaves* being not ſufficiently elliptical, and the *footſtalks* much too ſhort.

Sect. 14. *Stem without prickles, round.* Eleven ſpecies in Willdenow.

S. *elliptica*. Elliptical Smilax. Br. n. 3.—"Stem without prickles; branches round, ſtriated. *Leaves* elliptic-ovate, ſomewhat pointed, five-ribbed, ſmooth; rather acute at the baſe. Footſtalks bearing the tendrils."—Gathered by Mr. Brown in the tropical part of New Holland.

S. *glyciphylla*. Sweet-leaved Smilax. Smith in White's Voyage, 230. t. 24. f. A, B. Br. n. 2.—Stem round, without prickles. Leaves ovate-oblong, acute, three-ribbed, ſmooth, ſomewhat revolute; glaucous beneath. Footſtalks bearing the tendrils.—Sent from the neighbourhood of Port Jackſon, New South Wales, among the firſt communications from thence. The *leaves*, having a very ſweet taſte, like liquorice-root, accompanied with ſome bitterneſs, were uſed by the firſt ſettlers in that country, to make a ſort of tea, which was thought good for the ſcurvy. The *ſtem* is wiry, ſmooth, and ſlender. *Leaves* about two or three inches long, reticulated, coriaceous; broad and rounded at the baſe, on ſhortiſh curved *footſtalks*. *Flowers* in axillary, ſtalked umbels.

S. *Pſeudo-china*. Baſtard Virginian China-root. Linn. Sp. Pl. 1461. Willd. n. 38. Ait. n. 15. Purſh n. 10, excluding Sloane's ſynonym. (S. virginiana, ſpinis innocuis armata, latis canellæ foliis, radice arundinaceâ craſſâ et carnoſâ; Pluk. Phyt. t. 110. f. 5. China ſpuria nodoſa; Bauh. Pin. 297. Pſeudo-china radix ex Virginia; Cluſ. Exot. 83.) —Stem round, without prickles. Leaves ovate, pointed, five-ribbed. Tendrils from the baſe of the footſtalks. Common flower-ſtalks longer than the leaves.—In ſandy fields and dry woods, from New Jerſey to Carolina, flowering in May and June. A *ſhrub*. The *roots* very large, ſearched after by hogs. *Purſh*. The *ſtem* is of a purpliſh-brown, very ſmooth. *Branches* long, ſlender, leafy, climbing by means of ſlender, not very long, *tendrils*, ſpringing in pairs from the very baſe of the angular *footſtalks*. *Leaves* two inches, or 2½, in length, an inch or more in breadth, ſlightly heart-ſhaped at the baſe, undulated or criſped, but hardly crenate, at the margin, reticulated with veins, which, as well as the ribs, are ſometimes rough with minute prickles beneath. *Flower-ſtalks* axillary, umbellate, longer than the leaves.—The *root* of this ſpecies is ſaid to have been brought from Virginia for the true China-root, of which we have ſpoken under the ſecond ſection. They ſeem to agree in their farinaceous or ſtarch-like ſubſtance, which, it ſeems, is common to the roots of various other plants of this genus. Sloane deſcribes one under the name of S. aſpera, fructu nigro, radice nodoſâ, magnâ, lævi, farinaceâ, China dictâ; Sloane Jam. v. 1. 231. t. 143. f. 1. This, he ſays, has a *root* as thick as a man's leg, crooked and ſwelling, with a thin red-brown ſkin, and a friable light red internal ſubſtance, giving a reddiſh tincture to water. Its qualities are like the real China-root, in the place of which Sloane recommends its uſe, at leaſt in the Weſt Indies. Linnæus cites this ſynonym under his *S. Pſeudo-china*, with which it has little connection; and he refers alſo to the S. aſpera, foliis trinerviis oblongis, petiolis biclaviculatis, Browne's Jamaica, 359, a ſpecimen of which is attached, in the Linnæan herbarium, to the real *S. Pſeudo-china*. The *leaves* of this are elliptical. Common *flower-ſtalks* extremely ſhort. *Tendrils* from the middle of each *footſtalk*. *Stem* angular; ſaid to be prickly in the lower part. By theſe latter characters this plant of Browne ſhould belong to the firſt ſection; while Sloane's, deſcribed with a round and very prickly *ſtem*, muſt be referred to the ſecond. Moreover, Browne's is deſcribed with ſlender branching *roots*, and we muſt preſume that his *Smilax*, n. 1, is rather Sloane's plant, as Mr. Lunan, in his Hortus Jamaicenſis, v. 1. 180, makes it. We do not chooſe to run the riſk of determining theſe ſeveral ſpecies, without authentic ſpecimens, more eſpecially as Dr. Swartz has left them untouched. Two more of this tribe are repreſented in

Plumier's *Icones*, t. 82 and 84, which cannot be referred to any of the before-mentioned. The latter, indeed, is thus adopted by Willdenow.

S. *macrophylla*. Large-leaved Smilax. Willd. n. 39.—(China altera, non aculeata, foliis amplioribus; Plum. Ic. 73. t. 84.)—Stem round, without prickles.—Leaves ovate, obtuſe, ſomewhat heart-ſhaped, ſeven-ribbed. Tendrils from the middle of the ſhort footſtalks.—Native of the Weſt Indies. The *leaves* nearly agree in ſize and ſhape, as well as the *footſtalks*, with *Paſſiflora alata*. The *umbels* are axillary, ſolitary, on ſtalks twice the length of the *footſtalks*.

Smilax, in *Gardening*, contains plants of the ſhrubby, climbing, evergreen kinds, of which the ſpecies cultivated are, the rough ſmilax (S. aſpera); the tall ſmilax (S. excelſa); the medicinal ſmilax, or ſarſaparilla (S. ſarſaparilla); the bay-leaved ſmilax (S. laurifolia); the black bryony-leaved ſmilax (S. tamnoides); the herbaceous ſmilax (S. herbacea); the Chineſe ſmilax (S. china); and the baſtard Chineſe ſmilax (S. pſeudo-china.)

In the firſt ſort there is a variety which has the leaves eared at the baſe.

Method of Culture.—The ſix firſt hardy ſorts may be increaſed by ſlipping the roots, layers, and ſeed. In the firſt mode, the ſtalks ariſing from the roots ſhould be ſlipped with roots to each in the autumn, and be planted out either in nurſery-rows for a year or two, or, which is better, where they are to grow. In the layer method, the ſtalks ſhould be laid down in the common manner in autumn, and when well rooted, in the autumn following be taken off and planted out as above. The ſeed ſhould be obtained from abroad, and be ſown in pots filled with fine mould in the ſpring, being plunged in a hot-bed to forward their coming up; when the plants have attained ſome growth they ſhould be planted out and managed as the others.

The two laſt tender ſorts may be increaſed by layers of the young ſhoots, and dividing the roots, which ſhould be laid down, or planted out in the ſpring ſeaſon, in order to have the culture of other woody greenhouſe plants of the ſame nature. The layers will be ready to take off in the ſpring following.

The firſt ſorts are proper for ſhady ſituations, borders, &c. and the latter afford variety in the greenhouſe collections, among others of ſimilar growths.

SMILE', in *Surgery*, a lancet.

SMINTHEAN, Smintheus, σμινθευς, in *Antiquity*, an epithet given to Apollo; from the Greek σμινθος, *a rat*. There are two different accounts of the origin of this appellation: the firſt is, that, in the city of Chryſa in Myſia, was a prieſt of Apollo, called *Crinis*, with whom that god being offended, ſent a herd of rats to ſpoil all his lands; but Crinis appeaſing the deity, he came in perſon to his aſſiſtance, took up his lodgings with Crinis's ſhepherd, told him who he was, and deſtroyed all the rats with his arrows; in memory of which Crinis built a temple to his deliverer, under the name of *Apollo Smintheus*.

Strabo (l. 13.) ſays, that in Chryſa was to be ſeen a ſtatue of Apollo by the hand of Scopas, the celebrated ſtatuary of Paros, with the figure of a rat near his feet; and Heraclides of Pontus aſſerts, that the rats about that temple were ſacred.

Clemens Alexandrinus, in his exhortation to the Greeks, gives us a different ſtory. The Cretans, ſays he, intending to ſend out a colony, conſulted the oracle of Apollo as to the place: the anſwer was, that they ſhould fix their colony where thoſe born of the earth ſhould oppoſe them. Upon their arrival in the Helleſpont, the rats, in the night-time, gnawed aſunder all the ſtrings of their bows: this they deemed an accompliſhment of the oracle, and there built a city called *Smintha*.

SMINTO, Sminthium, in *Ancient Geography*, a town of Aſia Minor, in the Troade, or, as Strabo ſays, in the territory of Adramyttium. But its true name was *Chryſa*. (See Sminthean.) M. d'Anville has placed Sminthium at a ſmall diſtance S. of Tros, or Troy: according to Homer, this town was in an iſland. It gave name to a neighbouring mountain, called "Sminthium Nemus." Steph. Byz.

SMIRIS, in *Natural Hiſtory*. See Emery.

SMIRSITZ, in *Geography*, a town of Bohemia, in the circle of Konigingratz; 6 miles N.E. of Konigingratz. N. lat. 50° 14'. E. long. 15° 42'.

SMITH, Adam, in *Biography*, a diſtinguiſhed writer in moral and political philoſophy, was born in the year 1723, at Kirkaldy, in Fifeſhire, where his father held the comptrollerſhip of the cuſtoms. He received his early education under the care of his mother, then a widow, at the ſchool of Kirkaldy, where he was noticed for an extraordinary paſſion for reading. At the age of fourteen he was removed to the univerſity of Glaſgow, in which he ſpent three years, attending, among the other lectures, thoſe of the celebrated profeſſor Hutcheſon. In 1740 he was ſent as a penſioner to Baliol college, Oxford. Here he ſpent ſeven years, and it is thought that during this period he employed himſelf chiefly in acquiring an exact knowledge of the languages, ancient and modern, and in cultivating an Engliſh ſtyle, by the practice of tranſlating works of high reputation into his own language. Upon quitting the univerſity he abandoned all thoughts of entering into the Engliſh church, for which purpoſe he had been ſent thither, and went to Edinburgh, and found a friend and patron in lord Kaimes. In 1751 he was elected profeſſor of logic at Glaſgow, from which he was removed, in the following year, to that of moral philoſophy. He now felt that he was in a ſituation accommodated to his talents and diſpoſition, and in later life he was accuſtomed to ſpeak of his reſidence and employment at Glaſgow as the moſt uſeful and happieſt portion of his life. His lectures, both logical and moral, were extremely popular; and his manner of delivering them, if not graceful, was ſaid to be highly impreſſive. In thoſe on moral philoſophy were contained the rudiments of his two moſt celebrated works as an author. Of theſe, the firſt is entitled "The Theory of Moral Sentiments," and appeared in the year 1759. The fundamental principle is ſympathy, which the author makes the ſource of our feelings concerning the propriety or impropriety of actions, and their good or ill deſert. To this work he afterwards ſubjoined "A Diſſertation on the Origin of Languages." Theſe works were extremely well received, and gave him a place among the beſt writers of the time. They alſo made him known to ſeveral eminent characters; and it was in conſequence of the reputation thus acquired, that he was engaged to accompany the duke of Buccleugh in his travels. He of courſe reſigned his office as profeſſor, and in the beginning of the year 1764, he ſet out for the continent. He had now an opportunity of comparing the ideas which he had already formed reſpecting political economy, with thoſe of the ableſt men in foreign countries, and alſo with facts that preſented themſelves to his obſervation in the courſe of his travels. A long reſidence in France introduced him to the acquaintance of Turgot, Queſnai, Necker, D'Alembert, Helvetius, Marmontel, and others, to whoſe particular notice he was recommended by his countryman David Hume, with whom he had long been in habits of friendſhip. He returned to his own country in the autumn of 1766, and the following ten years he paſſed in retirement with his mother at the obſcure town of Kirkaldy. Here he was habitually employed in reading, the fruits of which were at length given to the world in his celebrated "Inquiry into the Nature and Cauſes of the Wealth of Nations." This work has long been a ſtandard work, not only in our own country, but throughout Europe. It has been ſtudied and referred to by all who pay attention to the important political topics on which it treats. After the publication of this "Inquiry," he ſpent a great part of two years in London, where his ſociety was courted by perſons of the higheſt rank in the philoſophical and literary world. In the year 1778 he obtained, through the intereſt of the duke of Buccleugh, the lucrative place of a commiſſioner of the cuſtoms of Scotland, in conſequence of which he removed to Edinburgh, which was thenceforth the place of his reſidence. His mother, who lived to a great age, ſpent her laſt days with him here. After the death of his friend, Mr. Hume, he publiſhed that philoſopher's memoirs of his own life, with ſome additions, in which he expreſſed himſelf ſo favourably with regard to the character and opinions of the deceaſed, that it was readily inferred his own ſentiments with reſpect to revealed religion could not be very different from thoſe of his friend, which drew upon him an attack in an anonymous letter, ſince known to have been from the pen of the late Dr. Horne, afterwards biſhop of Norwich. In 1787 he was appointed rector of the univerſity of Glaſgow, and in 1790 he died, at the age of ſixty-ſeven. A few days before his death he cauſed all his papers to be burnt, except a few Eſſays, which have ſince been publiſhed.

Dr. Smith was a man of great ſimplicity of character, ſubject to abſence of mind in ſociety, and fitter for ſpeculative than active life. He was much beloved by his friends, and poſſeſſed a calm and benignant diſpoſition. Of the originality and comprehenſiveneſs of his views, the extent, variety, and the correctneſs of his information, and the inexhauſtible fertility of his invention, he has left laſting monuments behind him. To his private worth, the moſt certain of all teſtimonies may be found in that confidence, reſpect, and attachment, which followed him through all the various relations of life. When perfectly at eaſe, and when warmed with converſation, his geſtures were animated and not ungraceful; and in the ſociety of thoſe whom he loved, his features were often brightened by a ſmile of inexpreſſible benignity.

Smith, Edward, one of the minor Engliſh poets, born in 1668, near Tenbury, Worceſterſhire, was the ſon of Mr. Neale, a merchant, by the daughter of lord Lechmere. The connection of his parents was dubious, or at leaſt unavowed; for after his father's death, being left to the care of Mr. Smith, who had married his paternal aunt, he aſſumed his guardian's name, by which he was ever afterwards known. He was indeed, when grown to mature years, acknowledged by his mother as her legitimate ſon, but he derived no advantage from this declaration. He was educated at Weſtminſter ſchool, under Dr. Buſby, who is ſaid to have formed a high opinion of his talents, and, in conſequence of this opinion, to have detained him longer than the uſual time under his tuition. From Weſtminſter he was elected to Trinity college, Cambridge, but having at the ſame time an invitation from Chriſtchurch college, Oxford, he preferred the latter, and became a ſtudent of that college. Here he diſtinguiſhed himſelf by Latin verſes, written on ſome public occaſions; and a Latin ode, which he compoſed in 1691, on the death of Dr. Pococke, the learned Orientaliſt, obtained for him much celebrity for a poetical imagination. In 1705 he was expelled from his college, on account of his intemperance and licentious conduct. He had, however, previouſly to this, taken his degree of M.A. He now went to London, where his wit and convivial powers cauſed him to be much careſſed by perſons of eminence, eſpecially of the Whig party; though neither his manners, nor his external appearance, rendered him adapted to good ſociety. In 1708 he publiſhed a "Poem to the Memory of Mr. John Phillips," which is ſaid to be the only one of his miſcellaneous pieces that merits notice. It has been much admired, becauſe it partakes more of ſatire than elegy. In the following year he produced his tragedy of Phædra and Hippolitus, which was not very well received. Addiſon, however, wrote the prologue, and Prior the epilogue; the principal actors took parts in it, and it was patroniſed by men of high rank, yet it was ſcarcely heard to the third night. "It has," ſays the critic, "more poetical than dramatic merit, and is greatly inferior, in point of delicacy, pathos, and conduct, to Racine's tragedy on the ſame ſubject." Mr. Smith died in the forty-ſecond year of his age, and his early death was imputed, probably with great juſtice, to his intemperate habits. He had attained much harmony of verſification as a poet, and poſſeſſed a certain luxuriance of fancy, but he gives no indication of a higher genius; and did very little for the intereſts of literature. He was lifted to temporary fame by the efforts of academic partiality, but has now ſunk to the level of many who are well nigh forgotten. Johnſon's Lives of the Poets.

Smith, *Sir* Thomas, an eminent ſcholar and ſtateſman of the 15th century, was born at Saffron-Walden, in Eſſex, in 1524. He was educated for, and ſent early to, Queen's college, Cambridge, and by his proficiency in learning obtained a penſion as king's ſcholar. Being choſen fellow of his college, he was appointed, in 1535, to read the public Greek lecture, on which occaſion he concurred with Cheke in introducing an improved mode of pronouncing that language. In 1539 he travelled to the continent, for the ſuperior advantages offered by the foreign univerſities, and at Padua he ſtudied the civil law, in which faculty he graduated. On his return he reſumed his reſidence at Cambridge, where, in 1542, he was admitted to the degree of doctor, and was nominated king's profeſſor in civil law. He purſued with great ardour his ſcheme of reforming the pronunciation of the Greek, and he likewiſe attended to the improvement of his native tongue, and publiſhed a work concerning its correct orthography and pronunciation. He was a promoter of the principles of the reformation in religion, and did his utmoſt to ſhelter thoſe reformers who were expoſed to the perſecution of the tyrant Henry VIII. He had himſelf taken orders, poſſeſſed a rectory, and alſo the deanery of Carliſle. On the acceſſion of the virtuous Edward VI., he was taken into favour by the protector Somerſet, and raiſed to ſeveral lucrative poſts, and in 1548 he was knighted, and appointed ſecretary of ſtate. On the diſgrace of the protector he was deprived of the ſecretaryſhip, but was ſoon replaced in it, and continued during the remainder of the reign in truſt and honour. When Mary ſucceeded to the throne he loſt all his offices, and was forbidden to quit the kingdom; but by his caution and prudence he was enabled to ſteer in ſafety through the ſtormy and perilous period. As ſoon as Elizabeth became queen he was invited to court, and reinſtated in the deanery of Carliſle, and employed in various public concerns, particularly in the reviſion of the Liturgy. He was ſent on various embaſſies to the court of France, and during one of his reſidences in that country he compoſed his work "On the Commonwealth of England." Owing to ſome diſappointment he retired to the country, where he ſpent three years, exerciſing the duties of a magiſtrate, and diſtinguiſhing himſelf by his ſeverity againſt ſuppoſed witches. In 1571 he returned to court, was nominated a privy counſellor, and made aſſiſtant to lord Burghley, in his office of ſecretary of ſtate. In 1572 he was employed to negociate an alliance with France, and after his return he ſucceeded lord Burghley, who was advanced to the poſt of treaſurer. He died in 1577, at the age of 63. Sir Thomas Smith is characteriſed by his eulogiſt, as "a maſter of various languages, ancient and modern, and as extremely well verſed in ſeveral ſciences. He was pious, upright, and benevolent, and ſeems to have been perfectly free from the duplicity and craft which were too frequent in the ſtateſmen of that age." He is chiefly known as a writer by the "Commonwealth of England," already referred to. Several of his letters have been printed in different collections, and four of his orations, on queen Elizabeth's projected marriage, are annexed to his Life by Strype. Biog. Brit.

SMITH, THOMAS, a learned writer, was born at London in 1638. He was admitted of Queen's college, Oxford, in 1657, and after taking his degree in arts, was choſen, in 1663, maſter of the free-ſchool adjoining to Magdalen college. He became fellow of that college in 1666, and was diſtinguiſhed for his great knowledge in the Oriental languages. He accompanied the Engliſh ambaſſador to Conſtantinople in 1668, and afterwards lived ſeveral years as chaplain with ſir Joſeph Williamſon, ſecretary of ſtate. He quitted him without any preferment, and was earneſtly ſolicited by ſeveral eminent clergymen, his particular friends, who knew his value, to return to the Levant, in order to collect MSS.; but knowing the danger attending ſuch a buſineſs, he put a negative on their propoſal. He had already made himſelf known to the learned world by a Latin diſſertation on the Chaldee paraphraſts, and their verſions, another on the Druids, and ſeveral ſermons on doctrinal points. He had alſo publiſhed ſome Latin epiſtles concerning the manners and inſtitutions of the Turks, and the ſeven churches of Aſia; of which he afterwards printed an Engliſh tranſlation; and in 1680 he publiſhed an account of the Greek church. To theſe works, relative to what he had obſerved in the Eaſt, may be added ſome papers communicated by him to the Philoſophical Tranſactions, and others contained in a collection of tracts, entitled "Miſcellanea." In 1683 he took his degree of D.D., and was preſented to a college-living, which he ſoon reſigned, and continued to reſide on his fellowſhip. When James II., in 1687, ſent a mandate to Magdalen college for the admiſſion of a popiſh fellow, Dr. Smith was one of the few perſons who petitioned againſt the meaſure, but he was far from ſteady in his oppoſition; and when the king ſignified his determination to be obeyed, Dr. Smith was one of the two fellows who ſubmitted, and in conſequence preſerved their fellowſhips, while the others had the honour of being expelled. The doctor, however, did not go far enough to pleaſe his ſovereign, and was eventually expelled from his office. The ſucceeding troubles produced his reſtoration: but in 1692, refuſing to take the oaths required by the government of William and Mary, he loſt his fellowſhip and living with which he had been preſented. He thenceforth reſided chiefly in the family of ſir John Cotton, occupied in his ſtudies, and in the compoſition of a variety of works. Of theſe, the greater part was of the antiquarian and biographical claſs. In the latter, his principal publication was entitled "Vitæ quorundam eruditiſſimorum et illuſtrium Virorum," containing the lives of archbiſhop Uſher and ſeveral other eminent characters. Dr. Smith died in 1710: he is characteriſed by his biographer as a man of great induſtry and learning, but he diſplayed in his writings much party bigotry and illiberality. His Latin ſtyle is neither clear nor ſimple. Biog. Brit.

SMITH, CHARLOTTE, daughter of Nicholas Turner, eſq. a gentleman of conſiderable property in the counties of Surry and Suſſex, when very young married Mr. Smith, the ſon of a Weſt India merchant. This match was not the effect of attachment on either ſide, and was productive of much miſery, of which a long account is given in the Monthly Magazine, vol. xxiii. p. 244. The affairs of Mr. Smith not proving proſperous, ſhe, after various perſecutions from creditors, and after paſſing ſome time in the gloom of a priſon with her huſband, retired to a convent in Normandy. Here ſhe was reduced to the utmoſt indigence, yet the exertion of her talents adminiſtered to her wants. She wrote ſeveral novels, which gained her a comfortable ſubſiſtence. She died, after various changes and misfortunes of life, at Thetford, near Farnham, Surry, in the year 1806. Her principal novels are as follow: "The Romance of Real Life;" "Emmeline;" "Ethelinda;" "Celeſtina;" "Deſmond;" and "The Old Manor Houſe." They diſplay great powers of invention; and it is remarkable, that in them all ſhe has contrived to interweave much of her own perſonal hiſtory, and painted in very ſtrong colours the characters of certain rapacious perſons, to whoſe diſhoneſty ſhe aſcribed all, or at leaſt the greater part, of her ſorrows. Mrs. Smith was alſo author of poems, ſonnets, and two ſmall volumes, entitled "Converſations introducing Poetry, chiefly on Subjects of Natural Hiſtory, for the Uſe of young Perſons." Her deſcriptions are intereſting, and her ſtyle is elegant. Her ſonnets poſſeſs great beauty, and all her writings every where diſplay the powers of a fine imagination, correct taſte, and ſtrong judgment.

SMITH, GEORGE, a native of Chicheſter, born in 1714, was, in deſpite of circumſtances in every reſpect unfavourable, a devotee to the art of painting, particularly in landſcape; and by dint of determined perſeverance ſucceeded in producing ſome works which do honour to his name. He was among the firſt who reſcued the Engliſh name, in art, from the odium caſt upon it by foreigners, and prepared the way for the brilliant efforts of Wilſon. His idea of compoſition may be eſtimated from the print, which Woollett engraved after the picture for which the Society in the Adelphi gave him their higheſt premium, and which preſents a conception almoſt worthy of Claude: his colouring, indeed, did not keep pace with the deſign, and his touch was too minute and trifling. There are many prints of his other productions, ſome etched by himſelf, but the one we have mentioned is the fineſt. He died in 1766.

SMITH, ROBERT, LL.D. and D.D., was a contemporary to Barrow. After all our reſearches, we have not been able to collect any particulars relating to the place of his birth, which was probably in Lincolnſhire, and the progreſs of his early years. It appears, however, that he was admitted A.B. in 1711, A.M. in 1715, LL.D. in 1723, and S.T.P. by royal mandate in 1739. He was firſt fellow, afterwards profeſſor of aſtronomy and experimental philoſophy, of which he was made Plumean profeſſor in 1716, ſupplying the place of his couſin, the celebrated Cotes; and he ſucceeded Dr. Bentley, in 1742, in the maſterſhip of Trinity college, in the univerſity of Cambridge. He had been preceptor to William, duke of Cumberland, and was maſter of mechanics to the king. In the year 1722 he publiſhed, at Cambridge, Cotes's "Harmonia Menſurarum," with additions, in 4to.: in 1738 appeared his "Complete Syſtem of Optics, in four books, *viz.* a popular, a mathematical, a mechanical, and a philoſophical treatiſe," &c. 2 vols.

4to.: in 1747 he publiſhed at Cambridge, in 8vo., a ſecond edition of Cotes's "Hydroſtatical and Pneumatical Lectures:" and in December 1748, he publiſhed his "Harmonics," of which a ſecond edition, much augmented and improved, appeared in October 1758. The inſcription over him is H. S. E. Robertus Smith, S. T. P. Hujus Collegii Magiſter, obiit Aug. 1768, ætatis 79.

Dr. Smith left two annual prizes of 25*l.* to two commencing bachelors of arts, who were to be the beſt proficients in mathematics and natural philoſophy of the year. He alſo left 2000*l.* towards repairs of Trinity college, and 2500*l.* to the univerſity.

Dr. Smith was a performer on the violoncello, and a curious inquirer into the defects of the muſical ſcale on keyed inſtruments; which he tried to remedy by many ingenious experiments and calculations. He had a harpſichord made by Kirkman, with quarter-tones, as they are called, with only a ſingle ſtring to each note, by which means the inſtrument, not being crowded with two or three ſtrings to each, by pedals could make any key perfect, as it allowed of two ſtrings for each of the five ſhort keys, differently tuned, to each note; as F♯ and G♭, G♯ and A♭, A♯ and B♭, &c. which rendered thoſe keys delightful, and which, in the old tuning, were inſufferable. But this perfect harmony only ſuited regular and ſober modulation: the compoſitions of Haydn and Mozart, and their imitators, would want a new ſcale every two or three bars. Poor Claggett purſued this plan, and by means of multiplied ſtrings and pedals had acquired perfect intonation to all the twenty-four keys. But by additional bridges, and the preſſure of ſo many ſtrings on the belly of the inſtrument, the tone was injured and enfeebled. This, alas! but confirms the two melancholy reflections, which tell us that "we cannot have every thing;" and that, "il faut ſouffrir dans ce monde."

The great mathematician, Dr. Smith, had ſo accuſtomed himſelf to perfect harmony, that he neither could bear the throwing of the imperfections of the ſcale on the *wolf*, or E♭, nor even on two or three ſhort keys ſeldom uſed in old church muſic; but all the compound ſtops in the organ, ſuch as the ſeſquialter and cornet, and the ſingle ſtops of the twelve and the tierce in the chorus, he took out of the fine organ of Trinity college, Cambridge, built by father Smith, and reduced the whole chorus to uniſons and octaves, which was thought by many to injure the inſtrument ſo much as to bereave it of all its ſpirit, and render it inſipid. And after the deceaſe of Dr. Smith we have been aſſured, that the excommunicated pipes have been again received into the boſom of the church.

Dr. Smith's "Harmonics," already mentioned, was profeſſedly written to aſſiſt organ-builders and tuners to divide the redundancies of the ſcale equally, or nearly equally, among all the twelve ſemitones in the octave by a table of *beats*. To give the reader an idea of Dr. Smith's plan, we muſt refer him to the article BEATS, where this effect, produced by two organ-pipes nearly in tune, is explained. But Dr. Smith's treatiſe, ſo far from being intelligible to tuners of organs, and organ-players in general, requires a knowledge in geometry and fluxions, which none but great mathematicians able to read Newton's Principia poſſeſs. Yet the book is written in ſo pleaſing and alluring a ſtyle, that many peruſe as much as they are able of the unſcientific part, and give the author credit for the accuracy of his calculations.

SMITH, JOHN CHRISTOPHER, a good muſician, and a reſpectable man. He was the eldeſt ſon of the worthy John Chriſtopher Schmidt, Handel's copyiſt, ſteward, and confidential countryman, who came over with him from Germany, and lived an inmate with him to nearly the time of his death. He uſed to engage and pay the performers in the oratorios carried on by Handel himſelf; and being a good muſician, was the moſt correct copyiſt of his time.

His ſon, John Chriſtian, was a ſtudious and cultivated man, and much eſteemed by many of the firſt people in the kingdom. He was particularly regarded by the late lord Barrington, and all that noble family; and having early in life travelled with a gentleman of fortune, at Geneva he became acquainted with ſome Engliſh gentlemen of learning and talents, among whom were Mr. Price, of Foxley, Herefordſhire; Mr. Windham, of Felbrig, Norfolk; Mr. Tate, of Mitcham, Surry; and Mr. Benjamin Stillingfleet, &c. This gave him a taſte for, and procured him admiſſion into, good company; ſo that he formed his character on models of a higher claſs than that of a mere muſician.

In the Monthly Review of a pamphlet publiſhed in 1780, entitled "Anecdotes of George Frederick Handel, and of John Chriſtian Smith," there are ſome paſſages relating to the venerable Mr. Smith, which we ſhall tranſcribe, being certain that they are accurate, from our own knowledge.

"After the period of Mr. Smith's return to England, he mixed very little with his profeſſional brethren, though he continued to compoſe muſic, and to teach the harpſichord, till the year 1760; when, being in poſſeſſion, not only of the *ſcores* of Handel's oratorios, but of the ſingle vocal and inſtrumental parts, which had been tranſcribed for, and uſed by his numerous bands, Mr. Smith undertook to continue the performance of oratorios in Lent, during eight years, on his own account; and during nine more, jointly with Stanley. . . . . . .

"We have heard, from the firſt contemporary authority, that there was a ſhyneſs between Handel and the younger Smith for ſeveral years, which kept them aſunder till the great muſician loſt his ſight: but the difference was occaſioned by no dignified cauſe of quarrel. Mr. Smith, early in life, having had ſome inſtructions from Handel, though his principal maſters were Dr. Pepuſch and Roſeingrave, when about the year 1739, he publiſhed a book of harpſichord leſſons, in 4to. Handel took it amiſs that his ſcholar, the ſon of his copyiſt, ſhould preſume to have a title-page to his leſſons engraved exactly in the ſame form and text-hand with his own firſt book of "Pieces de Clavecin," the beſt of all his productions. Mr. Smith's pieces were then perhaps inferior only to thoſe of his model. They conſiſted, as was then the general faſhion, of preludes, fugues, allemandes, corants, and jigs.

"Mr. Smith was certainly an elegant muſician, and in his conduct and manners far above the general level of the profeſſors of his art; but we are not certain, that his execution as a practitioner was great, nor that his invention as a compoſer was original. It is plain, that Mr. Smith's ſtyle of compoſition was that of the day, without an attempt at deviation; a ſtyle, which Handel had rendered *à-la-mode*, and to which not only Mr. Smith, but all the Engliſh compoſers, ſtrictly adhered during more than forty years; as is manifeſt in the works of Green, Boyce, Arne, (in his oratorios,) Worgan, and Stanley. Arne, in his dramatic muſic, adopted eaſy and elegant paſſages from Italian operas; but we muſt except his Comus, in which there is much original melody, as well as in his Vauxhall ballads. Mr. Smith never was a popular compoſer. His oratorios, though new, and in ſupport of which he had the patronage of ſeveral illuſtrious friends and great families, (particularly that of Barrington,) were not heard and attended ſo well as thoſe of Handel, which had been in conſtant uſe for many years. The Engliſh opera of "The Fairies," in which Guadagni and Fraſi performed the principal parts, had a conſiderable run; but it was never revived; nor did the airs penetrate into Vauxhall, Ranelagh, Mary-le-bone, private concerts, or private families, like thoſe of Arne's Comus, or Boyce's Chaplet, after having been heard at the theatres.

Smith, *Father*, or, as the Germans write his name, *Schmidt*, brought over with him from Germany, of which country he was a native, two nephews, Gerard and Bernard, as aſſiſtants; and to diſtinguiſh him from theſe, as well as to expreſs the reverence due to his abilities, which placed him at the head of his profeſſion, he was called *Father Smith*. During the grand rebellion, moſt of the organs in the kingdom having been deſtroyed, or ſtolen out of the churches, at the reſtoration a ſufficient number of workmen for the immediate ſupply of cathedrals and pariſh churches, with organs, not being found in our own country, it was thought expedient to invite foreign builders of known abilities to ſettle among us; and the premiums offered on this occaſion brought over the ſubject of our article and Harris.

The firſt organ which Smith engaged to build for this country was for the royal chapel at Whitehall, which, being haſtily put together, did not quite fulfil the expectations of thoſe who were able to judge of its excellence. An organ is ſo operoſe, complicated, and comprehenſive a piece of mechaniſm, that to render it complete in tone, touch, variety, and power, excluſive of the external beauty and majeſty of its form and appearance, is perhaps one of the greateſt efforts of human ingenuity and contrivance. It was probably from ſome ſuch early failure, that this admirable workman determined never to engage to build an organ upon ſhort notice, nor for ſuch a price as would oblige him to deliver it in a ſtate of leſs perfection than he wiſhed. And we have been aſſured by Snetzler, and by the immediate deſcendants of thoſe who have converſed with father Smith, and ſeen him work, that he was ſo particularly careful in the choice of his wood, as never to uſe any that had the leaſt knot or flaw in it; and ſo tender of his reputation, as never to waſte his time in trying to mend a bad pipe, either of wood or metal; ſo that when he came to voice a pipe, if it had any radical defect, he inſtantly threw it away, and made another. This, in a great meaſure, accounts for the equality and ſweetneſs of his ſtops, as well as the ſoundneſs of his pipes, to this day.

Smith had not been many months here, before Harris arrived from France, with his ſon René Renatus, an ingenious and active young man, to whom he had confided all the ſecrets of his art. However, they met with but little encouragement at firſt, as Dallans and Smith had the chief buſineſs of the kingdom; but upon the deceaſe of Dallans, who died while he was building an organ for the old church at Greenwich, 1672, and of the elder Harris, who did not long ſurvive him, the younger became a very formidable rival to Smith.

For the contention between theſe eminent artiſts, at the time of erecting the admirable organ which ſtill ſtands in the Temple church, ſee Burney's Hiſt. of Muſic, vol. iii. p. 437.

Smith, Theodore, a modern and pleaſing compoſer of natural and eaſy muſic. He was a native of Germany, and publiſhed at Berlin, at 1780, three different ſets of ſonatas *à quatre main*, three in each ſet; and in 1782, ſix concertos for the harpſichord. Though a native of Germany, he reſided ſo long in England as to be ſufficiently acquainted with our language to publiſh, beſides various muſical compoſitions, a Muſical Directory, printed by Welcker in 1778, an elementary work of conſiderable merit for its arrangement and clear explanation of the firſt rudiments of a player on keyed-inſtruments.

Smith, in *Geography*, a county of America, in the diſtrict of Weſt Tenneſſee, containing 11,649 inhabitants.—Alſo, a townſhip of Pennſylvania, in the county of Waſhington, containing 1646 inhabitants.

Smith's *Inlet*, a bay on the weſt coaſt of North America, the entrance of which is nearly cloſed by rocky iſles. From the entrance into the inlet, whoſe north point lies from its ſouth point N. 20 E. about a league diſtant, it was found to extend nearly in an eaſt direction about ſix leagues; here it takes a turn to the N.E., and terminates in N. lat. 51° 24′. E. long. 232° 47½′. About three leagues within the entrance, the rocks and iſles terminated, and the inlet contracted to a general breadth of about half a mile, though in ſome places it was near twice that diſtance from ſhore to ſhore; both of which were formed by high rocky precipices covered with wood. About half way up the canal a village of the natives was diſcovered, ſuppoſed to contain 200 or 240 perſons. This was built upon a detached rock, connected with the main by a platform, and conſtructed for defence. A great number of its inhabitants, in about thirty canoes, viſited captain Vancouver's party, and allured them in various ways to viſit their habitations. They offered the ſkins of the ſea-otter, and other animals, to barter; and beſides promiſes of refreſhment, made ſigns, not eaſily miſunderſtood, that the female part of their ſociety would take pleaſure in their company. The entrance is in N. lat. 51° 20′. E. long. 232° 12′.

Smith's *Iſland*, a ſmall iſland near the eaſt coaſt of Antigua.—Alſo, a ſmall iſland in the Atlantic, near the coaſt of Virginia; part of a cluſter collectively called "Smith's Iſlands." N. lat. 37° 15′. W. long. 75° 52′.—Alſo, a large and lofty iſland in the South Pacific ocean, diſcovered by lieutenant Ball, commander of the Supply, in 1790. S. lat. 9° 44′. E. long. 161° 54′.

Smith's *Point*, a cape on the coaſt of Virginia, forming the ſouthern limit of the Potomack river. N. lat. 37° 54′.

Smith's *River*. See Staunton.

Smith's *Sound*, a bay on the eaſt coaſt of Newfoundland, bounded by Cape Bonaviſta.

SMITHERY, a ſmith's ſhop; alſo the art of a ſmith, by which iron is wrought into any ſhape by means of fire, hammering, filing, &c.

SMITHFIELD, in *Geography*, a ſmall poſt-town of Virginia, on Pagan creek, which diſcharges itſelf into James river, in the Iſle of Wight county; 85 miles S.E. of Richmond. The creek is navigable for veſſels of 20 tons.—Alſo, a poſt-town, and the capital of Johnſon county, in North Carolina, on the eaſt ſide of Neus river, on a beautiful plain, about 100 miles N.W. of Newburn. In the centre of the town is an Indian burying-place, once in the form of a cone, 16 feet high, 30 feet in diameter, but its height is now reduced to five or ſix feet.—Alſo, a town of Jefferſon county, in the ſtate of Ohio, containing 1228 inhabitants.—Alſo, a townſhip of New York, in Madiſon county, bounded north by Lenox, eaſt by Auguſta in Oneida county, ſouth by Eaton and Nelſon, and weſt by Cazenovia; erected in 1807 from Cazenovia, and about 12 miles eaſt and weſt, and 5 north and ſouth. The principal part of this tract was leaſed of the Oneida Indians by Peter Smith, 1794, and purchaſed by the ſtate in 1795. The ſoil is of a ſuperior quality, and the whole tract is one of the beſt in the ſtate. It is amply irrigated by ſmall ſtreams, and alſo by the main branch of the Chenango river, itſelf a branch of the Suſquehanna. This town is principally ſettled by emigrants from the eaſtern ſtates, and compriſes the largeſt part of the tract called New Peterſburg. The population in 1810 conſiſted of 2651 perſons. The principal village is Peterboro', ſituated on the Oneida creek. N. lat. 42° 57', and W. long. 1° 37' from New York. —Alſo, a townſhip of Pennſylvania, in Lycoming county, containing 1084 inhabitants.—Alſo, a town of Rhode iſland, in Providence county, containing 3828 inhabitants.

Smithfield, *Lower*, a townſhip of Pennſylvania, in the county of Northampton, containing 1326 inhabitants.

Smithfield, *Upper*, a townſhip of Pennſylvania, in the county of Wayne, containing 520 inhabitants.

Smithfield, *Middle*, a townſhip of Pennſylvania, in the county of Wayne, containing 682 inhabitants.

SMITHIA, in *Botany*, was ſo named, after the writer of the preſent article, in the firſt edition of the *Hortus Kewenſis*, of his ever valued and lamented friend the late Mr. William Aiton, publiſhed in 1789.—Ait. Hort. Kew. ed. 1. v. 3. 496 and 512. ed. 2. v. 4. 336. Schreb. 809. Willd. Sp. Pl. v. 3. 1161. Mart. Mill. Dict. v. 4. Lamarck Dict. v. 7. 222. Illuſtr. t. 627.—Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, two-lipped; the ſegments ovato-lanceolate, concave, acute, nearly equal. *Cor.* papilionaceous. Standard inverſely heart-ſhaped. Wings oblong, obtuſe, rather ſhorter than the ſtandard. Keel linear-oblong, of one petal, cloven at the baſe, the length of the wings. *Stam.* Filaments ten, united into two equal ſets, combined at the bottom; anthers oblong. *Piſt.* Germen ſuperior, embraced by the baſe of the calyx; ſtyle capillary, permanent; ſtigma ſimple. *Peric.* Legume included within the calyx, of from four to ſeven orbicular, ſingle-ſeeded, diſtinct, muricated joints, connected with the permanent folded ſtyle, and lying horizontally over each other. *Seeds* ſolitary, kidney-ſhaped, compreſſed, ſmooth.

Eſſ. Ch. Stamens in two equal ſets. Legume of ſeveral horizontal, ſeparate joints, connected by the folded ſtyle, and incloſed in the two-lipped, equal calyx.

This genus, though eſtabliſhed under the authority of two very eminent botaniſts, Mr. Dryander and Mr. Saliſbury, who thought it peculiarly well marked, has of late been found ſo nearly to accord with the original ſpecies of *Aeſchynomene*, as to be ſcarcely diſtinguiſhable therefrom. Mr. Brown, however, who made this diſcovery, ſtill conſiders *Smithia* as diſtinct; the legume of *Aeſchynomene* being ſtraight, compoſed of a ſeries of vertical joints, connected by their edges, and projecting out of the calyx, while the latter is deeply divided. Their habits, and even the ſenſibility of their foliage, bring them ſo cloſely together, that we doubt, at leaſt, the propriety of keeping them ſeparate, though we are content, for the preſent, to leave them as we find them. Two ſpecies only of the genus before us have been obſerved.

1. S. *ſenſitiva*. Annual Smithia. Ait. Hort. Kew. ed. 1. v. 3. 496. t. 13. ed. 2. n. 1. Willd. n. 1. Saliſb. Parad. t. 92.—“Lips of the calyx entire. Cluſters ſtalked, of few flowers.”—Diſcovered in moiſt paſtures, on the coaſt of Coromandel, by J. G. Koenig, M.D., by whom ſeeds were ſent in 1785 to ſir Joſeph Banks. The plant is annual, and uſually kept in a hot-bed, or ſtove; but, according to Mr. Saliſbury, the ſeeds ſcattering themſelves in favourable ſituations, will ſometimes come up in the open ground, even in dry gravel. The *root* is tapering. *Stems* ſeveral, ſpreading, various in luxuriance, more or leſs branched, round, ſmooth, leafy. *Leaves* alternate, abruptly pinnate, of four, five, or ſix pair of elliptical, obtuſe, entire *leaflets*, about a quarter of an inch long; oblique at the baſe; glaucous beneath, their mid-rib and margins eſpecially beſet with long, briſtly, tawny, cloſe-preſſed hairs. *Stipulas* in pairs, lanceolate, membranous, ribbed; auricled and ſpurred at the baſe. The *leaves* fold together when touched, as in the *Mimoſa pudica*, but more tardily, unleſs in a very hot atmoſphere. The *flowers* are yellow, rather ſmall, with a purpliſh *calyx*, accompanied by a pair of cloſe *bracteas*, half its own length. Joints of the *legume* as ſmall as Red-poppy ſeed.

2. S. *conferta*. Cloſe-flowered Smithia.—Lips of the calyx toothed. Cluſters ſeſſile, ſhorter than the leaves.—Gathered in the tropical part of New Holland, by ſir Joſeph Banks, to whom we are obliged for a ſpecimen. This ſeems likewiſe to be an annual herbaceous plant. The *ſtems* are erect, ſlender, unbranched, round, ſmooth. *Leaves* few, diſtant, except at the top, where two or three are crowded together; their *leaflets* much as in the foregoing. *Stipulas* ſpurred, but ſcarcely auricled. *Cluſters* axillary, ſeſſile, of a very few *flowers*, whoſe *petals*, in the dried ſpecimen, are of a reddiſh or tawny hue. By the poſition of the dried *leaves* this ſpecies ſeems alſo ſenſitive; and perhaps they fold at night over the *flowers*, like thoſe of the *Lotus tetragonolobus*, celebrated for having firſt led Linnæus to conſider what he afterwards called the Sleep of Plants.

SMITHLAND, in *Geography*, a poſt-town of Kentucky, in the county of Livingſton, containing 99 inhabitants: the county contains 3575.

SMITHTOWN, a poſt-townſhip of New York, in Suffolk county, Long Iſland; 92 miles E. of New York; containing 1592 inhabitants, including 72 ſlaves. This place employs 14 veſſels principally in the trade with New York, of 30 to 100 tons burthen.

SMITHVILLE, a town of North Carolina, near the mouth of Cape Fear river; 30 miles S. of Wilmington. —Alſo, a townſhip of Chenango county, erected from a part of Greene in 1808; 13 miles S.W. of Norwich; containing 995 inhabitants, who manufacture moſt of their clothing in the houſehold way.

SMITING-Line, in a *Ship*, is a ſmall rope faſtened to the mizen-yard-arm, below at the deck, and is always furled up with the mizen-ſail, even to the upper end of the yard, and from thence it comes down to the poop. Its uſe is to looſe the mizen-ſail, without ſtriking down the yard, which is eaſily done, becauſe the mizen-ſail is furled up only with rope-yarns; and, therefore, when this rope is pulled hard, it breaks all the rope-yarns, and ſo the ſail falls down of itſelf. The word of art is, *ſmite the mizen*, (whence this rope takes its name,) that is, hale by this rope that the ſail may fall down.

SMITTL, in *Geography*, a town of Aſiatic Turkey, in Caramania; 18 miles E.N.E. of Cogni.

SMOCK, Lady's, or *Bitter Creſſes*, in *Agriculture*, a plant of the weed kind, found in coppices, and on the banks of rivers, which ſheep are ſaid ſometimes to eat. The common ſort is thought by ſome to be uſeful in epilepſies.

SMOKE, or Smoak, *Fumus*, a humid matter, exhaled in form of vapour by the action of heat, either external or internal; or ſmoke conſiſts of palpable particles, elevated by means of the rarefying heat, or by the force of the aſcending current of air, from bodies expoſed to heat; and theſe particles vary much in their properties, according to the ſubſtances from which they are produced. See Flame.

Smoke, ſir Iſaac Newton obſerves, aſcends in the chimney by the impulſe of the air it floats in: for that air, being rarefied by the fire underneath, has its ſpecific gravity diminiſhed; and thus, being determined to aſcend itſelf, it carries up the ſmoke along with it. The tail of a comet that great author takes alſo to aſcend from the nucleus, after the ſame manner. (See Comet.) Smoke of fat unctuous woods, as fir, beech, &c. makes what we call lamp-black.

Smoke, ariſing from the combuſtion of vegetables, is a mixture of water, oil, volatile ſalts, and all the gaſeous products which reſult from the combination of vital air with the ſeveral principles of the vegetable.

There are various inventions for preventing and curing ſmoky chimnies; as the æolipiles of Vitruvius, the ventiducts of Cardan, the windmills of Bernard, the capitals of Serlio, the little drums of Paduanus, and ſeveral artifices of De Lorme. See Chimney and Fire-*Places*.

In the Philoſophical Tranſactions we have the deſcription of an engine, invented by Monſieur Daleſme, which conſumes the ſmoke of all ſorts of wood, and that ſo totally, as the moſt curious eye cannot diſcover it in the room, nor the niceſt noſe to ſmell it, though the fire be made in the middle of the room. It conſiſts of ſeveral iron hoops, four or five inches in diameter, which ſhut into one another, and is placed on a trevet. A brand taken out of the fire ſmokes inſtantly, but ceaſes as ſoon as returned: the moſt fetid things, as a coal ſteeped in cat's piſs, which ſtinks abominably when taken out of the fire, yet in it makes not the leaſt ill ſcent; no more than red-herrings broiled, &c.

Smoke-*Jack*. See Jack.

Smoke-*Farthings* were the pentecoſtal or cuſtomary oblations offered by the inhabitants within any dioceſe, when they made their proceſſions to the cathedral church; which came, by degrees, into an annual ſtanding rent, called ſmoke-farthings. See Pentecostals.

Smoke-*Silver*, in our *Old Writers*. Lands were held in ſome places by the payment of the ſum of ſix-pence yearly to the ſheriff, called ſmoke-ſilver.

Smoke-ſilver and ſmoke-penny are to be paid to the miniſters of divers pariſhes as a modus, in lieu of tithe-wood; and in ſome manors, formerly belonging to religious houſes, there is ſtill paid, as appendant to the ſaid manors, the ancient Peter-pence, by the name of ſmoke-money.

SMOKEY Bay, in *Geography*, a large bay on the weſt coaſt of the entrance into Cook's river, between Cape Douglas and Point Banks.

SMOLEN, an iſland in the North ſea, on the coaſt of Norway, 25 miles in circumference. N. lat. 63° 24′. E. long. 8° 26′.

SMOLENSK, a town of Ruſſia, and capital of a government, ſituated on the Dnieper; the reſidence of a governor, and a biſhop's ſee, with very conſiderable commerce. The poſſeſſion of it has been often diſputed between the Poles and the Ruſſians. It is built on two hills, between which are a valley and river, and ſurrounded with walls, 30 feet high and 15 thick, the lower part being ſtone, and the upper brick, which trace the courſe of the hills, and encloſe a ſpace of about five miles. At every angle towers are erected. The houſes of the common people are moſtly conſtructed of wood: the number of inhabitants is ſaid to exceed 4000. The chief articles of trade are flax, hemp, timber, maſts, planks, honey, wax, hides, hogs' briſtles, and Siberian furs; 420 miles E.N.E. of Warſaw. N. lat. 54° 40′. E. long. 32° 18′.

Smolensk, a government of Ruſſia, bounded on the north by Pſovſkoe and Tverſkoe, on the eaſt by Moſcovſkaia and Kaluzſkoe, on the ſouth by Orlovſkoe and Novgorod Sieverſkoe, and on the weſt by Polotzſkoe and Mogilevſkoe; at its greateſt length 180 miles from N. to S., and 160 from E. to W. This government contains White Ruſſia, properly ſo called, and was ceded by Poland to Ruſſia, as a duchy, by a treaty, concluded in the year 1667, and confirmed in 1686. Its capital is Smolenſk. N. lat. 53° 20′ to 56° 15′. E. long. 31° to 36°.

SMOLIN, a town of Hungary; 22 miles N.N.E. of Preſburg.—Alſo, a mountain of Boſnia; 32 miles S.S.W. of Zwornick.

SMOLLET, Tobias, in *Biography*, a writer of conſiderable reputation, was born, in 1720, at Dalquhurn, in Dumbartonſhire. After a common education he was put apprentice to a ſurgeon in Glaſgow, and at the ſame time he availed himſelf of the opportunity of attending medical lectures at the univerſity. At this early period he compoſed a tragedy. In his nineteenth year he quitted Scotland for London, where he quickly obtained the ſituation of ſurgeon's mate in the navy. He ſailed in the expedition fitted out againſt Carthagena, under admiral Vernon and general Wentworth; and during the voyage he diſplayed his powers of obſervation, as well as his ſatirical turn, by the account he drew up of that ill-conducted and unſucceſsful enterprize. He was ſoon diſguſted with the ſervice in which he had engaged, and quitted it in the Weſt Indies. It had, however, been of great ſervice, by introducing him to that acquaintance with the manners and language of ſailors, of which he made the moſt amuſing exhibitions in his novels. The ſavage cruelties uſed by the king's troops after the battle of Culloden called forth Smollet's warmeſt feelings, and occaſioned his poem entitled "The Tears of Scotland," which by its ſpirit and elegance placed the author high in the rank of minor poets. It was followed by two ſatires, a ſpecies of compoſition to which the natural irritability of temper gave him a propenſity. He married, in 1747, a lady, with whom he expected a good fortune, of which, however, he received very little, and the expenſive ſtyle in which he ſet out in life brought him very ſoon into ſerious difficulties. In this emergency he had recourſe to his pen, and in 1748 he produced his firſt novel, entitled "Roderick Random," which had no doubt ſtrong alluſions to his own hiſtory, and became extremely popular. A trip to Paris, in 1750, enlarged his knowledge of the world, and gave riſe to his "Adventures of Peregrine Pickle," in which he exerted all the powers of humorous invention and delineation, though often at the expence of delicacy and morality. He now determined to purſue his profeſſion, and commenced phyſician at Bath, but he met with ſo little ſucceſs that he ſoon abandoned it, and reſumed writing as a profeſſion. His next publication was "Adventures of Ferdinand Count Fathom," which was followed by a new tranſlation of Don Quixote. In 1756 he undertook the management of a new Review, under the title of the "Critical," which, after undergoing a number of changes, ſtill exiſts. His ſatirical and acrimonious ſpirit ſoon broke out in this journal, and involved him in a quarrel with admiral Knowles, on whoſe conduct in the expedition to Rochefort he had ſpoken with great ſeverity. Smollet was proſecuted and convicted of a libel, and ſuffered the puniſhment of the law, *viz.* fine and impriſonment.

After this he wrote for the theatre an after-piece, entitled the "Repriſal, or the Tars of Old England;" this was acted at Drury-lane in 1757; and in the following year he publiſhed a haſtily written "Complete Hiſtory of England, from the Deſcent of Julius Cæſar to the Treaty of Aix-la-Chapelle," in two vols. 4to. About the ſame period he publiſhed a novel, entitled "The Adventures of Sir Launcelot Greaves," and he is ſuppoſed to have written the hiſtories of France, Italy, and Germany, in the modern part of the Univerſal Hiſtory. In 1761 he began to publiſh his

"Continuation of the Hiſtory of England," taken up at the Revolution, where Hume left it, and brought down to the year 1765.

At the beginning of the preſent reign, Dr. Smollet was an advocate in defence of the meaſures adopted by the adminiſtration, at the head of which was lord Bute, and in connection with others he publiſhed a weekly paper, called "The Briton," which was encountered by the more famous one entitled "The North Briton," ſet on foot by the well-known John Wilkes. The rancour diſplayed on both ſides diſſolved the friendſhip which had long ſubſiſted between theſe two political champions. Smollet, from ſome domeſtic afflictions, determined to viſit the continent, whither he went in 1763, and he ſpent two years in a tour through France and Italy. After his return he publiſhed, in 1766, his "Travels" in theſe countries, in a ſeries of letters, in two vols. 8vo. which contained many lively and ſenſible remarks, but which were deeply tinged with the gloomy temper of mind, which rendered him diſſatisfied and out of humour with almoſt every thing he ſaw. In 1769 he publiſhed a ſort of political romance, entitled "The Adventures of an Atom," intended to ridicule different adminiſtrations, but eſpecially that of the earl of Chatham.

Increaſing ill-health induced him, in the year 1770, to pay another viſit to Italy, accompanied by his wife, and during his laſt voyage he wrote his laſt novel, "The Expedition of Humphry Clinker," which ſome critics regard as the beſt of all his novels. He died in the neighbourhood of Leghorn, in October 1771, in the fifty-firſt year of his age. "Dr. Smollet," ſays the author of the article in the General Biography, "was undoubtedly a man of talents and great variety of powers, though he did not attain the higheſt rank in any thing. He is beſt known as a noveliſt, and they who read thoſe compoſitions for amuſement only, without much nicety of taſte, ſeldom fail of being entertained by him. Yet his portraits are often caricatures, his ſcenes of humour coarſe and extravagant, and his jeſts borrowed. As an hiſtorian, he has attained more credit for the elegance and animation of his ſtyle, than for the higher qualities of judgment, accuracy, and impartiality; and though his continuation is annexed to Hume's Hiſtory, the two writers will bear no compariſon." His poetic powers were conſiderable. His "Tears of Scotland," "Ode to Leven Water," and ſome other ſhort pieces, are poliſhed, tender, and pictureſque. His "Ode to Independence" is a loftier flight, and has perhaps few ſuperiors in the lyric ſtrain. His ſatires are vigorous, but violent and diſguſting.

SMOLNITZ, in *Geography*, a town of Bohemia, in the circle of Schlan; 12 miles W.N.W. of Schlan.

SMORGONIE, a town of Ruſſian Lithuania, in the palatinate of Wilna.

SMORZATO, in *Italian Muſic*, for the violin family, implies that the bow ſhould be drawn or preſſed to its full length, not with the ſame force throughout, but lighter by degrees, till ſcarcely any ſound is heard. This term ſeems now ſuperſeded by *diminuendo* and *perdendoſi*.

SMOSTRIE, in *Geography*, a town of Poland, in Podolia; 15 miles N. of Kaminiec.

SMOTHER-FLY, in *Agriculture*, a provincial term applied to the bean aphis.

SMOTRZICZ, in *Geography*, a river of Poland, which runs into the Dnieſter, 8 miles S. of Kaminiec.

SMRDOW, a town of Bohemia, in the circle of Czaſlau; 9 miles S. of Czaſlau.

SMUGGLING, a cant term for the running of goods, or the offence of importing them without paying the duties impoſed thereon by the laws of the *cuſtoms* and *exciſe*. See each of theſe articles.

This is reſtrained by a great variety of ſtatutes, which inflict pecuniary penalties, and ſeizure of the goods, for clandeſtine ſmuggling; and affix the guilt of felony, with tranſportation for ſeven years, upon more open, daring, and avowed practices: but the laſt of them (19 Geo. II. c. 34.) is for this purpoſe *inſtar omnium*; for it makes all forcible acts of ſmuggling, carried on in defiance of the laws, or even in diſguiſe to evade them, felony without benefit of clergy. For the chief proviſions of this act, which was at firſt temporary, but made perpetual by 43 Geo. III. c. 15, ſee Customs.

SMUSH-POT, amongſt *Painters*, is the veſſel into which they rub off the paint from the pencils, and put the ſcrapings of the pallet.

SMUT, or Ustilago, in *Agriculture*, a diſeaſe in corn, and which, according to M. Duhamel, exhibits the following marks or appearances. 1. This diſtemper deſtroys entirely the germ and ſubſtance of the grain. 2. It affects not only the ear, but alſo, in ſome degree, the whole plant, when it has made a great progreſs. 3. It very ſeldom happens, but that when one ſtalk is ſmutty, all the ears of the other ſtalks from the ſame root are ſo too. 4. So early as in March or April, upon opening carefully the hood or blades which cover the ear, and examining the young ear, then not above the ſixth part of an inch in length; and almoſt cloſe to the roots, he found this embryo already black, and attacked with this diſtemper. Perhaps it may not always ſeize the plant ſo early. 5. When the diſtempered ear comes out of its covering formed by the blades, it looks lank and meagre: the common, and immediate coverings of the grains, are in this caſe ſo very ſlight and thin, that the black powder is ſeen through them: and from this time nothing is found in lieu of grain, but a black powder, which has a fetid ſmell, and no conſiſtency. As this powder, of which the conſtituent particles have but very little cohesion, and of which the coverings are deſtroyed, is eaſily blown off by wind, or waſhed away by rain; the huſbandman, in houſing theſe plants, houſes only ſkeletons of the ears. If any impreſſion of this powder remains, it is eaſily taken off by ſifting; but he has not experienced it to be contagious, like that of burnt grain. And Mr. Tillet, it is remarked, has obſerved that theſe corrupted ears are often found to be vitiated even in the hood, though this laſt looks as green and perfect as if nothing ailed the corn within. The upper part of the ſtalk of a ſmutty plant is not commonly quite ſtraight, from within about half an inch below the ear. If ſuch a ſtalk is ſqueezed there, it ſcarcely yields at all to the preſſure. If it be cut aſunder at about a ſixth part, or a quarter of an inch below the ear, it will be found to be almoſt entirely filled with pith, in ſuch a manner that only a very ſmall opening can be perceived in the heart of the ſtalk, inſtead of the large pipe that is in healthy ſtems. He concludes from hence, that the circulation of the juices is obſtructed in the upper part of the ſtalks of ſmutty plants. Bearded wheat is apt to be ſmutty, as well as that which is not bearded; but neither Mr. Tillet nor he ever met with a ſmutty ear of rye.

And in reſpect to the cauſes of ſmut, it is obſerved, that the ſmuttineſs of corn cannot be owing to a want of fecundation, as many have hitherto miſtakenly imagined, ſince it affects and deſtroys the organs of both ſexes, long before the time of that fecundation:—that it cannot be imputed to the ſettling of wet upon the ears, or to fogs, or to a violent impreſſion of the ſun; ſince we have ſeen the ears ſmutty long before they ceaſed to be covered with the blades, which continue green till the diſtemper has made great progreſs:—that the ſame obſervations refute abſolutely the opinion of thoſe who ſuppoſe the cauſe of the ſmut to be in the grains after they are formed, and before they are paſt their milky ſtate:—that the ſmut of corn has been alſo aſcribed to the moiſture of the earth; but we do not ſee more ſmutty plants in the loweſt, and conſequently wetteſt parts of a field, than in the higheſt and moſt dry. Beſides, why ſhould there be a ſingle ſmutty plant in the midſt of numbers of ſound ones? However, as it appears that corn is more frequently attacked with this diſtemper in wet years than when the ſeaſons are dry, too much moiſture may perhaps, without being the immediate cauſe of the ſmut, favour its progreſs more than drought would do.

Some naturaliſts have aſcribed this diſtemper to inſects. Our author, if he is not authoriſed abſolutely to deny this, can at leaſt aſſert, that, after having been of this opinion for ſome time, all his endeavours to eſtabliſh it by facts have proved ineffectual. Some obſervers have indeed ſhewn him different inſects in ſmutty grains; but as he found the very ſame kinds likewiſe in ſound ears, he believes, with Mr. Tillet, that they are not in any manner the cauſe of this diſtemper. We know that the corn-caterpillar devours the mealy ſubſtance of the grain: but it does not occaſion ſmut. Numbers of flies lay their eggs upon theſe ſeeds, and the worms and maggots which proceed from them eat the ſeeds; but this does not occaſion any thing like ſmut. The Rev. Dr. Hales, to ſatisfy himſelf whether the ſmut of corn might not proceed from the ſeeds being bruiſed by the flail, took a number of grains, of different ſizes, and bruiſed them with a hammer. Thus his own experience convinced him that he had conceived a wrong idea of the cauſe of this diſtemper.

Several cultivators have thought that pigeons' dung and that of ſheep render corn ſmutty: but this is a groundleſs notion. We have large pigeon-houſes, the dung of which is ſtrewed upon our wheat-lands; yet we do not find that theſe fields are more affected with ſmut than others. This allegation is, therefore, abſolutely deſtitute of proof. It is added, that Wolfius was of opinion that the ſmut of corn proceeded from a monſtroſity of the embryo; but M. Almen has refuted that ſuppoſition, by ſhewing, that the male flowers of certain kinds of plants are attacked with this diſtemper: now the flowers have not any embryo.

And this laſt philoſopher has judiciouſly obſerved, that the ſmut of corn cannot derive its origin from a defect in the ſap; as all the parts of the plant, except the ear, look healthy, and there are plants whoſe roots are perennial, which appear vigorous, though their ſeeds are ſmutty every year. He is of opinion, that whatever weakens the plant is apt to bring on the ſmut, and inſtances as a proof of this, that it is a frequent cuſtom in his country, to cut rye as ſoon as it ſpindles, for food for their cattle; and that this rye generally produces other ears, which ſeldom contain any but diſtempered grain: to which he adds, that ſeed-corn which had been pricked or run through with a needle, or which is not thoroughly ripe, and that which produces lateral or ſecond ears, is ſubject to the ſmut. And he afterwards, from other trials, ſeems diſpoſed to aſcribe this diſeaſe to mouldineſs.

But in the "Memoirs of the Bath Agricultural Society," it is ſaid to be a diſeaſe that only occurs when the weather is wet, during the period of the flowering of the plants, in which the anthers may burſt and the farina be waſhed way. It is ſuppoſed not to be produced by any infectious material, or the *ova* of inſects that may adhere to the grain, as ſmutty ears and ſound ones are found proceeding from the ſame root; and, in ſome inſtances, both ſmutty and ſound grains to be contained in the ſame ear; ſome of the corns having even one end ſmutty and the other ſound, conſequently to ariſe from the want of due impregnation, from the farina fecundans being faulty or imperfect, and that putrefaction takes place on the death of the corn. And this ſuppoſition is ſupported by the experiments of the Italian philoſopher Spallanzani, who found that the ſeed is produced in the plants long anterior to impregnation, which cannot be performed until the flower is open, and the duſt of the anther fully in a ſtate of maturity. And Dr. Darwin, on theſe principles, conceives, that for want of impregnation, or the vivifying principle, the wheat-corn may putrefy, as is the caſe with addle eggs of oviparous animals. However, the inquiries of other writers ſeem to lead to the opinion that the affection is produced by the attacks of an inſect, and that, though certainly infectious, it may be prevented or cured by the uſe of different kinds of pickles.

Further, a variety of facts and reflections have been offered on this ſubject by Mr. R. Somerville, in the ſecond volume of "Communications to the Board of Agriculture;" who begins by remarking, that ſome years ago, he collected a quantity of ſmutted ears from one field of wheat, in which they were very numerous, and a number of healthy well-filled ears from another field, in which there was no ſmut. The grains were rubbed out of both, intimately mixed, and kept in a box for two months, at the end of which time they were rubbed between the hands in ſuch a manner as to break the whole of the ſmut-ball. The parcel was then divided into two equal parts, one of which was three or four times waſhed with pure water, and well rubbed between the hands at each waſhing, and afterwards ſown in a drill in his garden; the other half was ſown in another drill without any waſhing or preparation whatever, the ſoil and every other circumſtance being equal. Both parcels vegetated at the ſame time, and for about two months thereafter there was no viſible difference in their appearance; about that period, he however obſerved, that many of the plants in the drill that had been ſown without being waſhed, were of a darker colour than the others; theſe, when narrowly examined, were of a dirty-green. The plants in the drill that had been waſhed were all of one colour, and ſeemingly healthy; as the ſeaſon advanced, the difference in colour became more ſtriking, and continued to increaſe till the grain was fairly out of the blade: about this time many of the dirty-green ears began to exhibit ſymptoms of decay. As ſoon as the ear was fairly ſhot out, the whole of thoſe in the unwaſhed drill, that had the dirty-green appearance above deſcribed, were found to contain nothing but ſmut; and theſe ſmutted ears were in the proportion of more than ſix to one of the healthy ones; while, on the contrary, the drill in which the waſhed grains had been ſown, and which conſiſted of ſeveral hundred grains, had hardly a ſmutted or unhealthy ear in it. The ſame experiment was repeated the following ſeaſon, and with nearly the ſame reſult. Satisfied with knowing that complete waſhing would be found a remedy for the diſeaſe, he made no farther inquiry upon the ſubject till laſt autumn, when he was employed in making obſervations upon the blight, in the courſe of which he met with a good deal of ſmut in many fields; and being at the time poſſeſſed of ſome excellent glaſſes, he carefully examined ſome of the ſmutted plants. This at firſt was done more as a matter of amuſement, than from any expectation of diſcovering any thing that might contribute to throw light upon the ſubject. Upon a near inſpection with the glaſs, he found that the dirty-green colour of the blades of the ſmutted ears was owing to a number of ſpots infinitely ſmall, and bearing a near reſemblance to thoſe upon blighted ears: his obſervations were continued throughout the whole period of the ripening, in the courſe of which he made no additional diſcovery, except obſerving, that the leaves and ſtalks of the ſmutted ears decayed ſooner than ſuch as were healthy. About the end of autumn, however, having one day brought home ſome ſmutted ears of rather an unuſual appearance, he examined them very narrowly, and obſerved that the balls were perforated in many places with ſmall round holes, a thing he had not before obſerved in any that he had met with: this he aſcribed to vermin; and upon ſticking one of the grains upon a pin, and placing it under the glaſs in a very bright ſun, he could diſtinctly obſerve ſeveral ſmall tranſparent ſpecks upon the beard, or downy part of it. He examined ſeveral more, and met with exactly the ſame appearance; but upon being called haſtily away upon buſineſs, he was under the neceſſity of leaving them upon the table, without being able to aſcertain whether the objects he had ſeen were eggs or inſects. In the evening, when he came home, he reſumed the inveſtigation by *candle-light;* in the courſe of which, as he was under the neceſſity of holding them very near the candle, the heat ſoon relieved him from his embarraſſment, by putting them in motion, and he then diſcovered that the ſpecks above-mentioned were real inſects, reſembling wood-lice in ſhape. Next day he repeated the ſame trials by ſun-light with new ſmut-balls, and diſcovered the ſame appearances, but without being able to make any of the inſects ſtir. Diſappointed and vexed at not being able to ſee them in motion with the ſun-light, and recollecting the heat of the candle, he threw the concentrated rays of the ſun upon them with a burning-glaſs, which completely anſwered his purpoſe of putting them in motion, and ſhewing them in every different point of view. To deſcribe minutely an inſect ſo ſmall as not to be diſtinguiſhable by the naked eye, would, he thinks, be no eaſy matter; it is ſufficient to ſay, that its general appearance is very ſimilar to the wood-louſe, though infinitely ſmaller. As ſoon as he had clearly aſcertained the exiſtence of this inſect, his mind was perfectly at eaſe with regard to the cauſe of the diſtemper; but though he could very readily conceive that vermin, in the early ſtages of the growth of a plant, might ſo injure the ſtamina as to render it unfit to produce any thing but ſmut, he could not ſo well underſtand how it was poſſible for the mere touch of the black earth contained in the ſmut-balls to produce the ſame effect. It is well known, that in the animal body, certain infections are communicated merely by the contact of the ſound and unſound parts; but that in every inſtance where this happens, the injury can be diſtinctly traced to an abſorption of the virulent matter, by the veſſels of the healthy ſubject.

And we are now, he thinks, ſo well acquainted with vegetation, as to know that plants have a circulating ſyſtem as well as animals; and that while they are in a growing ſtate, poiſon as well as nouriſhment may enter their veſſels, and do infinite miſchief. If this reaſoning is ſanctioned by experience, and there can be no doubt of it, and if there is the ſlighteſt analogy between animal and vegetable life, it will at once appear, that no bad effect could poſſibly ariſe from ſmutted and healthy ears coming in contact, either in the ſtack or the barn, as at that time they are in a ſtate of reſt, and no circulation going on. It may be argued in anſwer to this, that while the plants are green, the ſhaking of the wind may bring the ſmutted and the healthy ears into contact, and that the acrimony of the ſmut may corrode and deſtroy the healthy wheat, ſo as to produce the diſeaſe. This idea he knows is entertained by many very good farmers: it is, however, clearly diſproved by the experiment above recited, by which it appears that a ſimple waſhing in water, provided it is properly performed, is a very effectual cure for the diſtemper: common ſenſe will inform us, that had the ſtamina, or germ of the grains ſo waſhed, been injured by any thing of a corroſive nature, even in the ſlighteſt degree, no ablution whatever could poſſibly have repaired the miſchief. And the ſame reaſoning, he ſuppoſes, applies with equal juſtice to the other cauſes aſſigned, with the ſingle exception of inſects; for if either the grain was naturally weak, or had been ſprung in harveſt, or was deficient in its male organs, as is ridiculouſly ſuppoſed, nothing but the higheſt degree of weakneſs and credulity could make any perſon believe, that either the waſhing with water, or indeed any other preparation, could cure ſuch defects.

It is, therefore, his opinion, that the ſmut is occaſioned by the ſmall inſect above deſcribed, as ſeen by the glaſs in the downy part of the grain; and that when the balls are either broken in the operation of thraſhing, or come in contact with clean healthy grains, the inſects leave the ſmutted grains, and, adhering to ſuch as are healthy, are ſown with them, and wound the tender ſtem in ſuch a manner as to render the plant incapable of producing any thing but ſmut. It is not an eaſy matter to account for the manner in which this takes place; but a little attention to the circumſtances he is now to mention will perhaps throw ſome light upon it. It is known that plants of very oppoſite natures and qualities will grow and produce abundantly upon the ſame ſoil, where the nouriſhment is ſeemingly the ſame. This effect is alſo known to be owing to the ſtructure of their veſſels, by the action of which the juices that circulate through them are differently prepared in every different plant. From this ſtriking difference, owing confeſſedly to organization, is it not, he aſks, preſumable that the ſmut in wheat is produced by the inſects wounding the veſſels of the plant in ſuch a manner as to render them incapable of taking up any other principle from the ſoil, but the ſmut contained in the balls, which, upon examination, ſeems to have no quality different from the fineſt vegetable earth? This opinion, he thinks, is ſtrongly ſupported from the circumſtance of certain pickles being found a cure for the malady. The effect of theſe pickles is, however, completely miſunderſtood; for, in place of ſuppoſing, as is erroneouſly done, that they operate by ſtrengthening the grain, and thereby removing that debility which has been long conſidered the cauſe of ſmut, their benefit depends upon the powers they poſſeſs of deſtroying the inſects above deſcribed: but to ſhew the abſurdity of the commonly received opinion in a more ſtriking point of view, it is only neceſſary, he adds, to ſtate, that many of theſe preparations, which are ſuppoſed to be ſo friendly to vegetation, are in fact inimical to it, unleſs they are uſed with the utmoſt caution; even ſtale urine, which has long been conſidered as a ſafe and innocent remedy, is, under certain circumſtances, highly pernicious. After he had diſcovered the inſect, he made trial of all the ſubſtances commonly uſed, and found all of them, when properly applied, deſtructive to it. Is it not, therefore, he contends, more agreeable to plain common ſenſe to ſuppoſe, that the virtue of theſe preparations conſiſts more in the power they have of deſtroying vermin, than in any ſtrengthening quality they poſſeſs?

The following opinion has been offered on this vegetable

table affection by ſir John Call, who ſuppoſes, that the ſmut is occaſioned by certain animalcula depoſited in the huſks of the ear, when the wheat is in bloſſom, which are fed and brought to perfection by devouring the milky juice, and obſerves, that were the diſeaſe radical in the original grain of the ſeed-wheat, or infectious from the juice ariſing through the pores and tubes of the ſtalk, there could not be in the ſame ear, grains, ſome decayed and others quite perfect. But to bring the matter to the teſt of experiment, he collected a quantity of ſmutted ears of wheat, in ſome of which were two or more grains apparently perfect, all which he cauſed to be rubbed out with the hand in a bag, ſmut and altogether; the freſh grains found in the bag were then ſown in a particular ridge amongſt other wheat, in a field under tillage. Their growth from the firſt was ſimilar to the reſt of the wheat; and from a certificate of reſpectable farmers, it appears their produce was as free from ſmut, as that of the field in general. And hence the concluſion is drawn, that waſhing or pickling wheat, as a remedy againſt the ſmut, is unneceſſary and uſeleſs; and that as blights and other diſeaſes of plants are more prevalent from circumſtances in ſome ſeaſons than in others, ſo the ſmut is an accident of a like nature, which mankind can neither foreſee nor prevent. The general experience of farmers is, however, in oppoſition to this ſuppoſition. And whether this vegetable diſeaſe may be produced by inſects, or be the effect of ſome other cauſe, to many of which it has been aſcribed by different philoſophical inquirers; the moſt general practice of farmers has been that of preparing their ſeed by the means of ſome ſort of waſhing or brining. The following is a tabular view of the reſults of trials made with different ſteeps, in order to aſcertain their utility in this intention, as well as in promoting the growth of the grain, as given by Mr. Bevan, in the 9th volume of the "Agricultural Magazine." It contains twelve ſamples of ſmutty wheat, and the ſame number of ſound good wheat, ſteeped in twelve different ſolutions of the moſt common acids and alkalies, and ſalts, moſt readily procured. The wheat was ſown at Leighton, Bedfordſhire, on a ſandy ſoil. The ſolutions were all made cold, and the ſamples continued about twenty-four hours in ſteep. The columns marked A are the reſults from the good wheat, and thoſe marked B are from the ſmutty ſamples. It may be obſerved, that neither of the ſamples ſteeped in the ſolutions of nitric acid came up, excepting a ſingle corn in the good ſample, and which produced above 1200 corns from it.

Kinds of Subſtances uſed.	* Specific Gravity of the Solution.	Number of ſmutty Ears in Three Sheaves.		Buſhels of good Wheat, *per* Acre.		Cwts. of Straw, *per* Acre.	
		A.	B.	A.	B.	A.	B.
1. Solution of potaſh - - - - -	1.357	1	81	21.6	13.6	36.6	29.1
2. ——— of muriate of potaſh - -	1.097	3	218	20.2	10.1	36.0	21.1
3. ——— of nitrate of potaſh - -	1.080	7	115	23.8	14.3	36.9	31.9
4. ——— of ſoda - - -	1.056	9	159	20.2	11.7	35.6	26.7
5. ——— of murate of ſoda - -	1.089	—	290	24.0	14.5	41.5	33.3
6. ——— of ſulphate of ſoda - -	1.047	12	241	21.6	12.3	38.5	27.8
7. ——— of muriate of ammonia -	1.026	1	150	19.8	17.6	35.4	30.2
8. ——— of common ſoot - -	1.025	—	123	20.8	11.4	34.8	25.3
9. ——— of lime ſaturated - -	1.003	—	2	21.9	12.4	38.7	25.9
10. ——— of nitric acid - - - -	1.016	—	—				
11. ——— of muriatic acid - -	1.011	—	136	2.07	16.1	35.7	34.1
12. ——— of ſulphuric acid - -	1.050	—	—	2.04	17.8	35.4	37.1
13. Dry in its natural ſtate - - - -	—	6	323	20.3	14.7	35.7	31.1
14. Waſhed in common water - -	—	None ſown.	107		18.3		35.8

But M. de Lignerolle contends, that the ſureſt means of avoiding ſmut, and that which he has long practiſed with ſucceſs on upwards of three hundred acres of land, is to change the ſeed every year, to be very careful that the ſeed-corn be well dried and thoroughly ripe, and that it be not ſmutty, nor have any ſmutty powder ſticking to it. He then pours boiling-water on quick-lime, in a large tub; and after the ebullition is over, as much cold water as there was hot, and ſtirs it all ſtrongly together, in order to diſſolve and thoroughly mix the lime. The quantity of wheat intended to be ſowed is ſprinkled with this ley, and then well ſtirred with a ſhovel, and laid in as high a heap as poſſible. It is beſt, he ſuppoſes, to keep the grain for a week after this preparation, turning it every day; for otherwiſe it would heat ſo as to deſtroy the germ. By theſe means he has not had any ſmut, when the fields around him have been infected with that diſtemper. And Mr. Donat, near Rochelle, has uſed the following with ſucceſs: take quick-lime and pigeons'-dung, of each twenty-five pounds, forty pounds of wood-aſhes, and twenty-five pounds of ſea-ſalt, or ſaltpetre. Put all theſe into a tub large enough to hold half a hogſhead of common water, which ſhould be added to them. Stir them all well with a ſtick, till the lime is quite diſſolved. This ley will keep ſome time without ſpoiling. It muſt be ſtirred juſt before the corn is ſteeped in it. The grain is then put into a baſket, and plunged into the ley, where it remains till it has thoroughly imbibed it; after which it is taken out, and laid in a heap till it is quite drained of all its moiſture: or, which is a ſtill better way, take a maſhing-tub, fill it with grain to within four inches of the brim, and then pour in the ley well ſtirred before-hand. When the tub is full, let the ley run out at the bottom into ſome other veſſel, in order to uſe it again for more corn. Let the grain be then taken out and laid in a heap to drain; and continue in this manner to ſteep all the ſeed-corn. The wheat, thus prepared, may be ſowed the next day, and muſt not be kept above five or ſix days, for fear of its heating. This quantity of ley will ſerve to prepare more than twenty buſhels of wheat. Mr. Tull has alſo long ſince obſerved, that brining and changing the ſeed are the general remedies for ſmut. Likewiſe a very intelligent writer in the eleventh volume of the Agricultural Magazine ſays, that he can truly ſtate, that in the courſe of long and extenſive practice, he has never diſcovered the produce of any good and properly prepared ſeed-wheat ſmutted, while that of his unprepared eſcaped. On the contrary, whenever he has ſown any in the latter ſtate, he has always obſerved much ſmut in the crops raiſed from it; and refers his readers to the following account of an accurate comparative ſtatement. On the 15th of March laſt he ſowed two contiguous ridges (in the middle of a very large field,) equal in ſoil, condition, and expoſure, with wheat of the ſame variety, raiſed on the ſame kind of ſoil, in preciſely the ſame mode of management, and thoroughly *mixed*. The ſeed contained a very ſmall quantity of ſmut, perhaps one black ball to a quart; but the other grains were not at all diſcoloured. The ridges were ſet out in an eaſt and weſt direction, each eighty yards long and nine broad. On the weſt half of the northern ridge he ſowed the ſeed without any preparation whatever; and on the eaſt, after being well waſhed in clean river-water. On the weſt half of the other ridge the wheat was ſown after having been wet with old chamber-ley; and on the eaſt half, after being prepared (provincially pickled) in the uſual manner, with old chamber-ley and lime in fine powder. All the land was ploughed and ſown broad-caſt on the ſame day, without any variation of weather, and equally well harrowed. We had a calm, dry, and tolerably warm blooming ſeaſon. Some time after the ears were out he examined the crop very minutely. That after the unprepared ſeed, the waſhed ſeed, and the wheat wet with chamber-ley, contained a great, and that from the ſeed which received the chamber-ley and lime, a very ſmall, quantity of ſmut. The ſtraw of this appeared as good as that of the ſound wheat. Upon every piece of ground he found ears partly ſmutted and partly ſound. In part of theſe ears he found ſome rows of grain containing ſound wheat near the middle of the row, and ſmut both above and below it. With a view of finding the proportion (at harveſt) with ſome degree of preciſion, he took four ſheaves from the middle of the crop raiſed from the pickled ſeed, mixed them thoroughly, reduced them to an equal ſize, *viz.* to the circumference of twenty-four inches, and then carefully picked out and counted the number of ſmutted ears they contained. He purſued preciſely the ſame mode with the crops upon the other pieces of ground, and the reſults were as under:

	Smutted Ears.
The four ſheaves after the pickled ſeed contained -	165
The four do. from the ſeed which was waſhed in clean water - - - - - -	1212
The four do. from the ſeed wet with chamber-ley	723
The four do. from the ſeed which received no waſhing or preparation - - - - -	1270

It is ſuppoſed that it is ſtated in ſome of our agricultural publications, that one of the ſtrong acids, much diluted with water, has been ſucceſsfully uſed in preparing ſeed-wheat, with a view of preventing ſmut; a diſeaſe which has been improperly confounded with blight or mildew. The latter remedy he never tried; he has, however, on ſeveral occaſions, uſed ſea-water (ſo ſtrongly impregnated with ſalt, that an egg would ſwim on it) and lime, and alſo the drainings of fold-yards and lime, and is of opinion that theſe mixtures are not nearly ſo efficacious as the latter article and ſtrong chamber-ley. The beſt mode of preparation is, he thinks, to immerſe the wheat in the chamber-ley, ſtirring it well (about five or ten minutes), and ſkimming off the light grains, &c. The chamber-ley ſhould be let out by a tap, and the wheat ſpread on a floor, and ſo well mixed with the lime that every grain may receive a part of it. If this mode be carefully practiſed with ſeed free from ſmut, he can, from experience, aſſure the huſbandman that he will never ſuffer, in any conſiderable degree, from that diſeaſe. As the lime and chamber-ley will ſoon deſtroy the vegetative principle of the grain, if it be ſuffered to remain in a heap, or in bags, it ſhould be committed to the ground within ſix or eight hours after it has been thus prepared. He has ſometimes known it conſiderably injured after being kept twenty-four hours thinly ſpread out upon a well aired floor. And as, when the ſeed is in a very moiſt ſtate, it will not paſs regularly through the drill-machine, it is neceſſary on that account to have it drier in the drill than the broad-caſt huſbandry.

When the wheat uſed in the above experiment was prepared, a proper veſſel was not at hand, and therefore the chamber-ley was ſprinkled upon it. This, however, is not a good method, for we loſe the chamber-ley, and the advantage of ſkimming off the light grains, black balls, &c.; and notwithſtanding frequent turnings, it ſometimes happens that *all* the grains do not receive a ſufficient quantity of the liquid. A proper veſſel ſhould therefore be conſtantly had recourſe to for this purpoſe.

But on the ſuppoſition of this diſeaſed ſtate of grain being produced by an inſect, the following method of kiln-drying has been propoſed in the third volume of the Farmer's Magazine. Let the wheat be laid upon the kiln about three or four inches thick, the kiln being heated middlingly ſtrong with blind coal; the wheat to continue on the kiln for twenty-four hours, but turned frequently. After taking it off the kiln, it muſt be allowed twenty-four hours to cool, during which time it muſt be frequently turned, and then put through the fanners once or twice. After the wheat has lain a few hours on the kiln, and the fire begins to have effect, a great number of very ſmall worms, formerly undiſcovered by the eye, appear on the top of the grain, and are ſoon deſtroyed by the heat. Theſe come from blacked wheat or other corns that could not be ſuſpected to be indifferent; or may lie in, or on good wheat, which worms continuing, (when not thus killed,) might conſume the corn after it is thrown into the earth, thereby checking the growth entirely, or preventing it from having the ſtrength it otherwiſe would have, to bring forth a ſtrong productive ſtalk. It is added, that the firſt farmer in Clackmannanſhire who tried the kiln-drying of wheat, inſtead of pickling it, learnt it about twenty-five years ago (and he has continued the practice ever ſince) from an Iriſhman, who had been appointed by the Board of Truſtees to ſtamp the linens, &c. manufactured in the village of Alva, who aſſerted that it was practiſed in his part of Ireland; but at this diſtance of time, the farmer has forgot what part of Ireland the man ſaid he came from. See Pickle and Steeping.

Further, with the view of cleaning ſmutty grain, various methods have been propoſed; as by agitating it with different ſubſtances, as ſand, and lime made from ſtone, or white or grey chalk, which, when uſed, ſhould be finely ſifted, and then well blended with the wheat in proportion to the ſtate of the ſmut, as from one to two buſhels for a load of five quarters, which ſhould then be paſſed through a machine one or more times, according to the purpoſe for which the wheat is intended. And for common purpoſes, it is ſuppoſed that the ſmut in wheat may be removed by a machine with bruſhes, invented for the purpoſe; but that if it be for ſeed, it ſhould be put in a trough, or wicker receiver, under the ſpout of a pump, or the fall of a ſtream, and be briſkly ſtirred about, until the injurious ſubſtance floats away, or can be ſkimmed off from the ſurface. When intended for flour, after this waſhing, it muſt be dried on a malt-kiln for the ſpace of eighteen hours, but heated ſo as not to exceed 85° of Fahrenheit's thermometer. The repreſentation of a machine contrived for this uſe, may be ſeen in the Corrected Agricultural Report of Berkſhire.

M. Chantran preſented a memoir to the French National Inſtitute in 1799, on the ſmut in wheat, and its acid. After remarking, that ſtalks which bear charred ears do not differ from others, and that theſe ears often contain good and bad grains, he thought himſelf authoriſed to advance, that this diſeaſe does not exiſt, as generally believed, in the germ of the ſeed from which they ſprung. However, he does not conſider liming the ſeed as uſeleſs; he thinks that it deſtroys the animalculæ attached to the ſeeds, and that the reaſon of its not entirely extirpating the ſmut, is becauſe it cannot act on thoſe ſmall inſects which occaſion it, and which happen to be ſcattered in the ground.

Having analyſed forty-ſix grains of ſmut, he found in this ſubſtance an acid eaſy to be demonſtrated. For this purpoſe, boiling water being infuſed over it, gave a ſtrong tinge of red to tincture of turnſole, while the remainder of this tincture retained its former character. Smut, deprived of the acid, and calcined in the open air, emitted the odour of burnt corn, and gave a reſiduum ſix times as large as the ſame quantity of the farina of wheat treated in the ſame manner. This, joined to microſcopic obſervations, ſays Chantran, proves the animal nature of this ſubſtance, and a difference between it and the farina of wheat greater than could ariſe merely from diſeaſe. The acid of ſmut is not volatile, and may be concentrated by diſtillation. With lime and with ammonia it proves an inſoluble ſalt; and this diſtinguiſhes it from the phoſphoric acid. Combined with potaſh it gave a ſalt cryſtallized in ſmall deliqueſcent needles of a bitter taſte. It decompoſes carbonate of lime.

SMUT, or *Blacks*, in oats, a ſort of vegetable diſeaſe that often occurs or takes place in crops of this kind, in much the ſame manner as that of ſmut in wheat, in many of the country diſtricts. It is ſaid by ſome to affect the whole of the ear of the grain, being occaſionally met with in different ſtages of its progreſs in the ſtanding crops, as well as at the time of threſhing out the corn, as in thoſe of a ſoft unctuous ſtate, in the ſtate of a ball, and in a powdery ſtate, or that of a fine duſt, which diſperſes itſelf in threſhing, and fixes upon different parts of the faces of the men who threſh, rendering them quite black. But others, probably without ſufficient obſervation or knowledge of the fact, ſuppoſe it to be a plant growing ſeparately among the oats.

It is an affection of this ſort of grain which happens frequently on the eaſtern ſide of the county of Lancaſter, in the Iſle of Man, and in ſeveral other ſituations. It is found to prevail leſs among the potatoe oat crops than thoſe of any other ſorts of that grain, and to be much more prevalent in ſome years than in others.

No effectual method of preventing it has yet been diſcovered, but it is found to be much leſſened by the good cultivation and management of the land on which this ſort of crop is grown. The oat crops, where it exiſts to any conſiderable extent, are much leſs productive than in other circumſtances, and the quality of the produce is probably not ſo good. But the diſeaſed ſubſtance is ſo light in its nature, that it is readily blown away in dreſſing or cleaning the grain without its doing much miſchief to it.

SMUT-*Balls*, the ſmall balls of ſmutty matter which are found among diſeaſed wheat and other crops. Theſe balls, as well as the diſeaſed parts of the crops, appear now, from actual experience, to be conſtantly of a very infectious nature, and ſhould, of courſe, be as much guarded againſt, and cautiouſly avoided, in preparing the ſeed of the crops for ſowing, as poſſible; as it is not improbable, but that the diſeaſe may ſometimes be communicated and propagated in this way, without the farmer being in the leaſt aware of it. See STEEPING *Seed-Grains and Seeds*.

SMYNHUSEN, in *Geography*, a town of the duchy of Holſtein; 6 miles E. of Lunden.

SMYRHIZA, in *Botany*, a name uſed by Pliny, and ſome other old authors, for the common myrrhis, or chervil.

SMYRNA, in *Ancient Geography*, one of the Ionian towns of Aſia Minor, ſituated towards the northern part of the iſthmus of the peninſula of Colophon, upon a gulf bearing the name of the town. This town is very ancient, and is ſaid to have been founded by the Smyrnæans, who inhabited a quarter of Epheſus called "Smyrna," from whom it derived this name. Being expelled by the Æolians, they retired to Colophon; but the Colophonians having been obliged to expatriate themſelves on account of ſedition, found an aſylum among the inhabitants of Smyrna. Some time afterwards, finding that the Smyrnæans celebrated without their city a feaſt in honour of Bacchus, they ſhut the gates and took poſſeſſion of the town. The Æolians came to their ſuccour; but it was at length determined, by common conſent, that they ſhould leave the Ionians in poſſeſſion of the town, and withdraw themſelves with all their moveable effects. The Smyrnæans having accepted this condition, they diſtributed themſelves into eleven other Æolian cities, where they obtained the right of citizenſhip. At a ſubſequent period the Lydians took poſſeſſion of Smyrna under Ardys; and having deſtroyed it, the inhabitants diſperſed themſelves into different diſtricts. Four hundred years afterwards, Alexander rebuilt it about twenty ſtadia from its ancient ſcite. Strabo, however, attributes its re-eſtabliſhment to Antigonus and Lyſimachus, without mentioning Alexander. Nor does Arrian, in his hiſtory of this province, take notice of this circumſtance. Hence it is natural to conclude, that Alexander only formed a deſign of rebuilding it, or that he partially executed his project; that it was continued by Antigonus, and completed by Lyſimachus. This town was deſtroyed by an earthquake A.D. 180, according to Euſebius, but according to Dion Caſſius, two or three years ſooner. The Chronicon Paſcale dates it A.D. 178. Marcus Aurelius re-eſtabliſhed it. The river Meles ran by its walls, and near its ſource was another, where it has been ſaid that Homer wrote his poems. Hence it was that Tibullus (l. iv. c. 1.) called theſe poems "Meletere Carmen," but Smyrna arrogates to itſelf the honour of having given birth to Homer. At Smyrna there was a quadrangular portico, with a temple of Homer and his ſtatue. The Smyrnæans had alſo a bronze coin, which they called "Homerium." This town was built partly on the brow of a hill and partly on a plain; and towards its front and the gymnaſium was the temple of the Mother of the Gods. The ſtreets were paved, and interſected one another at right angles. It had ſeveral grand porticoes of a ſquare form, ranges of buildings, and a fine library. In proceſs of time Smyrna became the centre of the commerce of Aſia. Luxury drew hither the arts; and it was decorated by ſuperb edifices, and crowded by a multitude of ſtrangers. At Smyrna there were none of thoſe tyrants who oppreſſed many other cities of Aſia, and even the Romans reſpected the happy ſtate of this town, and left it the ſhadow of liberty. This city has retained a very conſiderable degree of its ancient celebrity. See the next article.

SMYRNA, or *Iſmir*, in *Geography*, a city and ſea-port of

Aſiatic Turkey, in the province of Natolia, ſituated on a gulf of the Mediterranean, which is capable of containing the largeſt navy in the world. On account of the extent and convenience of its harbour, it is become the common rendezvous of merchants from the four parts of the world, and the ſtaple of their commerce ; ſo that it is the firſt port for trade in the Turkiſh dominions. Its ſituation is delightful ; and approaching it by ſea, it has the appearance of a capacious amphitheatre, crowned at the ſummits with the ruins of an ancient caſtle. The bay is extenſive, the anchorage excellent, and the water ſo deep, that ſhips of conſiderable burden may anchor cloſe by the wharf. Many Engliſh merchants reſide here, and they have a conſul to protect them. The trade is conducted by Jew brokers, who are wealthy, and live handſomely and even ſplendidly. The whole town is a continual bazar, or fair, abounding with every thing that ſerves for clothing, ſuſtenance, and pleaſure ; all the beſt commodities of Europe and Aſia being brought hither for ſale.

The adjacent territory is very fertile, abounding with fine olive-trees and vines ; and it affords excellent wine. The European conſul lives here in great ſtate and magnificence. The population of Smyrna conſiſts of about 130,000 perſons : of theſe, about 70,000 are Turks, 30,000 Greeks, 15,000 Armenians, 10,000 Jews, and 5000 ſtrangers and Franks. The governor is appointed by the Porte, who manages the civil concerns in the city ; but in all criminal caſes is ſubject to the mollah or cadi, who is judge of his diſtrict. The ſalary of the governor, or muſelim, is eſtimated at nearly 300,000 piaſtres, or about 17,000*l.* ſterling.

In the environs are ſeveral fine villages, to which the Franks and wealthy inhabitants reſort in ſummer, particularly Bournabat, at the diſtance of about half an hour's ride, ſtanding on the banks of the Melica, and at the foot of ſeveral mountains. Other villages are Cucklueiah, where the imperial conſul has a palace ; Bugiah, where the Britiſh conſul has a good houſe ; and Sadig, where the Dutch conſul reſides.

The total value of goods from Smyrna to London amounted, on an average of the years 1785, 1786, and 1787, to 463,349*l.* ſterling, and from London to Smyrna to 423,548*l.* In 1790, 1791, and 1792, the exports to London amounted to 779,610*l.*, and the imports from thence to 848,240*l.* This city ſuffered very much by a fire on the 6th of Auguſt, 1763, which deſtroyed many of the beſt houſes, factories, and magazines, and occaſioned very extenſive deſolation. The loſs ſuſtained was reckoned at 200,000*l.* ſterling ; 176 miles S.S.W. of Conſtantinople. N. lat. 38° 28′. E. long. 27° 8′.

SMYRNA, a poſt-townſhip of America, in the ſtate of New York, and county of Chenango ; 105 miles W. of Albany, bounded N. by Lebanon in Madiſon county, E. by Sherburne, S. by Plymouth, and W. by German. It is ſix miles ſquare, and its ſtreams ſupply grain-mills, ſaw-mills, and a fulling-mill. It has alſo a ſmall furnace for caſting of iron. Its vallies are rich and productive, and a great part of the hilly land is either arable, fit for meadow, or good for grazing. Hemp is cultivated on the rich mould of the vallies, and the timber is principally maple, beech, elm, baſs-wood, and hemlock. The firſt ſettler here was Porter, in 1792, and a poſt-office was eſtabliſhed in 1808. The whole population, in 1810, conſiſted of 1344 perſons.

SMYRNA, *New*, a town of Eaſt Florida, inhabited by a colony of Greeks and Minorquins, eſtabliſhed by Dr. Turnbull, on a branch of the Moſquito river. N. lat. 28°.

SMYRNIUM, in *Botany*, indubitably the σμυρνιον of Dioſcorides, whoſe ample deſcription is peculiarly applicable to one of the ſpecies, *S. perfoliatum.* By his account of the ſenſible qualities of the ſeed, being ſo like Myrrh, the origin of the name from σμυρνα, *myrrh*, is ſufficiently apparent.—Linn. Gen. 144. Schreb. 194. Willd. Sp. Pl. v. 1. 1467. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 328. Prodr. Fl. Græc. Sibth. v. 1. 202. Ait. Hort. Kew. v. 2. 157. Purſh v. 1. 196. Juſſ. 219. Tourn. t. 168. Lamarck Illuſtr. t. 204. Gærtn. t. 22.—Claſs and order, *Pentandria Digynia.* Nat. Ord. *Umbellatæ.*

Gen. Ch. *General umbel* unequal, increaſing daily in ſize ; *partial* erect. *General* as well as *partial involucrum* wanting. *Perianth* ſcarcely diſcernible. *Cor. Univerſal* uniform ; the flowers of the diſk abortive ; *partial* of five lanceolate, keeled, ſlightly inflexed petals. *Stam.* Filaments five, ſimple, the length of the corolla ; anthers ſimple. *Piſt.* Germen inferior, ſtyles two, ſimple ; ſtigmas two, ſimple. *Peric.* Fruit oblong, ſtriated, ſeparable into two parts. *Seeds* two, creſcent-ſhaped, convex on the outer ſide, and marked with three angles ; flat on the other.

Eſſ. Ch. Involucrum neither general nor partial. Fruit oblong, with angular ribs. Petals pointed, keeled, incurved.

1. S. *perfoliatum.* Perfoliate Alexanders. Linn. Sp. Pl. 376. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 289, unpubliſhed. (S. creticum ; Matth. Valgr. v. 2. 131. Ger. Em. 1024. An Hippoſelinum ; Column. Ecphr. v. 2. 21.)—Stem-leaves ſimple, claſping the ſtem with their heart-ſhaped baſe, all ſerrated and alternate.—Native of Italy and the Levant. Common in the hilly parts of Greece, as well as in Crete and Cyprus. *Sibthorp.* A hardy biennial plant, one of the handſomeſt of its tribe, naturalized, in a manner, on rock-work, neglected banks, or open borders, in Chelſea garden, flowering in May. This anſwers moſt preciſely to the σμυρνιον of Dioſcorides, inſomuch that we can only wonder at the doubts of any of his commentators. "Παραφυαδας εχοντα πολλας" ſurely alludes to the abundance of very peculiar leaves *ſurrounding* the ſtem, which are contraſted, in the next ſentence, with the broader foliage, ſpringing from the root. That expreſſion, therefore, is improperly rendered by the word *ſoboles*, offsets or ſcyons, of which there are no traces. The *root* is brown, fleſhy, tuberous, with thick fibres. *Stem* two feet high, much branched, with dilated membranous angles, eſpecially in the branches. *Radical leaves* ſtalked, twice or thrice ternate ; their leaflets ſtalked, ſmooth, ſhining, ovate or wedge-ſhaped, notched, three-cleft, or variouſly lobed ; *ſtem-leaves* ſeſſile, ſimple, roundiſh-heart-ſhaped, crenate, ſmooth, reticulated with veins, either more or leſs obtuſe, or acute and elongated, embracing the ſtem with their broad, rounded baſe, one of whoſe lobes folds over the other ; their colour becomes a rich golden yellow as the *flowers* advance toward perfection ; the upper ones are gradually ſmaller, more coloured, and cloſer together. *Umbels* yellow, of many rays. *Seeds* black, globoſe, angular, ſcarcely ribbed, about the ſize of cabbage ſeed, of a hot, pungent, aromatic flavour, like the reſt of the plant. The *petals* are really heart-ſhaped, with inflexed points.

2. S. *ægyptiacum.* Egyptian Alexanders. Linn. Sp. Pl. 376. Amoen. Acad. v. 4. 270. Willd. n. 2.—Floral leaves oppoſite, heart-ſhaped, entire.—Gathered in Egypt by Haſſelquiſt. Of this there is no figure. By the Linnæan ſpecimen, which conſiſts of the top of the plant only, it appears nearly akin to the preceding ; but differs eſſentially in having the *branches* oppoſite, or three together, not alternate, the *floral leaves* being alſo diſpoſed in the ſame manner, and nearly, if not abſolutely, entire.

3. S. *laterale*. Cape Alexanders. Thunb. Prodr. 51. Willd. n. 3.—Stem-leaves ternate, cut and ſerrated. Umbels lateral, ſeſſile.—Gathered by Thunberg, at the Cape of Good Hope.

4. S. *Oluſatrum*. Common Alexanders. Linn. Sp. Pl. 376. Willd. n. 4. Fl. Brit. n. 1. Engl. Bot. t. 230. (Smyrnium; Matth. Valgr. v. 2. 130. Hipposelinum; Ger. Em. 1019. Petroſelinon Alexandrinum; Trag. Hiſt. 436.) — Stem-leaves ternate, ſtalked, ſerrated. Umbels terminal. — Native of rocks near the ſea, the borders of marſhes, or the neighbourhood of ancient buildings, in Britain, France, Spain, Holland, Cyprus, Greece, and Aſia Minor, flowering in ſpring. The *root* is fleſhy, uſually biennial, but we have obſerved it to live ſeveral years in a ſituation where it could not produce flowers. Whole *plant* ſmooth, light green, ſhining, buſhy, three feet high, of an aromatic and ſweetiſh flavour. *Stem* round, pale, furrowed, hollow. Lower *leaves* thrice ternate, with broad, deeply ſerrated, variouſly ſhaped leaflets, ovate or wedge-ſhaped at the baſe. *Footſtalks* dilated, concave, ribbed, and membranous. *Umbels* numerous, greeniſh-white, globoſe, of many general and partial rays; very rarely accompanied by a few ſmall, awlſhaped leaves of a *general involucrum*, but this is accidental, and occurs now and then in other genera that, like this plant, have never any *partial involucrum*. The *fruit* is black, compoſed of two aromatic, acrid, bitter, three-ribbed *ſeeds*, as big as thoſe of the garden *Tropæolum*, or Naſturtium. There can be no more doubt of this being the ιπποσελινον of Dioſcorides, than there is reſpecting his ſynonym for our firſt ſpecies. The old name of *Olus atrum*, or Black Pot-herb, probably alludes to the colour of the ſeeds, which are remarkably large and conſpicuous. Our Engliſh one was perhaps introduced from Germany, where, as well as in Italy, Ray ſays the plant is called *Herba Alexandrina*. Were it not for this information, we might ſuſpect Alexanders, or Aliſanders, (as the word ſometimes is written,) to be a corruption of *Oluſatrum* pronounced with a broad foreign twang. The root and young herbage formerly ſerved thoſe purpoſes in ſallads and broths, which are now better anſwered by the more delicately flavoured Celery.

5. S. *apiifolium*. Smallage-leaved Alexanders. Willd. n. 5. Ait. n. 3. (S. creticum, paludapii folio; Tourn. Cor. 22.) — "Stem-leaves wedge-ſhaped, obtuſe, three-cleft, toothed."—Gathered in Crete, by Tournefort, from one of whoſe ſpecimens, conſiſting of a branch with *umbels* in ſeed, Willdenow adopted this ſpecies. He informs us there was no general or partial *involucrum*. We have ſeen nothing anſwering to the above account.

6. S. *cordatum*. Heart-leaved Alexanders. Walt. Carolin. 114. Purſh n. 1. (Thapſia trifoliata; Linn. Sp. Pl. 366. Willd. Sp. Pl. v. 1. 1465. Ait. Hort. Kew. v. 2. 156. Sium folio infimo cordato, caulinis ternatis, omnibus crenatis; Gron. Virg. 43.) — Radical leaves roundiſh-heart-ſhaped, crenate, ſimple; thoſe of the ſtem ternate, ſtalked, acute, ſerrated. Ribs of the ſeeds prominent, compreſſed.—In woods, frequently on the mountains, from New England to Carolina, flowering in June and July. *Root* perennial. *Flowers* yellow. *Purſh*. The habit of the whole plant, and, if we miſtake not, the character of the ſeeds, both agree with the preſent genus, but not at all with *Thapſia*; yet it is to be wiſhed that Walter, in transferring this ſpecies hither, had not needleſsly changed the ſpecific name. The *herb* is ſmooth, ſlender, erect, ſlightly branched. *Leaves* light-green; the radical ones ſimple, ſhaped like thoſe of a violet, on long ſtalks; the reſt ternate, more ovate and acute. *Umbels* ſmall, denſe, terminal, ſolitary. Walter ſays the *flowers* are white; and ſo they appear rather than yellow, in Kalm's ſpecimen. The *ſeeds* are ſmall, oval, brown, with three prominent, rounded, thick-edged, flat ribs to each.

7. S. *aureum*. Golden Alexanders. Linn. Sp. Pl. 377. Willd. n. 6. Ait. n. 4. (Angelica acadienſis, flore luteo; Dodart Mem. ed. Amſterd. 557. t. 1.)—Leaves twice ternate; the middle diviſion often pinnate; leaflets ovato-lanceolate, ſtrongly ſerrated. Seeds elliptical, furrowed.—On the mountains and hills, near banks of rivers, from Pennſylvania to Carolina, flowering in June and July. *Purſh*. *Root* perennial, black, tufted. *Stems* numerous, erect, hollow, a foot and a half high, angular, furrowed, ſmooth like every other part of the plant, except at the origin of the *footſtalks*. Lower *leaves* on long ſtalks, ſpreading; their *leaflets* an inch or more in length, coarſely ſerrated, acute, but not pointed. *Umbels* ſmall, denſe, yellow. *Seed* brown, not unlike Caraway ſeeds. The whole plant is ſaid by Dodart to be acrid, bitter, and aromatic, "very different in flavour from common Angelica." We have, from the Rev. Dr. Muhlenberg, a variety of this, with much narrower, ſharper, more finely ſerrated *leaflets*.

8. S. *acuminatum*. Pointed-leaved Alexanders. (S. aureum β; Linn. Sp. Pl. 377. Willd. n. 6. S. foliis caulinis decompoſitis acuminatis; Gron. Virg. 44.) — Leaves twice ternate; the middle diviſion pinnate; leaflets ovate, taper-pointed, copiouſly and ſharply ſerrated. Rays of the umbel elongated.—Native of Virginia; ſent by Gronovius to Linnæus, who confounded it improperly with the laſt. The whole plant appears to be much larger. *Stalks* of the radical *leaves* at leaſt a foot long; *leaflets* two inches or more in length, with very numerous, cloſe, acute, rather unequal ſerratures, and taper points; ſtem-leaves ſmaller, leſs compound. *Umbels* ſolitary, on long terminal ſtalks; the general *rays* above an inch long, while in flower, accompanied, in our ſolitary ſpecimen, with a ſerrated acceſſory leaf, which cannot be ſuppoſed a general *involucrum*, though a few of the partial *umbels* are each alſo furniſhed with a ſingle entire lanceolate leaf, more indicative of a partial *involucrum*. The *flowers* ſeem to be yellow. We have no knowledge of the *ſeeds*, and the genus of this plant muſt therefore remain doubtful.

9. S. *atropurpureum*. Dark-purple-flowered Alexanders. Lamarck Dict. v. 3. 667. Purſh n. 3. — "Leaves all ternate; leaflets ovate, acute, ſerrated."—On dry ſlate hills in Virginia and Carolina, flowering from May to July. *Purſh*. *Root* perennial. *Stem* a foot or more in height, ſlightly branched, angular, ſmooth. *Leaflets* ovate, more or leſs elongated, pointed, ſmooth, rather fleſhy, finely and regularly ſerrated, and ſomewhat cartilaginous at the edges, green on both ſides. *Umbels* ſmall, terminal, ſtalked, of a very dark purple; the partial ones having ſometimes a very ſhort *involucrum*. *Deſrouſſeaux* (in Lamarck).

10. S. *integerrimum*. Entire-leaved Virginian Alexanders. Linn. Sp. Pl. 377. Willd. n. 7. Ait. n. 5. Purſh n. 4. — Leaves glaucous, twice or thrice ternate; leaflets oval, entire. Rays of the umbel elongated. Central flowers abortive. Seeds ovate, angular.—On dry hills, from New England to Carolina, but ſcarce; flowering in June. *Root* perennial. *Purſh*. The whole *plant* is ſmooth; and glaucous in ſome degree. *Stem* round, ſomewhat branched, leafy. *Leaflets* about an inch long. Common *footſtalk* of the ſtem-leaves concave, dilated, membranous; partial ones long and ſlender. *Umbels* without any general or partial *involucrum*; the general *rays* long and ſlender: partial ones ſhort. *Flowers* yellowiſh; the central ones

male, or abortive. *Fruit* the ſize of muſtard-ſeed, blackiſh, obſcurely angular in Kalm's dried ſpecimen, agreeing much with ſome kinds of *Liguſticum*, to which genus this plant is cloſely allied in habit; ſee LIGUSTICUM. The *ſeeds* of theſe genera are, in ſome caſes, nearly akin; which circumſtance has led a learned botanical traveller, Marſchall von Bieberſtein, to name a plant of mount Caucaſus *Smyrnium nudicaule*, which is no other than *Liguſticum cornubienſe*, according to a ſpecimen from Dr. Fiſcher. This is the more ſurpriſing, as the ſame able botaniſt had previouſly deſcribed *Danaa* of Allioni, which is the very ſame ſpecies, for a *Pimpinella*. See Sims and Konig's Ann. of Bot. v. 2. 433. The preſence of a general and partial *involucrum*, and eſpecially the ſmall, not capitate, *ſtigmas*, prove it, nevertheleſs, to be no *Pimpinella*; nor do the *ſeeds* themſelves anſwer to that genus.

11. S. *nudicaule*. Naked-ſtalked Alexanders. Purſh n. 5.—"Leaves radical, ternate; leaflets with a few unequal teeth. Flower-ſtalk radical. Rays of the umbel elongated, with ſcarcely any general or partial involucrum."—Gathered by governor Lewis, on the Columbia river, flowering in April and May. *Root* perennial. The natives eat the tops of this plant, and boil it in their ſoups, as we uſe celery. *Purſh.*

SMYRNIUM, in *Gardening*, contains a plant of the herbaceous eſculent kind, of which the ſpecies cultivated is the common alexanders (S. oluſatrum).

Method of Culture.—Theſe plants are raiſed from ſeeds, which ſhould be ſown in the ſpring, in any light ſoil and open ſituation, in ſhallow drills, fifteen or eighteen inches aſunder; and when the plants are come up two or three inches high, be thinned out to ſix or eight inches diſtance in the rows, to give them room to ſhoot up ſtrong; when earth muſt be drawn up about them gradually, in order to blanch or whiten them a little below, that they may be more criſp and tender for autumn and winter uſe; but as in the ſpring following they ſhoot out again vigorouſly, ſome earth ſhould be hoed up cloſe about each plant, and in three or four weeks they will be blanched fit for uſe.

This is uſed as a culinary plant, when blanched, in the ſame manner as celery, and is of a warm aromatic quality.

SMYRUS, in *Ichthyology*, a name ſometimes given by Pliny to the fiſh called by authors *myrus*, the *Muræna myrus* of Linnæus, and by Willughby the *ſea-ſerpent*, with a compreſſed tail.

It is a ſpecies of the muræna according to Artedi, and is diſtinguiſhed from all the others by that author, under the name of the muræna with a ſharp ſnout, variegated with white ſpots, and with the edge of the back-fin black.

SMYTHAM, in *Mineralogy*, lead-ore ſtamped and pounded down, like powder or ſand, to cleanſe the ſtones and earth from the ore.

SNAASEN, in *Geography*, a lake of Norway, in the province of Drontheim, 24 miles long and three wide; 54 miles N.N.E. of Drontheim.

SNACKENBURG, a town of Weſtphalia, in the principality of Luneburg-Zelle; 52 miles E.S.E. of Luneburg.

SNÆFELL's SYSSEL, a diſtrict of Iceland, about ſix miles to the weſt of Miklaholt, which is a village ſituated on a ſmall eminence, completely ſurrounded by moraſſes, and conſiſts of a church, the prieſt's houſe, and a few cottages. This Syſſel forms the extremity of the peninſula, terminated by the Snæfell Jokul. The central part of this peninſula, through its whole length, is occupied by a lofty range of mountains, between which and the ſea, on the ſouthern ſide, an extenſive tract of flat land intervenes. Beyond Miklaholt, this plain narrows conſiderably, becoming not more than three or four miles in width. Some part of this extent is ſandy, and appears to have been left by the ſea. The greateſt part, however, is boggy; and the whole is covered with an abundance of fine graſs, on which numbers of cattle and ſheep are ſeen grazing. Here and there are ſmall elevations. See STADERSTAD.

The height of Snæfell Jokul was aſcertained by calculation to be 4558 feet; which eſtimate differs no more than a few feet from the meaſurement of the Daniſh officers, who at this time (1810) were employed in ſurveying the coaſts of Iceland. Nevertheleſs, Egbert Olaſſoo, one of the moſt eminent naturaliſts in modern times, aſſerts that, by barometrical meaſurement, he found the height of this mountain to be not leſs than 7000 feet; a calculation that certainly differs widely from the truth. This mountain is volcanic, as part of it has diſcharged lava, which has flowed into the ſea: but this lava is very ancient; as no eruptions have taken place, either from the Snæfell Jokul, or from any part of the adjacent mountains, ſince the iſland firſt became inhabited. This mountain was aſcended by the travellers whoſe report we are now citing, and they have deſcribed the progreſs of their aſcent, which was a very adventurous undertaking, on account of the chaſms and precipices occaſioned by the ſnow that covers the ſummit and ſides of it.

Snæfell Syſſel is ſituated on the weſtern coaſt (ſee SYSSEL), and contains 270 farms, 652 families, and 3541 inhabitants. Mackenzie's Travels in Iceland.

SNAFELSNESS, a promontory on the weſt coaſt of Iceland, 45 miles long, and five broad.

SNAFFEN, a town of Norway, in the province of Drontheim; 46 miles N.E. of Drontheim.

SNAFFLE, in the *Manege*, a well-known kind of bridle. The ſnaffle, after the Engliſh faſhion, is a very ſlender bitmouth, without any branches; they are much uſed in England inſtead of true bridles, which are only employed in the ſervice of war. The French call them *bridons*, by way of diſtinction from *brides*, i. e. *bridles*.

The ſnaffle, or ſmall watering-bit, is commonly a ſcatchmouth, accoutred with two little very ſtraight branches, and a curb, and mounted with a head-ſtall, and two long reins of Hungary leather. See BRIDLE.

The ſnaffle is much recommended by Mr. Berenger in his Hiſtory and Art of Horſemanſhip, vol. ii. p. 225, &c.

SNAFIELD, in *Geography*, the higheſt mountain in the Iſle of Man; its height, obſerved by an exact barometer, the mercury of which ſubſided $2\frac{1}{10}$ inches, being about 580 yards. The ſummit of this mountain affords a proſpect of England, Scotland, Ireland, and Wales.

SNAG-GREET. See SNAIL-*Cod*.

SNAIL, in *Ichthyology*. See LIPARIS *Noſtras*.

SNAIL, *Helix*, in *Natural Hiſtory*. See HELIX.

The *garden ſnail*, or *helix lucorum* of Pultney, is a well-known ſpecies: it abounds with a viſcid ſlimy juice, which it readily gives out by boiling to milk or water, ſo as to render them thick and glutinous. The decoctions in milk are apparently very nutritious and demulcent, and have been recommended in a thin acrimonious ſtate of the humours, in conſumptive caſes and emaciations. See HELIX *Hortenſis*.

The *exotic ſnail*, or *pomatia helix* of Linnæus, is alſo celebrated on account of its naturalization in this country, by ſir Kenelm Digby, and its uſe, as a food, in ſeveral parts of Europe during Lent. See POMATIA and HELIX *Pomatia*.

Perrault doubts of ſnails having eyes, and Dr. Brown denies it; but according to Dr. Porterfield, a good microſcope ſhews them diſtinctly.

The eyes of ſnails are lodged in their horns, one at the end of each horn, which they can retract at pleaſure. Med. Eſſ. Edin. vol. iii. art. 12.

The manner of examining theſe eyes, which are four in number, is this; when the horns are out, cut off nimbly the extremity of one of them, and placing it before the microſcope, you may diſcover the black ſpot at the end to be a really ſemiglobular eye.

The diſſection of this animal is very curious; for by this means the microſcope not only diſcovers the heart beating juſt againſt the round hole near the neck, which ſeems the place of reſpiration, but alſo the liver, ſpleen, ſtomach, and inteſtines, with the veins, arteries, mouth, and teeth, are plainly obſervable; the guts of this creature are green, from its eating of herbs, and are branched all over with fine capillary white veins; the mouth is like a hare's or rabbit's, with four or ſix needle-teeth, reſembling thoſe of leeches, and of a ſubſtance like horn.

Snails are ſaid to couple three times at the diſtance of about fifteen days from each other, nature producing a new ſpear for each time of copulation, which laſts ten or twelve hours; at the end of about eighteen days they bring forth their eggs, by the aperture of their neck. Baker's Microſcope, p. 217. Mem. Roy. Ac. Abr. vol. iii. p. 85.

So ſmall an animal as the ſnail is not free from the plague of ſupporting other ſmall animals on its body; and as in other animals we find theſe ſecondary ones either living only on their ſurface, as lice, &c. or only in the inteſtines, as worms; it is very remarkable that this creature infeſts the ſnail in both theſe manners, being found ſometimes on the ſurface of its body; and ſometimes within its inteſtines.

There is a part of the common garden ſnail, and of other of the like kinds, commonly called the *collar;* this ſurrounds the neck of the ſnail, and is conſiderably thick, being the only part that is viſible when the animal is retired quietly into its ſhell. In this ſtate of the animal, theſe inſects, which infeſt it, are uſually ſeen in conſiderable numbers, marching about very nimbly on this part: beſides, the ſnail, every time it has occaſion to open its anus, gives them a place by which to enter into its inteſtines, and they often ſeize the opportunity. Mem. Roy. Ac. Abr. vol. iii. p. 377, &c.

Snails are great deſtroyers of fruit in our gardens, eſpecially the better ſorts of wall-fruit. Lime and aſhes ſprinkled on the ground where they moſt reſort, will drive them away, and deſtroy the young brood of them: it is a common practice to pull off the fruit they have bitten, but this ſhould never be done, for they will eat no other till they have wholly eat up this, if it be left for them.

Ariſtotle and the old Greeks had no idea of the generation of theſe inſects in the manner of other animals, but ſuppoſed them produced ſpontaneouſly; but the Romans ſhew, by many paſſages in their writings, that they have got over this error; and even ſeem, by the preference they gave to the neck of this animal in this intention, to have underſtood the hermaphrodite ſtructure of this inſect, which much later ages have pretended to make a new diſcovery.

The eaſtern nations at preſent run much into the opinions of the Romans of old, as to provocatives; they uſe, as the others did, every thing that ſerves to the purpoſes of generation in other animals, and every thing that has but the reſemblance of the external figure of the parts ſubſervient to it.

Snail, *Ear.* See Shells.

Snail, *Naked, Limax.* See Slug and Limax.

Snail, *Oat,* a name given by Dr. Liſter, in the Philoſophical Tranſactions, to a ſmall ſnail, which he obſerved under the looſe bark of old willows, elms, and other trees, and which is of a very ſingular ſtructure; the ſhell reſembling an oat-corn, whence the name, and its volutæ, or wreaths, running contrary to the direction of them in other ſnails, that is, eaſt and weſt, as the philoſophers expreſs it, referring it to the motion of the ſun; but theſe ſhells, to uſe that language, have the turns weſt and eaſt, or more plainly, they have the turns running from the right hand to the left, not from the left to the right, as other ſnails. Phil. Tranſ. N° 250.

Snail is alſo the name of the animal inhabiting many kinds of ſhells, as the patella, cochlea, nerite, buccinum, turbo, trochus, voluta, murex, purpura, lyra, and concha Veneris. See Patella, Cochlea, &c.

Snail-*Cod,* in *Agriculture,* a name given by Mr. Worlidge to a ſpecies of manure found at the bottom of deep rivers. It is a kind of mud or ſludge, very ſoft, full of wrinkles, and intermixed with many little ſhells and ſnails, to which it is thought to owe a great part of its richneſs. It is ſometimes called *ſnag-greet.*

Snail-*Flower,* in *Botany.* See Phaseolus.

Snail-*Horned,* in *Rural Economy,* a term applied to the horns of ſuch cattle as have them ſhort and down-hanging, with blunt points, and ſomewhat bent, in the common form of the ſnail.

Snail-*Shell, Medic* or *Trefoil,* in *Agriculture,* a plant of the artificial graſs kind, often known by the name of heart clover or trefoil. It was introduced into Berkſhire, according to the agricultural report of that diſtrict, by captain Vancouver, on his return from his voyage round the world, though a native of that country, under the notion of the ſeeds being thoſe of ſome more important plant from the South Sea iſlands. It has ſince been cultivated there, it is ſaid, with ſucceſs, producing a luxuriant herbage, of which cattle are extremely fond. It ſtands the winter well, and a crop may at any time be produced. It is aſſerted to have the advantage of lucerne, in not being eaſily choaked, and in growing on a light ſoil, though it without doubt produces the moſt abundantly in good ſoils. The cultivators have hitherto ſown it in the broad-caſt method, and are, it is ſaid, determined to perſevere, having now collected a ſufficient quantity of its ſeed to enable them to extend their trials to ſome acres of land.

It would ſeem to be deſerving of trials in other counties, where herbage is ſcarce and not eaſily raiſed.

Snail-*Trefoil,* in *Botany.* See Medicago.

SNAITH, in *Geography,* a market-town in a pariſh of the ſame name, lower diviſion of the wapentake of Oſgoldcroſs, liberty of the honor of Pontefract, and Weſt Riding of Yorkſhire, England, is ſituated at the diſtance of 22 miles S. by E. from York, and 174 miles N. by W. from London. The ſcite of this town is a gentle eminence, which riſes from the ſouthern bank of the river Aire, and overlooks a flat and fertile diſtrict of country. The market-day here is Thurſday, weekly; and there are fairs on the firſt Friday in April, 10th of Auguſt, and firſt Friday in September, for horned cattle, ſheep, woollen cloth, linen, and cheeſe. The church is an ancient building, in the pointed ſtyle; remarkable only as the burial-place of the anceſtors of lord viſcount Down, who has a ſeat at Cowick, about a mile S.E. from Snaith. Carlton, two miles to the N.E., is the ſeat of the family of Stapleton, whoſe anceſtors diſtinguiſhed themſelves by their bravery and loyalty during the civil wars between king Charles I. and his parliament.

According to the parliamentary returns of 1811, Snaith pariſh includes eleven townſhips, *viz.* Armin, Baln, Cowick, Goole, Hick, Henſall, Hooke, Follington, Rawcliff, and Snaith, which united contain 1133 houſes, and 5095 inhabitants, of whom about 743 reſide in the town of Snaith. Beauties of England and Wales, vol. xvi. by John Bigland, 8vo. 1812. Carliſle's Topographical Dictionary of England, 4to. 1808.

SNAKE, Anguis, in the Linnæan *Syſtem of Zoology*, is a genus of ſerpents, the characters of which are, that the animals belonging to this genus have abdominal and ſubcaudal ſcales. Here we may obſerve, that Linnæus has diſtinguiſhed the ſmall ſcales, with which the back and ſides of the animals belonging to the claſs of ſerpents are covered, by the name of *ſquamæ;* and the oblong, narrow, tranſverſe plates, with which the bellies of ſome of them are covered, by the denomination of *ſcuta.* Thoſe that have both ſquamæ and ſcuta, he diſtributes under the genus of *coluber;* thoſe that have only ſquamæ, under the appellation of *anguis.* In conformity to this diſtribution, he has ranked the common ſnake, as well as the viper, &c. under the genus of *coluber* (which ſee); and claſſed ſixteen different ſpecies, as the four-footed Javan ſnake, the common ſlow-worm, &c. under that of *anguis.* See Serpentes.

Snake, *Annulated.* See Amphisbæna and Serpentes.

Snake, *Argus.* See Coluber *Argus.*

Snake, *Auſtralaſian.* See Coluber *Auſtralaſiæ.*

Snake, *Black.* See Coluber *Conſtrictor.*

Snake, *Black and Red.* See Coluber *Torquatus.*

Snake, *Blood, Hæmorrhous,* the name of a peculiar ſpecies of ſerpent, ſo called, becauſe it was ſuppoſed, that on a perſon's being bit by it, the blood flowed out of every part of the body.

It is a ſmall ſerpent, ſeldom arriving to more than a foot long; its eyes are remarkably vivid, bright, and ſparkling; its ſkin is very gloſſy, and its back variegated with a great number of black and white ſpots; its neck is very ſlender; its tail extremely ſharp, and it has a ſort of ſmall horns placed over its eyes. It is found in Egypt.

There is alſo an American kind of this, found in the ſouthern parts, and called by the natives *ahucyatli,* which is larger than the other, and reſembles the rattle-ſnake in many particulars, but wants the diſtinguiſhing character in the tail.

Snake, *Boaform.* See Coluber *Boæformis.*

Snake, *Braſilian.* See Coluber.

Snake, *Bull-headed.* See Coluber *Bucephalus.*

Snake, *Coach-whip.* See Coluber *Flagellum.*

Snake, *Common,* or *Ringed, Coluber Natrix* of Linnæus. See Natrix and Coluber *Natrix.*

The following account of an eaſy method of preſerving ſnakes may not be unacceptable. When the ſnake is killed, it muſt be waſhed clean, and put into a glaſs of a proper ſize, the tail firſt, and afterwards the reſt of the body, winding it in ſpiral aſcending circles, and diſpoſing the back, which is always the moſt beautiful, outwardly. A thread connected with a ſmall bead is then, by a needle, to be paſſed through the upper jaw from within outwardly, and then through the cork of the bottle, where it muſt be faſtened: by this means the head will be drawn into a natural poſture, and the mouth kept open by the bead, by which the teeth, &c. will be diſcovered. The glaſs is then to be filled with rum, and the cork ſealed down. In this manner the ſnake may be preſerved for many years; nor will the ſpirits impair or change the luſtre of its colour.

Snake, *Daboya.* See Coluber.

Snake, *Hooded.* See Coluber *Naja.*

Snake, *Horned.* See Cerastes and Coluber *Ceraſtes.*

Snake, *Javan.* See Coluber *Javanicus.*

Snake, *Oak.* See Dryinas and Crotalus.

Snake, *Panther.* See Coluber.

Snake, *Rattle,* a very dreadful genus of ſerpents. See Crotalus.

Snake, *Ruſſelian.* See Coluber *Ruſſelli.*

Snake, *Sand,* the Engliſh name of a kind of ſerpent found in Lybia, and ſome parts of Italy. See Ammodytes.

Snake, *Sea, Serpens Marinus,* the name of a fiſh of the eel-kind, being the cylindric *muræna* (which ſee), with the tail naked and acute, uſually of five or ſix feet in length, and a furrowed body, continuing all the way of the ſame thickneſs, till near the tail. Its back is of a duſky yellow, and its belly a ſhining blue; its ſnout is long, ſlender, and pointed, and the opening of its mouth extremely large; near the end of the under jaw it has four or five large ſharp teeth, which bend backwards; the reſt of the teeth are very ſmall, and ſtand cloſe together; at the very extremity of the upper jaw it has four very large teeth, and all the reſt are ſmall, and like thoſe in the under one; but the largeſt teeth of all are placed in a row, in the middle of the palate; it has only one pair of fins, which are placed near the gills; the opening of the gills is at a conſiderable diſtance from the head, and it is marked with dotted lines down its ſides. It is common in the Mediterranean, and its fleſh is very fine taſted, but full of ſmall bones. Willughby, Hiſt. Piſc. p. 108.

Biſhop Pontopiddan mentions (in his Hiſt. of Norway, vol. ii. p. 195, &c.) a ſea-ſnake of a very prodigious ſize; for the particulars of its dimenſions, &c. we muſt refer to the teſtimonies which he has recorded. Theſe animals, ſome of which are ſaid to be no leſs than ſix hundred feet long, are dangerous to navigators, as they throw themſelves over veſſels of ſome hundred tons burthen, and ſink them to the bottom by their weight. The preſervative againſt them is caſtor, the ſmell of which they are ſaid to avoid. The biſhop apprehends, that this creature, which inhabits the North ſea, is the leviathan mentioned in the ſcripture. Iſaiah, xxvii. 1. Job, xxvi. 13.

Snake, *Sleep.* See Hypnoticus *Serpens.*

Snake, *Spectacle.* See Cobras *de Capello* and Coluber.

Snake, *Triangular-headed.* See Coluber.

Snake-*Gourd,* in *Botany.* See Tricosanthes.

Snake-*Root, Serpentaria,* the root of a ſpecies of ariſtolochia. See Aristolochia *Serpentaria.*

The ancients were only acquainted with two kinds of ſerpentaria, the great and the ſmall: but ſince the diſcovery of America, botaniſts have added ſeveral others; as the ſerpentaria Virginiana, or Virginian ſnake-root; beſides that of Canada, and that of Braſil.

They were ſuppoſed to be alexipharmics, or counterpoiſons; and as ſuch were ingredients in the Venice treacle.

The herb dragon is alſo called, by ſome writers, the great ſerpentaria; by the ancients, dracunculus major. This has its ſtem very ſtraight, ſmooth, and marked with red ſpots, like the ſkin of a ſerpent; whence, probably, as much as from its virtues, it is that it takes its name. Its root is big, round, and white, covered with a thin ſkin. The ſmaller ſerpentaria, of this kind, has its ſtalk much like that of the larger, only its leaves are like thoſe of ivy, whereas thoſe of the larger are digitated, after the manner of baſtard hellebore. Its root is round and bulbous.

The ſerpentaria of Virginia, called alſo colubrina Virginiana, aſarum Virginianum, ſerpentaria nigra, and the contrayerva of Virginia, has its leaves green and large, almoſt in figure of a heart; its fruit round, and its root, which is of a very ſtrong aromatic ſmell, has, at bottom, an infinite number of long ſmall filaments, repreſenting a kind of beard, of a browniſh colour on the outſide, and paler or yellowiſh within.

It was firſt brought into Europe from Virginia by the Engliſh; and is by the Americans eſteemed a ſovereign antidote againſt the bite of the rattle-ſnake.

We are told by travellers, that this root not only cures the bite of a rattle-ſnake, but that that animal flies the very ſmell of it; for which reaſon the Indians, and other travellers, always carry it with them on the end of a ſtaff, by way of a preſervative from that creature.

The dried ſerpentaria root is imported into this country in bales, each containing from two to five hundred weight. The dried root has an aromatic odour, not unlike that of valerian; and a ſharp, warm, bitter taſte, reſembling in ſome degree that of camphor. Water extracts all the ſenſible qualities of the root, affording a yellowiſh-brown infuſion, which is not altered by ſulphate of iron or zinc, the nitrate of ſilver, oxymuriate of mercury, tartarized antimony, the mineral acids, and the alkalies; nor is it precipitated by gelatine or tannin. The ſuperacetate of lead throws down a flocculent precipitate, which is not ſoluble in acetic acid, ſhewing the preſence of mucus. With alcohol it affords a bright greeniſh tincture, which is rendered turbid by the addition of water. The active principles of ſerpentaria, therefore, appear to reſide in a bitter reſin; and perhaps camphor, and eſſential oil.

For medical purpoſes, ſerpentaria, or Virginian ſnake-root, is reckoned a ſtimulating diaphoretic and tonic. It is beneficially employed in typhoid and putrid fevers, whether idiopathic, or accompanying the exanthemata, to excite diaphoreſis, and ſupport the powers of the ſyſtem; and is found frequently to increaſe the efficacy of cinchona in removing protracted intermittents. It is alſo an excellent remedy in dyſpepſia, particularly when the ſkin is dry and parched; and is ſometimes uſed as a gargle in putrid ſore-throat. On account of its ſtimulant properties, it is contraindicated when the inflammatory diatheſis is preſent; and previous to its exhibition, the bowels ſhould be well evacuated.

It may be given in ſubſtance, or in infuſion made by macerating ʒiv of the bruiſed root in f℥xij of boiling water, in a covered veſſel for two hours, and ſtraining. Decoction is a bad form of giving ſerpentaria, as the boiling diſſipates the eſſential oil, on which the virtues of the remedy chiefly depend. The doſe of the powdered root is grs. x, or grs. xx, increaſed to ʒſs; that of the infuſion f℥jſs to f℥ij, every fourth hour.

The officinal preparations are as follow: *viz.* the "tinctura ſerpentariæ," the "tinctura cinchonæ compoſita," and the "electuarium opiatum." The "tincture of ſnake-root" of the Lond. and Dub. pharmacopeias is prepared by macerating for fourteen days (ſeven days, Dub.) three ounces of ſnake-root (cut and bruiſed, Dub.) in two pints of proof ſpirit, and filtering. The "tinctura ariſtolochiæ ſerpentariæ," or "tincture of ſnake-root," of the Edinb. Ph., is obtained by digeſting for ſeven days two ounces of ſnake-root bruiſed, a drachm of cochineal in powder, in two pounds and a half of proof ſpirit, and filtering through paper. This tincture is an uſeful addition to infuſion of cinchona in typhoid and putrid fevers, gout, and periodic head-ache. The doſe is from f ʒſs to f ʒij; or when taken in water, as much as can be taken without any injury from the operation of the ſpirit.

The "tinctura cinchonæ compoſita," or "compound tincture of cinchona," of the Lond. and Dub. Ph., is prepared by taking of lance-leaved cinchona bark, powdered, two ounces; dried orange-peel, an ounce and a half (half an ounce, Dub.); Virginian ſnake-root bruiſed, three drachms; ſaffron, one drachm; cochineal in powder, two ſcruples; macerating for fourteen days in twenty fluid-ounces of proof ſpirit, and filtering. This tincture is more grateful than the officinal tincture of cinchona, and though it contains leſs cinchona, yet the addition of the other ingredients renders it more uſeful both as a ſtomachic and a febrifuge. It is the ſame as the celebrated tincture of Huxham, who generally gave it in intermittents and low nervous fevers, in diluted wine or any proper vehicle, with ten or fifteen drops of elixir of vitriol (aromatic ſulphuric acid, Edinb.) The doſe is from f ʒj to f ʒiij, or more, in intermittents. For an account of the "electuarium opiatum," ſee OPIUM. Thomſon's Lond. Diſp.

SNAKE-*Root*, *Rattle.* See POLYGALA *Senega.*

SNAKE-*Root*, *Rattle*, in the *Materia Medica.* See SENEKA.

SNAKE-*Stone*, in *Mineralogy.* See AMMONITE.

SNAKE-*Weed Knot-Graſs*, in *Agriculture*, a common graſs by way-ſides, which, if cultivated, the ſeeds are found to anſwer the ſame purpoſes as thoſe of buck-wheat. It is annual, or at moſt biennial, in its growth.

SNAKE-*Wood*, in the *Materia Medica*, is the wood or root of the tree which affords the nux vomica, or of other trees of the ſame genus. It is brought from the Eaſt Indies under the name of lignum colubrinum, in pieces about the thickneſs of a man's arm, covered with a ruſty-coloured bark, internally of a yellow colour, with whitiſh ſtreaks. This wood, in raſping or ſcraping, emits a faint but not diſagreeable ſmell; and when chewed for ſome time, diſcovers a very bitter taſte.

From the experiments of Cartheuſer, water appears to be the proper menſtruum of its active matter. It has been recommended, in ſmall doſes, not exceeding half a drachm, as an anthelmintic, and in obſtinate quartans, jaundices, cachexies, and other chronical diſorders. It is ſaid to operate moſt commonly by ſweat, ſometimes by ſtool, and ſometimes by vomit. It appears, however, to be poſſeſſed, in a lower degree, of the ſame ill qualities with the nux vomica. Lewis.

SNAKE *Creek*, in *Geography*, a river of Louiſiana, on the north-eaſt ſide of the Miſſouri, in N. lat. 38°, 18 yards wide.

SNAKE *Iſlands*, a cluſter of ſmall iſlands in the Indian ſea, near the coaſt of Africa. S. lat. 5° 20′.

SNAKE *Indians*, a tribe of Indians in Louiſiana, on the ſouth-weſt ſide of the Miſſouri river, near the heads of the Arkanſas, Platte, and Yellow-ſtone rivers. The number of warriors is 200, and of inhabitants 5500. They trade with New Mexico. Theſe Indians, though a very numerous race, are badly armed, and much at the mercy of the other Indians, by whom they are made ſlaves, when taken priſoners. They are alſo called Ayuten bands, and Camanches. They wander about the heads of the Platte, and in the vaſt plains bordering on New Mexico and New Spain, ſouth of the Arkanſas; and are divided into many bands. One of theſe bands is probably that denominated Paunch Indians, who wander along the Rocky mountains, and ſometimes venture acroſs. The Snake Indians poſſeſs a very great number of horſes, aſſes, and mules. Mr. Brackenridge, in his "Views of Louiſiana," obſerves, that theſe Indians were different, both in language and appearance, from any whom he had ever ſeen; and he thinks, that the ſound of the language bears a conſiderable reſemblance to thoſe of Africa which he had heard. We ſhall here ſubjoin a brief account of the river, near which theſe Indians are ſettled. The Arkanſas, next to the Miſſouri, is the moſt conſiderable tributary of the Miſſiſippi. It is nearly 2500 miles in length, and navigable at proper ſeaſons through nearly the whole diſtance. The chief rivers which fall into it are the Verdigris, the Negracka, Canadian river, Grand river, &c. Several are much impregnated with ſalt, and the Arkanſas, at certain ſeaſons, is alſo brackiſh. The lands on this river, for 600 or 800 miles upwards, are deſcribed as very fine, and capable of affording ſettlements, though principally untimbered. There is a remarkable communication between the Arkanſas and White river, by a channel connecting the two rivers, with a current ſetting alternately out of the one or the other, as the flood in either happens to predominate. The Platte is the longeſt and largeſt of the rivers which diſcharge themſelves into the Miſſouri, being little ſhort of 2000 miles, and yet it can hardly be reckoned a navigable ſtream; the channel being very wide, and the quickſands, with which it abounds, ever varying. Several fine navigable rivers, however, diſcharge themſelves into it; ſuch are the Elk Horn, the Wolf river, and the Padoncas Fork.

The Yellow-ſtone, or Roche Jaune, much reſembles the Miſſouri in extent and difficulty of navigation, and is a very conſiderable river. After the junction, the Miſſouri undergoes a very perceptible change. In ſeaſons of high water, it is more properly a ſound, and indeed the deſcriptions of its rapidity are almoſt incredible. It enters the Miſſouri 1880 miles up. Its principal branches are Big Horn, Tongue river, and Clark's river.

SNAKENBURG, a town of Brandenburg, in the Old Mark, on the Elbe; 10 miles N. of Sechauſen.

SNAKING, in the *Practice of Rigging*, a ſort of faſtening to confine the outer turns of ſeizings, &c. with the ſame ſize rope, line, ſpun-yarn, &c. by paſſing it acroſs and under the outer turns at angles; ſo that one part may remain perfect and independent, if the other ſhould be ſhot away.

SNAP-DRAGON, or *Calf's-Snout*, in *Botany*. See ANTIRRHINUM.

The leaſt ſort of this plant is ſometimes a troubleſome weed in corn-fields, but it is annual in its growth, and, of courſe, with care, eaſily and readily deſtroyed by preventing its flowering and producing ſeeds.

SNAP-DRAGON *of America*. See RUELLIA and BARLERIA.

SNAPE, in *Anchor-Making*, denotes the ſudden diminution of any part.

SNAPPERTUNA, in *Geography*, a town of Sweden, in the province of Nyland; 7 miles E.N.E. of Eknas.

SNAP-TREE, in *Botany*. See JUSTICIA.

SNARES, in *Geography*, a cluſter of craggy iſlands in the South Pacific ocean, diſcovered by Capt. Vancouver, on the 24th of November, 1791, and appearing without verdure. The north-eaſternmoſt, which is the largeſt, he apprehended to be equal in extent to all the reſt; it is about 9 miles in circuit, and may be ſeen 8 or 9 leagues off. It is ſituated in S. lat. 48° 3'. E. long. 166° 20'. Mr. Broughton alſo diſcovered theſe iſlands on the 23d of the ſame month, and in paſſing through them, called the largeſt "Knight's Iſland;" which ſee.

SNARNVIER, a town of Aſiatic Turkey, in the province of Sivas, anciently called "Synoria," and once the place where Mithridates kept his treaſures; 25 miles S.S.W. of Arabkir.

SNATCH-BLOCKS, in *Block-Making*. See BLOCKS.

SNATHE, in *Agriculture*, a term applied to the handle of a ſcythe.

SNAYERS, PETER, in *Biography*, a painter of very conſiderable merit in almoſt every branch, but particularly in battles, huntings, and landſcapes. He was born at Antwerp in 1593, and was a diſciple of Henry van Balen. He was held in great eſtimation by the archduke Albert, who patronized him, appointed him his painter, and ſent ſeveral of his pictures into Spain. Beſides this ſuperior encouragement, he was employed for many of the churches in the Netherlands, and his battle-pieces are to be found in all the moſt choice collections of that country. Rubens and Vandyck honoured them with their approbation; and the latter painted the portrait of Snayers among the eminent artiſts of the day. He died in 1670, aged 77.

SNEATH, or SNEYTH, in *Agriculture*, a term applied to the ſhaft of a ſcythe in ſome places.

SNECK, in *Rural Economy*, provincially the latch of a door or gate.

SNECKEN, in *Geography*, a town of Pruſſian Lithuania; 8 miles W.S.W. of Tilſit.

SNEECK, a town of Holland, in the province of Frieſland, ſituated in the country of Weſtergoo, called by the natives "Snitz." The town is well-built, and encompaſſed by ditches and ramparts. Several learned men have been educated in the Latin ſchool of this town; 38 miles W.S.W. of Groningen. N. lat. 53° 4'. E. long. 5° 35'.

SNEEZE-WORT, in *Botany*, a ſpecies of *Achillea*; which ſee.

SNEEZE-WORT, *Auſtrian*, a ſpecies of *Xeranthemum*; which ſee.

SNEEZING, in *Medicine*, *Sternutatio*, a violent convulſive motion of the muſcles of reſpiration, which is preceded by a deep inſpiration filling the lungs, then forces the air violently through the noſe, while the lower jaw is at the ſame moment cloſed, and ſhakes the head and whole body. See LUNGS.

Sneezing is always excited by ſome irritation affecting the inner membrane of the noſe; and the air, therefore, which in coughing is expelled through the mouth, is vehemently driven through the noſtrils in ſneezing, for the purpoſe of expelling that irritation. When a perſon is about to ſneeze, he perceives a ſort of gentle and agreeable tickling in the noſe, and ſometimes there is alſo a ſimilar ſenſation about the præcordia: when one or both theſe are felt, the perſon is obliged to ſuſpend all the bodily actions and wait the event; the whole effort of the body appears to be centered in the convulſion which enſues, and the expulſion of the air through the noſtrils is accompanied by the peculiar noiſe ſo well known. In general, one or two of theſe convulſive efforts effects the purpoſe of removing the irritating cauſe; but caſes are recorded, in which the repetition and violence of the convulſion have been increaſed to the extent of becoming a diſeaſe; and, in perſons of an apoplectic diſpoſition, it is even ſaid to have induced that diſeaſe, and thus to have proved fatal. (See a caſe related by Morgagni, De Sed. et Cauſ. Morborum, Epiſt. xiv. art. 27.) It is clearly demonſtrable, indeed, as Van Swieten has ſhewn, that continued paroxyſms of ſneezing tend to load the veſſels of the head with blood: for the violent contraction of the cheſt impedes for the time the paſſage of the blood through the lungs, and therefore obſtructs the return of the venous blood from the head, the veſſels of which neceſſarily become diſtended. That this is actually the caſe is evident from the appearances; becauſe, on a repetition of ſneezing, the face ſwells and looks redder, the eyes water and appear full and diſtended;

diſtended, and the noſe drops from the increaſed ſecretion into its cavities. (Van Swieten Comment. ad Aph. 271.) Its occaſional dangerous violence is ſaid to have been the cauſe of the benediction, ſo univerſally beſtowed on thoſe who ſneeze, of which we ſhall ſay more preſently.

The cauſes of ſneezing are various, and conſiſt not only of irritating matters immediately ſtimulating the lining membrane of the noſe, but of ſympathetic irritations from neighbouring, or even from diſtant parts. Any extraneous body brought into contact with the pituitary membrane, ſuch as inſtruments, and eſpecially irritating powders, ſuch as ſnuff, or even its own mucous fluids, under particular ſtates, will excite ſneezing. As a direct communication exiſts between the eyes and the noſtrils, into which the tears are conſtantly paſſing through the lacrymal ducts, a reverſe ſympathy is excited in many people by irritations of the eye, ſo that the membrane of the noſe is at the ſame time titillated; whence, in ſuch perſons, ſneezing is immediately excited by ſudden expoſure to a ſtrong light, as by paſſing from a ſhade into a bright ſun-ſhine, eſpecially where that is ſtrongly reflected from ſnow or a white pavement. Other ſympathies have been mentioned by medical authors, eſpecially irritations in the lungs, and alſo in the ſtomach and bowels, as the cauſes of ſneezing. Thus it has been produced by carbonic acid gas, by fermenting beer, by eating ſhell-fiſh, by worms in the alimentary canal, by a leaden ball remaining in the region of the diaphragm, and even by more diſtant irritations, as by the diſtention of the gravid uterus in pregnancy, diſeaſes of the head, &c. See Richter's Bibliotheca, vi. 730. See alſo Sauvages Noſol. Method. who makes ſeven ſpecies of *ſternutatio* from theſe various cauſes.

It is only in theſe rare caſes in which ſneezing, being connected with ſome other diſeaſe, becomes the object of medical treatment; and then of courſe it can only be remedied by curing the diſeaſes, or removing the diſtant irritations, from which it originates. Like other ſpaſmodic affections, however, it may be alleviated by opiates, with camphor and ether, and ſimilar antiſpaſmodics. It would be fruitleſs to mention many of the inert remedies that have been propoſed; ſuch as bags, filled with aromatic ſubſtances, fixed to the vertex, rubbing the gums, &c.

The cuſtom of *bleſſing* perſons when they ſneeze is derived from very ancient times, and its origin has been variouſly accounted for. Several writers affirm that it commenced in the year 750, under pope Gregory the Great, when a peſtilence occurred, in which thoſe who ſneezed died; whence this pontiff appointed a form of prayer and a wiſh to be ſaid to perſons ſneezing, for averting this fatality from them. But the cuſtom is of much more ancient date. It was accounted very ancient in the time of Ariſtotle, who in his problems has endeavoured to account for it. It is alluded to in the Greek Anthology in an epigram, in which the ſalutation of *ſalve Jupiter*, Ζευ σωσων, is given as a familiar phraſe addreſſed to ſneezers. Pliny alſo queſtions "cur ſternutantes ſalutantur?" (Nat. Hiſt. lib. 28. cap. 2. Anthol. Lipſ. 1794. tom. iii. p. 95.): and Cælius Rhodoginus has an example of it among the Greeks in the time of Cyrus the younger. In Alexander Roſs's appendix to Arcana Microcoſmi, p. 222, it is ſaid, "Prometheus was the firſt that wiſhed well to the ſneezer, when the man, which he had made of clay, fell into a fit of ſternutation, upon the approach of that celeſtial fire which he ſtole from the ſun. This gave original to that cuſtom among the Gentiles, in ſaluting the ſneezer. They uſed alſo to worſhip the head in ſternutation, as being a divine part, and ſeat of the ſenſes and cogitation." For many other paſſages relating to this ſubject, ſee Brand's Obſervations on Popular Antiquities, edited by H. Ellis, vol. ii. p. 456, et ſeq. Theſe teſtimonies are ſufficient to ſhew the antiquity of this cuſtom, and the obſcurity of its origin. It may be added, that ſneezing has been from ancient times alſo conſidered as an *omen;* reſpecting which Pliny has ſome obſervations in the chapter juſt quoted. It is noticed as ſuch in the eighteenth Idyllium of Theocritus; and by Ariſtotle, who has a problem, "why ſneezing from noon to midnight was good, but from night to noon unlucky."

SNEGACIUS, Cyriacus, in *Biography*, in 1590 publiſhed at Erford, a tract upon "Harmony, or the Uſe of the Monochord, an Inſtrument for meaſuring and aſcertaining the Proportion of Sounds by a ſingle String;" of which he aſcribes the invention to the Arabians; the only new idea which we could find in the book, which is written in Latin, and of which the original title is, "Nova et exquiſita Monochordi dimenſio."

The ſame author publiſhed likewiſe, in 1590, an elementary tract, entitled "Iſagoges Muſicæ," in two books, the chief merit of which ſeems to conſiſt in the definitions of muſical terms, with ſhort examples in notation.

SNEIRNE, in *Geography*, a town of Perſia, in the province of Irac.

SNELL, Rodolph, in *Biography*, a reſpectable Dutch philoſopher, was born at Oudenwater in the year 1546. After having occupied the ſtation of profeſſor of Hebrew and mathematics at Leyden for ſome time, he died in 1613, at the age of 67 years. He was a writer of ſeveral works on geometry, and various parts of philoſophy.

Snell, Willebrord, the ſon of the preceding profeſſor, and an excellent mathematician, was born at Leyden in the year 1591, where he ſucceeded his father in the profeſſorial chair in 1613, and where he died in 1626, at the premature age of 35 years. He was the author of ſeveral valuable works and diſcoveries. To him we owe the firſt diſcovery of the true law of the refraction of the rays of light; and this diſcovery was made, as Huygens aſſures us, before it was announced by Des Cartes. Snellius undertook alſo to meaſure the earth; and this operation he effected by obſerving the interval between Alcmaer and Bergen-op-Zoom, correſponding to a difference of latitude of 1° 11′ 30″. He alſo determined the diſtance between Alcmaer and Leyden; and from a mean of theſe meaſurements, he made a degree to conſiſt of 55,021 French toiſes or fathoms. Theſe meaſures were afterwards repeated and corrected by Muſchenbroeck, who then found the degree to contain 57,033 toiſes. His works were numerous, and the principal of them are enumerated in Hutton's Dictionary.

SNELLINCKS, John, was born at Mechlin in 1544. He painted in hiſtory and ſtill-life; but he derives his principal renown from his ſkill in repreſenting battles, particularly attacks of cavalry, which were regarded as pre-eminent among works of that kind. He was honoured by the patronage of the archduke and ducheſs, and moſt of the nobility of his day in the Netherlands, and enjoyed all the gratifications which employment and applauſe are calculated to afford. His taſte in grouping is judicious, and he knew how to take advantage of the circumſtances of a battle to diſplay his knowledge of chiaro-ſcuro with great effect. Vandyck appears to have honoured him with his approbation, and has painted his portrait among the diſtinguiſhed artiſts of his day, and alſo etched a plate of it. He died in 1638, aged 94.

SNET, among *Sportſmen*, the fat of all kinds of deer. Dict. Ruſt.

SNEYDERS, or Snyders, Francis, in *Biography*. This ingenious painter was born at Antwerp in 1579, and was a diſciple of Henry van Balen. At the beginning of his practice he confined himſelf to fruits, flowers, and other objects of ſtill-life; but he ſoon advanced to the imitation of animated nature, and in the repreſentation of animals in all the vigour of life and action, in ſcenes of huntings and fightings, if he has had any rival, he has not been ſurpaſſed for freedom, truth, and energy.

Though Rubens was excellent in ſubjects of this nature himſelf, yet he frequently employed Sneyders to introduce animals into his pictures: and ſuch was his excellence in colouring and execution, that in this dread competition he roſe to a level with his great compeer; and produced an union of ſpirit and effect, which has rarely occurred where two artiſts have been engaged upon one canvas. Sometimes Rubens, and Jordaens alſo, returned the compliment, and painted figures in Sneyders' aſſemblages of beaſts, dead game, fiſh, vegetables, &c. Of theſe combined labours, we have many excellent examples in this country; and as Sneyders lived to the age of 78, and was an induſtrious man, they are not thinly ſcattered on the continent. It is impoſſible not to be ſtruck with the aſtoniſhing facility with which his works are completed; or with the delicacies of drawing, the correctneſs and fulneſs of expreſſion, he has given to his animals, their ferocity or their alarm, even their affection for their young or their benefactor. Vandyck painted an excellent portrait of Sneyders, which was in the Orleans collection, and is engraved in the ſet of his heads. He himſelf handled the point, and has left ſeveral etchings of various animals. They are now become ſcarce. He died in 1657.

SNEYDSBOROUGH, in *Geography*, a town of America, in Amſon county, North Carolina, on the Great Pedee; 120 miles above George-Town.—Alſo, a poſt-town in Richmond county, North Carolina, 418 miles from Waſhington.

SNIADYN, a town of Lithuania, in the palatinate of Brzeſc; 88 miles E. of Pinſk.

SNIATYN, a town of Auſtrian Poland, in Galicia, on the Pruth; 96 miles N. of Lemberg. N. lat. 48° 33′. E. long. 25° 52′.

SNID-SKARON, a ſmall iſland in the gulf of Bothnia. N. lat. 65° 25′.

SNIEGULKA, in *Natural Hiſtory*, the name given by the common people of Poland to a bird of paſſage, that only comes to them in the colder months.

The name ſignifies the *ſnow-bird;* and Rzaczinſki, in his Hiſtory of Poland, calls it *nivalis avis*. The people preſage from its coming, the mildneſs or ſeverity of their winter.

SNIGGLING, a method of fiſhing for eels, chiefly uſed in the day-time, when they are found to abſcond themſelves near weirs, mills, or flood-gates; it is performed thus; take a ſtrong line and hook, baited with a lob or garden-worm, and obſerving the holes where the eels lie hid, thruſt your bait into them by the help of a ſtick, and if there be any, you ſhall be ſure to have a bite; and may, if your tackling hold, get the largeſt eels.

SNIPE, *Gallinago Minor*, or *Scolopax Gallinago* of Linnæus, in *Ornithology*, a bird well known among the ſportſmen, and which, though in general a bird of paſſage, yet ſometimes remains with us the whole year, and builds and breeds here. Its young are ſo often found in England, that Mr. Pennant doubts whether it ever entirely leaves this iſland. It lives in marſhy places, and builds among reeds in winter, but in the ſummer is found in our higheſt mountains as well as low moors; it lays four or five eggs at a time, of a dirty olive colour, marked with duſky ſpots.

When ſnipes are much diſturbed, particularly in the breeding ſeaſon, they ſoar to a great height, making a peculiar bleating noiſe, and when they deſcend, dart down with great rapidity. The cock is obſerved (while his mate ſits on her eggs) to poiſe himſelf on his wings, making ſometimes a whiſtling and ſometimes a drumming noiſe. Their food is the ſame with that of the woodcock, and they are found in every quarter of the globe, and in all climates. See SCOLOPAX *Gallinago*.

Theſe birds are eaſily taken, by means of lime-twigs in this manner: take fifty or ſixty birchen twigs, and lime them all very well together; take theſe out into places where there are ſnipes, and having found the places which they moſt frequent, which may be ſeen by their dung, ſet the twigs in theſe places, at about a yard diſtance one from another. Other places are thoſe where the water lies open in hard froſt and ſnowy weather; in theſe places alſo, and wherever they are ſuſpected to come to feed, let more lime twigs be placed in the ſame manner. The twigs are not to be placed perpendicularly in the ground, but ſloping, ſome one way, ſome another; the ſportſman is then to retire to a diſtance, and watch the coming of the birds to theſe places. When they fly to them, they naturally take a ſweep round the earth, and by this means they will almoſt always be caught by one or other of the twigs. When the firſt ſnipe is taken, the ſportſman is not to run to take it up, for it will feed with the twig under its wings, and this will be a means of bringing down more of them to the place. When three or four are taken, they may be taken up, only leaving one faſt to entice others; and thus the ſport may be continued as long as there are any birds of this kind about the place. It may be very proper, when the twigs are planted, to go about, and beat all the open and watery places near, that they may be raiſed from thence, and fly to thoſe places where the twigs are placed to receive them. The ſnipe, and alſo the woodcock, are by a late act comprehended under the claſs of GAME.

SNIPE, *Great*, a ſpecies very rarely found in England. See SCOLOPAX *Major*.

SNIPE, *Mire*. See BITTERN.

SNIPE, *Jack*. See JACK *Snipe*, and SCOLOPAX *Gallinula*.

SNIPE-*Bills*, in *Maritime Affairs*, a kind of hooks for faſtening the axle-tree of chain-pumps to the bitts.

SNISNITZA, in *Geography*, a mountain of Boſnia; 8 miles W. of Boſna.

SNIZORT, a town of the iſland of Skye. N. lat. 57° 27′. W. long. 6° 20′.

SNORING, in *Medicine*, *ſtertor*, *ronchus*, a ſound produced by ſleeping perſons in particular poſitions, apparently occaſioned by the vibrations of the palate in a ſtate of relaxation, when the reſpiration is performed by inſpiring and expiring the air through the mouth and the noſe at the ſame time. The ſounder the ſleep, and the more completely therefore the parts are relaxed, the louder and more conſtant the ſnoring. In the profound coma, which conſtitutes the ſleep of apoplexy, ſnoring is a characteriſtic ſymptom; but the apoplectic ſtertor is alſo commonly accompanied by an additional noiſe, ariſing from the ſaliva and mucus, which are not ſwallowed, being forced through the noſtrils, and ſtill more impeding the reſpiration. A ſimilar ſtertor likewiſe occurs in the profound coma produced by an over-doſe of opium, or of wine and ſpirits, which indeed is not always eaſily diſtinguiſhable from common apoplexy, except by the knowledge of the cauſe.

This ſnoring is very different from the noiſy reſpiration, or rattling in the throat, denominated *cerchnos* or *cerchon*, which is made in the larynx and windpipe, by the paſſing of the air through an accumulating fluid, as in caſes of aſthma, or in the laſt ſtruggles of exhauſted life; of the termination of which, in the latter inſtance, this rattling ſound is marked by the attendants as an unerring ſign.

SNORT, in the *Manege*, called in French *ebrouer*, denotes a certain ſound which a horſe of fire makes by breathing through his noſtrils; as if he had a mind to expel ſomething that was in his noſe, and hindered him to take breath.

This noiſe or ſound is performed by means of a cartilage within the noſtrils, called in French *ſouris*. Horſes of much metal ſnort, when you offer to keep them in. See SOURIS.

SNOTTER, in *Rigging*, a ſhort rope ſpliced together at the ends, and ſerved with ſpun-yarn, or covered with hide: it is ſeized to the ſize of the maſt, leaving a bight, wherein is fitted the lower end of the ſprit, which confines it to the maſt.

SNOV, in *Geography*, a river of Ruſſia, which runs into the Deſna, near Beriezin, in the government of Tchernigov.

SNOW, VALENTINE, in *Biography*, an admirable performer on the trumpet, whoſe exquiſite tone and fine ſhake muſt be well remembered by many perſons now living, who have heard him at Vauxhall, or in Handel's oratorios.

In 1753 he ſucceeded Shore as ſerjeant-trumpet, a place of 500*l.* a-year; after which promotion he ceaſed to perform in public, which was a ſerious loſs to the frequenters of Vauxhall, where his ſilver tones, having room to expand in the open air, never arrived at the ears of the audience in a manner too loud or piercing.

SNOW, *Nix*, a meteor formed in the middle region of the air, of vapour raiſed by the action of the ſun, or ſubterraneous fire; there congealed, its parts conſtipated, its ſpecific gravity increaſed, and thus returned to the earth in form of little white villi, or flakes.

The ſnow we receive, may properly enough be aſcribed to the coldneſs of the atmoſphere through which it falls. When the atmoſphere is warm enough to diſſolve the ſnow before it arrives at us, we call it *rain;* if it preſerves itſelf undiſſolved, it makes what we call *ſnow*. See EVAPORATION.

Dr. Grew, in a diſcourſe of the nature of ſnow, obſerves, that many parts of it are of a regular figure, for the moſt part ſo many little rowels, or ſtars of ſix points; and are perfect and tranſparent ice, as we ſee on a pond, &c. Upon each of theſe points are thoſe collateral points, ſet at the ſame angles as the main points themſelves; among which there are divers other irregular ones, which are chiefly broken points, and fragments of the regular ones: others, alſo, by various winds, ſeem to have been thawed, and frozen again into irregular cluſters; ſo that it ſeems as if the whole body of ſnow were an infinite maſs of icicles irregularly figured. A cloud of vapours being gathered into drops, the ſaid drops forthwith deſcend; upon which deſcent, meeting with a freezing air as they paſs through a colder region, each drop is immediately frozen into an icicle, ſhooting itſelf forth into ſeveral points; but theſe ſtill continuing their deſcent, and meeting with ſome intermitting gales of warmer air, or, in their continual waftage to and fro, touching upon each other, ſome of them are a little thawed, blunted, and again frozen into cluſters, or entangled, ſo as to fall down in what we call flakes.

Clouds of ſnow, ſignior Beccaria obſerves, differ in nothing from clouds of rain, (ſee RAIN,) but in the circumſtance of cold, which freezes them. Both the regular diffuſion of ſnow, and the regularity in the ſtructure of the parts of which it conſiſts, (particularly ſome figures of ſnow or hail, which he calls *roſette*, and which fall about Turin,) ſhew the clouds of ſnow to be actuated by ſome uniform cauſe, like electricity. He even endeavours, very particularly, to ſhew in what manner certain configurations of ſnow are made, by the uniform action of electricity. He adds, that his apparatus never failed to be electrified by ſnow, as well as by rain; and that a more intenſe electricity unites the particles of hail (ſee HAIL) more cloſely than the more moderate electricity does thoſe of ſnow. Lett. dell' Elletriciſmo, p. 520, &c. Prieſtley's Hiſt. &c. of Electricity, vol. i. p. 432.

The lightneſs of ſnow, although it is firm ice, is owing to the exceſs of its ſurface, in compariſon to the matter contained under it; as gold itſelf may be extended in ſurface till it will ride upon the leaſt breath of air.

The uſes of ſnow muſt be very great, if all be true that Bartholine has ſaid in its behalf, in an expreſs treatiſe "De Nivis Uſu Medico." He there ſhews, that it fructifies the earth (which, indeed, is a very old and general opinion); and that it preſerves from the plague, cures fevers, colics, tooth-aches, ſore-eyes, and pleuriſies, (for which laſt uſe, his countrymen of Denmark uſually keep ſnow-water gathered in March). He adds, that it contributes to the prolongation of life; giving inſtances of people in the Alpine mountains that live to great ages: and to the preſerving of dead bodies; inſtances of which he gives in perſons buried under the ſnow in paſſing the Alps, which have been found uncorrupted in the ſummer, when the ſnow is melted.

He obſerves, that, in Norway, ſnow-water is not only their ſole drink in the winter; but ſnow even ſerves for food; people having been known to live ſeveral days without any other ſuſtenance.

Indeed, the generality of the medicinal effects of ſnow are not to be aſcribed to any ſpecific virtue in ſnow, but to other cauſes.

It fructifies the ground, for inſtance, by guarding the corn, or other vegetables, from the intenſer cold of the air, eſpecially from the cold piercing winds; and it preſerves dead bodies, by conſtipating and binding up the parts, and thus preventing all ſuch fermentations, or internal conflicts of their particles, as would produce putrefaction.

It has been a vulgar opinion, very generally received, that ſnow fertilizes the lands upon which it falls more than rain, in conſequence of the nitrous ſalts which it is ſuppoſed to acquire by freezing. But it appears from the experiments of Margraaf, in the year 1751, that the chemical difference between rain and ſnow-water is exceedingly ſmall, and that the latter, however, is ſomewhat leſs nitrous, and contains a ſomewhat leſs proportion of earth than the former; but neither of them contain either earth or any kind of ſalt in any quantity, which can be ſenſibly efficacious in promoting vegetation. Allowing, therefore, that nitre is a fertilizer of land, which many are, upon good grounds, diſpoſed utterly to deny, yet ſo very ſmall is the quantity of it contained in ſnow, that it cannot be ſuppoſed to promote the vegetation of plants upon which the ſnow has fallen.

The peculiar agency of ſnow as a fertilizer, in preference to rain, may, without recurring to nitrous ſalts, erroneouſly ſuppoſed to be contained in it, be rationally aſcribed to its furniſhing a covering for the roots of vegetables, by which they are guarded from the influence of the atmoſpherical cold, and the internal heat of the earth is prevented from eſcaping. Snow may alſo fertilize the earth, agreeably to the hypotheſis of thoſe who make oil the food of plants, by means of the oily particles which it contains: beſides, ſnow, in melting, moiſtens and pulverizes the ſoil which had been bound up by the froſt, and thus fits it for the abſorption of the vernal dews and rain; and as its water has a tendency to putrefaction, it ſeems, on many accounts, without admitting it to contain any nitre, to be admirably adapted to promote vegetation. Watſon's Chem. Eſſ. vol. ii. p. 77, &c.

It is ſuppoſed by Dr. Darwin, that it may be true, that ſnows of long duration in our winters may be leſs injurious to vegetation than great rains and ſhorter froſt. Firſt, becauſe great rains carry down many thouſand pounds worth of the beſt manure into the ſea; whereas ſnow diſſolves gradually, the upper ſurface, as it thaws, ſliding over the under part, which remains frozen, and thence carries away leſs from the land into the rivers; whence a ſnow flood may be diſtinguiſhed from a rain flood by the tranſparency of the water. Secondly, ſnow protects vegetables from the ſeverity of the froſt; ſince it is generally in a ſtate of thaw where it is in contact with the earth; as the earth's heat is 48°, and that of thawing ſnow 32°. The plants between them are generally kept in a degree of heat about 40°, by which many of them are preſerved. On this account, ſome plants from Siberia were ſaid to periſh by the froſts at Upſal; becauſe the ſnows did not commence at the ſame time as in the colder climate from which they were brought. And thus, ſays he, the lichen rangiferinus, coral moſs, vegetates beneath the ſnow in Siberia, where the degree of heat is always about 40°; that is, in the middle between the freezing point and the common heat of the earth. And as this vegetable is, for many months of the winter, the ſole food of the rein-deer, who digs furrows in the ſnow to find it; and as the milk and fleſh of this animal are almoſt the only ſuſtenance which can be procured by the natives during the long winters of thoſe higher latitudes, this moſs may be ſaid to ſupport ſome millions of mankind. And it is added, that ſnow protects vegetables, that are covered by it, from cold, both becauſe it is a bad conductor of heat itſelf, and contains much air in its pores. When living animals are buried in ſnow, as ſheep, or hares, the water which their warmth produces, becomes abſorbed into the ſurrounding ſnow by capillary attraction, and the creatures are not moiſtened by its dropping on them; but the cavity enlarges, as the ſnow diſſolves, affording them both a dry and a warm habitation. If this was generally known, many cold and weary travellers in ſnowy nights might be ſaved by covering themſelves with ſnow, inſtead of endeavouring to proceed. It ſhould be added, he ſays, that Haſſenfratz has endeavoured to ſhew, by ingenious chemical experiments, that rain-water and ſnow contain both of them a redundancy of oxygen, compared with river-water, which they may have acquired in their deſcent through the atmoſphere; and that as oxygen is ſhewn by the experiments of Ingenhouz and Senebier, to promote the growth of ſeeds and of plants, he concludes that rain-water and ſnow promote vegetation in a much greater degree than river-water and ice, which ſeems to accord with the popular obſervations on this ſubject.

Deep and drifting ſnows are often very dangerous and troubleſome on ſheep-farms, and the elevated tracts on which they are kept during the winter ſeaſon, ſo as to require and demand much attention in the ſhepherd to prevent their fatal effects and conſequences.

It is a popular error, that the firſt ſnow that falls in the year has particular virtues. In Italy they cool their wines all the ſummer with ſnow-water.

Snow may be preſerved by ramming it down in a dry place under ground, and covering it well with chaff. At Leghorn they uſe barley chaff for this purpoſe.

Snow and ice are alſo preſerved with ſtraw or reeds. Mr. Boyle has deſcribed the manner in his experimental hiſtory of cold. See ICE and ICE-*Houſe*.

It is uſual in hot countries to mix ſnow and ice with their wine. Hence Pliny ſays, "Hi nives, illi glaciem potant, pœnaſque montium in voluptatem gulæ vertunt."

Signior Sarotti, in the Philoſophical Tranſactions, mentions a *red*, or *bloody* ſnow, which fell on the mountains La Langhe, near Genoa, on St. Joſeph's day. This ſnow, when ſqueezed, yielded a liquor of the ſame red colour.

Snow of a very bright red colour has ſometimes been found on the ſummits of the higheſt mountains. The matter which colours it burns with a ſmell ſimilar to that of a great many vegetable ſubſtances. Sauſſure, who often collected ſuch ſnow on the Alps, was induced by this property, as well as by its being found in ſummer, and in places where many plants were in flower, to conſider the colouring matter as the farina of ſome plant. C. Ramond, who found this duſt on the ſnow of the Pyrenees, remarked, that it is heavier than water, and hence ſuſpected it to be of mineral origin; and he, indeed, found that it ariſes from the decompoſition of certain micas. This decompoſition requires, without doubt, the conditions mentioned by Sauſſure; for C. Ramond found, that they are neceſſary on the Pyrenees, as well as on the Alps.

SNOW, in *Sea Language*, is generally the largeſt of all two-maſted veſſels employed by Europeans, and the moſt convenient for navigation. The ſails and rigging on the main-maſt and fore-maſt of a ſnow are exactly ſimilar to thoſe on the ſame maſts in a ſhip, only that there is a ſmall maſt behind the main-maſt of the former, which carries a ſail nearly reſembling the mizen of a ſhip. The foot of this maſt is fixed in a block of wood on the quarter-deck, abaft the main-maſt, and the head of it is attached to the after-part of the main-top. The ſail, which is called the try-ſail, is extended from its maſt towards the ſtern of the veſſel. When ſloops of war are rigged as ſnows, they are furniſhed with a horſe (ſee HORSE), which anſwers the purpoſe of the try-ſail-maſt, the fore-part of the ſail being attached by rings to the ſaid horſe, in different parts of its height. Falconer.

SNOW-*Ball Tree*, in *Botany*, a ſpecies of *Viburnum*; which ſee.

SNOW-*Berry*. See CHIOCOCCA.

SNOW-*Berry Buſh*, a ſpecies of *Lonicera*; which ſee.

SNOW-*Bird*, in *Ornithology*, the EMBERIZA *Nivalis* of Linnæus; which ſee.

Theſe birds are called in Scotland *ſnow-flakes*, becauſe they appear in hard weather and in deep ſnows. Some few breed in the Highlands, on the ſummits of the higheſt hills, but the greateſt number migrate from the extreme north. Their appearance is a certain forerunner of hard weather and ſtorms of ſnow, being driven by the cold from their common retreats. Their progreſs ſouthward is probably thus: Spitzbergen and Greenland, Hudſon's Bay, the Lapland Alps, Scandinavia, Iceland, the Ferro iſles, Shetland, Orknies, Scotland, and the Cheviot hills. They viſit, at that ſeaſon, all parts of the northern hemiſphere, Pruſſia, Auſtria, and Siberia. They arrive lean and return fat. In their flight they keep cloſe to each other, and fling themſelves collectively into the form of a ball, at which inſtant the fowler makes great havock among them. Pennant.

SNOW-*Drop*, in *Botany*. See GALANTHUS.

SNOW-*Drop, Great*. See LEUCOIUM.

SNOW-*Drop Tree*. See CHIONANTHUS.

SNOW-*Maill*, in *Sheep Farming*, a term uſually applied by the farmers in the northern parts of the iſland, to the ſum of money paid to any perſon who may be in poſſeſſion of low grounds, for permitting their ſheep to feed thereon in times of deep ſnows.

SNOW-*Plough*, in *Rural Economy*, a contrivance made uſe of in Sweden, and other northern countries, for the purpoſe of clearing roads from ſnow; and which might probably be employed here with advantage in the ſame intention. It conſiſts of a ſhaft, to which the horſes are yoked, uſually two a-breaſt, and one before. The ſides are conſtructed of three or four deals, well jointed and nailed together, having more or leſs height, according as the ſnow is more or leſs deep, as from three to four feet. The length is uſually about fifteen feet, and two iron bars are nailed to the bottom, to make it ſlide with greater facility. It has alſo a box for the purpoſe of being loaded, to keep it down. It may have any breadth, from fifteen to twenty feet, according as the ſnow may want clearing. There is a repreſentation of an implement of this kind in the firſt volume of Communications to the Board of Agriculture.

SNOW-*Stone*, in *Natural Hiſtory*, a name given by ſome to a very beautiful ſtone found in America; of which the Spaniards are very fond, making it into tables, and other ornaments, in their houſes. Alonſo Barba, who had ſeen much of it, tells us, that it is found in the province of Atacama, uſually in pieces of four feet long, and four or five inches broad; ſo that they are forced to join them in the working. Its general thickneſs is about two inches. It has a great variety of colours, which form clouds and variegations of a very beautiful kind. The principal colours are red, yellow, green, black, and white. The white is generally formed into ſpots on the very blackeſt parts of the maſs, and is ſo beautifully diſpoſed, that it repreſents ſnow falling in all its whiteneſs upon a jetty ſurface.

SNOW *Mountains*, in *Geography*, a range of lofty mountains, which forms an extenſive diſtrict in Southern Africa, near the Cape of Good Hope. The whole range of hills which is included under this name forms a large group, of which the two great parallel chains from the weſt, with another not leſs extenſive chain from the north-eaſt, and a ſmaller from the ſouth, are all united. The name, in itſelf, indicates a pretty conſiderable height; and, in fact, the higheſt point, called the "Compaſs-Hill," is, according to the calculations of colonel Gordon, about 300 feet higher than the ſummit of the "Kamberg," and, conſequently, 6500 feet above the level of the ſea. This hill is diſtinguiſhed more particularly from all others in Southern Africa, by being leſs inſulated; or, in other words, it is ſurrounded every way by hills of a conſtantly decreaſing elevation, till they are loſt at length in the plain. On all ſides, the ſlopes are gradual from the ſummit, ſo that the traveller may be conſtantly aſcending for ſeveral days together, by tolerably commodious paths, without encountering any dangerous ſteeps, any deep chaſms, or rugged precipices. The heights are all rounded like domes; the valleys are ſpacious and open; and even conſiderable plains ſtretch in ſome places between one aſcent and the next. The aſpect of the whole mountain is rather naked and uniform than wild and majeſtic: on account of the gentleneſs of the acclivity, and the level nature of the valleys, the water does not ruſh down in torrents, or form deep channels, but rather ſinks into the earth; and to this circumſtance the fertility of theſe mountains is to be principally aſcribed. In its marſhy hollows, the horned cattle find excellent paſture, and the ridges and heights being ſcattered over with ſmall aromatic plants, the ſheep are furniſhed with an abundant ſupply of the moſt ſalutary nouriſhment. The climate in the higher parts is cold in winter, and deep ſnows fall, which continue to lie upon the ground for many weeks. Nevertheleſs, the greater part of the country is habitable; the inhabitants of the other parts that are not ſo, deſcend into ſome of the lower parts, where they have a "legplaats," or winter habitation, during the ſhort period in which they are obliged to quit their more elevated ſituation. In this reſpect the Snow mountains have a very decided preference over the Roggeveld; and, beſides, the weather, in winter, though cold, is clear and bright, whereas, in the Roggeveld, there are often thick fogs, which are very injurious to the cattle.

Three conſiderable rivers have their ſources in the Snow mountains, which are conſtantly ſupplied with water through the whole year, from the melted ſnows and the rain-water. Towards the S. flows the Zondag's river; towards the E. ſeveral ſmall ſtreams, which at laſt unite to form the great Fiſh river; and at the foot of the mountains on the N. ſide, riſes the Sea-Cow river, which flows into the Orange river, which latter, ſubſequent to this union, continues its courſe for more than 100 miles, when it falls into the ſea on the weſtern coaſt. Both the other rivers run in a ſoutherly direction.

The upper ſtratum of the Snow mountains conſiſts of a large-grained ſand-ſtone, intermingled at intervals with quartz. Lower down they conſiſt of a ſchiſt, varying in different parts, both in thickneſs and colour; but no granite is found here. The ſoil throughout is a ſoft argile, which, as well as the ſand-ſtone, is in many parts very much oxydated. The ground is almoſt every where ſtrewed with looſe ſtones, which very much contribute to keep it cool in ſummer, and alſo aſſiſt in promoting the vegetation of the plants. Here is no want of ſprings, and therefore the country is tolerably populous; it is very favourable to the breeding of cattle, and moſt of the inhabitants are in eaſy circumſtances. But through the country the ſprings, though conſtantly flowing, do not yield ſuch an abundance of water as to allow of ſufficiently watering the fields for agricultural purpoſes. On theſe hills no tree grows; and it is juſtly obſerved by Mr. Barrow, that here are people, who in their whole lives never ſaw a wood, or even a copſe. The want of wood prevents a ſupply of fuel, ſo that people are obliged to burn the dung of their cattle dried. The bleak wind of winter is particularly adverſe to the cultivation of nut or fruit-trees, and even the oak will not thrive. The locuſts in this country are very numerous, and very deſtructive. Game is abundant, but the lions and leopards do great miſchief among the flocks and herds. But of all the enemies which this country has to dread, the Boſjeſmans are the moſt formidable, whoſe maraudings occaſion annually a loſs of five out of every hundred of the ſheep and oxen. The breeding of ſheep is the moſt important occupation of the coloniſts in theſe parts. The ſheep of this country and of the Roggeveld are the moſt weighty of any in the colony, and their fleſh is reckoned the beſt flavoured. Some farmers have flocks to the amount of 6000 or 7000, and few have leſs than 3000. The cattle are not leſs profitable. The cows give rich milk in abundance, more ſo than in other parts; and great quantities of butter are carried to Cape Town. Mr. Barrow reckons that a herd of 50 cows will produce at leaſt 100 pounds of butter in a week. The inhabitants of the Snow mountains are a vigorous and cheerful race. Mr. Barrow, it is ſaid, aſſociated with ſome of the moſt worthy and reſpectable people of the colony, and ſeems to have entertained too favourable an opinion of their general character, as others have found them leſs friendly and hoſpitable. It is obſerved, that without ſuch dogs as this country affords, it would be abſolutely uninhabitable. By theſe the inhabitants are defended, not only from their four-footed enemies, but alſo from the Boſjeſmans. Nothing can be compared to their watchfulneſs; the leopard, the jackal, even the lion himſelf, are terrified with the barking of the faithful troop, and haſten to retreat.

SNOW-BIRD Lake, a lake of North America, W. of Hudſon's bay; 12 miles wide from E. to W., but from N. to S. much more extenſive.

SNOWDON Mountains, a cluſter or ridge of lofty hills in the county of Caernarvon, North Wales, are ſituated to the S.E. of the county-town, ſtretching to the confines of Merionethſhire. They are called by the Welſh the mountains of Eryri, and according to an ancient proverb, mentioned by Giraldus, were conſidered to be ſo extenſive and productive, as to be capable of affording ſufficient paſture for all the herds in Wales, if collected together. The ſame author informs us, that there were two lakes on the high part of theſe hills, one of which was remarkable for a floating iſland, and the other for three kinds of fiſh, *viz.* eels, trout, and perch, which had "only one eye, the left being wanting." The higheſt ſummit of this ridge is called by the inhabitants Y Wyddfa, or the Conſpicuous, and by the Engliſh, ſpecially Snowdon. Though confeſſedly the higheſt mountain in Wales, being, according to Pennant, 3567 feet above the level of the ſea, it is by no means the moſt pictureſque in its form; for Cadair Idris, Moelwyn, and Arran, in North Wales, and the Cadair Arthur, near Brecknock, in South Wales, preſent a far bolder outline. Camden remarks of theſe mountains, that they may be very properly termed the Britiſh Alps; "for beſides that they are the higheſt of all the iſland, they are alſo no leſs inacceſſible by reaſon of the ſteepneſs of their rocks than the Alps themſelves; and they all encompaſs one hill, which far exceeding the reſt in height, does ſo towre its head aloft, that it ſeems, I ſhall not ſay to threaten the ſky, but to thruſt its ſummit into it. It harbours ſnow continually, being throughout the year covered with it, or rather with a hardened cruſt of ſnow, and hence the Britiſh name of Craig Eryri, and the Engliſh one of Snowdon."

Snowdon was held as ſacred by the ancient Britons, as Parnaſſus was by the Greeks, and Ida by the Cretans. It is ſtill ſaid, "that whoſoever ſlept upon Snowdon would wake inſpired, as much as if he had taken a nap on the hill of Apollo." The Welſh alſo have always had the ſtrongeſt attachment to the tract of Snowdon. It was, ſay they, the appurtenance of the principality of Wales, which the prince and his predeceſſors held from the days of Brute. One of the titles of the prince was that of lord of Snowdon: and, indeed, ſuch was the importance attached to this ſtrong region, that when Llewellyn was at his laſt extremity, he rejected "the propoſal of Edward, of a thouſand a-year, and ſome honourable county in England, to give it up, well knowing that his principality muſt terminate with the ceſſion." When the Engliſh monarch afterwards effected the complete conqueſt of Wales, he held a triumphal fair upon this mountain, and adjourned to finiſh the joy of his victory, by ſolemn tournaments on the plains of Nevin. After this event the tract of Snowdon was annexed to the crown of England, and continued to be a royal foreſt as late as the reign of queen Elizabeth. Leland informs us, that in his days ſtags were found here in ſuch numbers, as to deſtroy the little corn the farmers attempted to ſow; but theſe, Pennant tells us, were extirpated before the year 1626. The ſame author adds, "Snowdon being a royal foreſt, warrants were iſſued for the killing of the deer. I have ſeen one from the duke of Suffolk, dated April 30, 1552, and another in the firſt year of queen Elizabeth, ſigned by Robert Tounesfend; and a third, in 1561, by Henry Sydney. The ſecond was addreſſed to the maſter of the game, ranger, and keeper of the queen's highneſs foreſt of Snowdon, in the county of Carnarvon. The laſt extended the foreſt into the counties of Meirionydd and Angleſea, with the view of gratifying the rapacity of the favourite, Dudley, earl of Leiceſter, who had by letters patent been appointed chief ranger." Pennant's Tour in Wales, vol. ii. 4to. The Itinerary of Archbiſhop Baldwin through Wales, A.D. 1188, by Giraldus de Barri, tranſlated by ſir R. C. Hoare, bart. 4to. 1806. Aikin's Tour in Wales, 8vo. Wyndham's Tour in North Wales, 4to. Hutton's Remarks on North Wales, being the Reſult of Sixteen Tours, 8vo. 1803. Bingley's Tour round North Wales, 2 vols. 8vo. 1800. Caernarvonſhire, or ſome Account of its Antiquities, Mountains, and Productions, 8vo. 1792.

SNOW-HILL, a ſea-port of Maryland, and capital of Worceſter county, ſituated on the S.E. ſide of Pokomoke river, containing about 60 houſes, a court-houſe and gaol; the inhabitants of which deal principally in lumber and corn; 158 miles from Waſhington. N. lat. 38° 11′. W. long. 75° 30′.

SNOWSWICK *Pine-Apple Cheeſe*, in *Rural Economy*, a particular ſort of cheeſe made about that place in Berkſhire, which are of the pine-apple ſhape and external appearance. They are principally made upon the farm of a Mr. Pike, and ſome others, in the pariſh of Buſcot, which are famous for them. They ſell conſiderably higher than thoſe cheeſes which are made in the common forms, and they are juſtly entitled to the diſtinction and increaſe of price, in conſequence of their peculiar richneſs, and the delicacy of their flavour. When kept to the proper age, they are, perhaps, not inferior to any cheeſe in the kingdom.

In regard to the method of making them, the firſt part of the proceſs is exactly the ſame as for the common ſort. The curds are then well worked and broken down with the hands, after which the whole is preſſed into a wooden mould, contrived in the ſhape of a flower-pot, being afterwards hung up and ſuſpended from beams, rafters, or pegs, in an airy apartment, in a net, the meſhes of which mark and indent the ſurface in the manner of the pine-apple. Salt is then rubbed into and over them, or they are ſteeped in a ſuitable brine made from that ſubſtance. On the above perſon's farm, the firſt of theſe methods is thought to be the moſt proper and adviſeable. No ſort of continued preſſure is employed, and yet in firmneſs, it is ſaid, when dry, theſe cheeſes cannot be diſtinguiſhed from thoſe which have undergone the force of preſſure in cheeſe-preſſes.

One of theſe pine-apple cheeſes, for the moſt part, weighs about five pounds, and in good years, it is ſaid, that two tons of them are made on the farm already noticed alone. It is, indeed, ſcarcely known that they are manufactured any where elſe.

Some cheeſes are made in other parts of this diſtrict, as about Stanford, in the Vale, in the fanciful ſhape of a hare ſitting in her form. Theſe are likewiſe ſometimes coloured with ſage. See Cheese and Dairying.

SNUFF, a preparation of tobacco, made by reducing it into a powder, fit to be taken in at the noſe, in order to purge or clear the head of pituita.

Ordinarily, tobacco is the baſis of ſnuff; other matters being only added to give it a more agreeable ſcent, &c. The kinds of ſnuff, and their ſeveral names, are infinite; and new ones are daily invented; ſo that it would be difficult, not to ſay impoſſible, to give a detail of them. We ſhall only ſay, that there are three principal ſorts: the firſt granulated; the ſecond an impalpable powder; and the third the bran, or coarſe part remaining after ſifting the ſecond ſort.

The many miſchiefs attending the unnatural practice of taking this powder of tobacco at the noſtrils, have been deſcribed by the writers in general on theſe ſubjects, ſince this pernicious cuſtom has reigned in the world; but one of the moſt remarkable accidents, occaſioned by it, is related in the Acta Eruditorum, which was the forming of a polypus in the œſophagus, that killed the patient, by ſtarving him, from an inability of ſwallowing. Act. Erudit. an. 1715, p. 475. See Pica *Naſi*.

Snuff, or *Snuffler*, in the *Manege*. See Snort.

SNUG Bay, in *Geography*, a bay in the Straits of Magellan, N.N.W. of Cape Froward.

Snug *Bay Point*, a cape in the Straits of Magellan; 8 miles N.N.W. of Cape Froward.

Snug *Corner Cove*, a bay of the North Pacific ocean, on the E. ſide of Prince William's ſound, on the W. coaſt of North America. N. lat. 60° 50′. W. long. 146° 30′.

SNYING, in *Ship-Building*, a term applied to thoſe planks, whoſe edges curve or round upwards. The great ſny occaſioned in full bows or buttocks is only to be prevented by introducing ſteelers. See Steelers.

SNYTE, in *Geography*, a river of England, which runs into the Dean, in Nottinghamſhire.

SOA, a town of the iſland of Cuba; 60 miles N. of St. Yago.

Soa, a ſmall iſland of the Hebrides, or Weſtern iſlands of Scotland, ſituated near the celebrated iſle of St. Kilda. It is about a mile in circumference.

SOACA, in *Ancient Geography*, a town ſituated in the interior of Arabia Felix, according to Ptolemy.

SOAGGIO, in *Ichthyology*, the name of a fiſh common in the markets of Rome and of Venice, and of the turbot kind. See Lug-*a-leaf*.

SOAID, in *Geography*. See Saidou.

SOAK, or Souiak, a town of Arabia, in the province of Maſcat, on the E. coaſt; 5 miles N.W. of Burka.

SOAKAGE, in *Agriculture*, a term applied to the water that drains through the banks or other parts, in fen and other moiſt diſtricts. It is very conſiderable and troubleſome in ſome inſtances, ſo as to cauſe much expence. See Embankment.

SOAL, or Sole, in *Ichthyology*, the Engliſh name of the fiſh, called by the generality of authors the *bugloſſus*, by ſome *ſolea*, and the Pleuronectes *Solea* of Linnæus, which ſee. Some authors call it the *linguacula*.

The ſoal is found on all our coaſts, but thoſe on the weſtern ſhores are much larger than thoſe of the north. They are uſually taken in a trawl-net; they keep much at the bottom, and feed on ſmall ſhell-fiſh. The ſmall ſoals are much ſuperior in goodneſs to the large ones.

Soals may be taken at any time of the year, but they muſt not be under ſeven inches from the eye to the end of the tail. 1 & 2 Geo. I. cap. 18.

Soal, *Smooth*, from its tranſparency called the *lantern-fiſh*. See Pleuronectes *Arnogloſſus*.

SOALTERPOUR, in *Geography*, a town of Bengal; 20 miles E. of Rangamatty.

SOAMUS, (*Tſhamou*), in *Ancient Geography*, a river of India, on this ſide of the Ganges. Its ſource was in mount Emodus, S. of the Hydaſpes, into which it diſcharged itſelf N.E. of Bucephala.

SOANA, a river of Aſiatic Sarmatia, the mouth of which is placed by Ptolemy on the weſtern coaſt of the Caſpian ſea, above the town of Telcha.—Alſo, a river of the iſland of Taprobana, ſo called by Ptolemy, who places its mouth on the weſtern coaſt, between the promontory of Andraſimundum and the town Sindocanda. —Alſo, a town of Italy, in Etruria, N.W. of the Volſinii.

Soana, in *Geography*, a town of Etruria, the ſee of a biſhop, ſuffragan of Sienna; 24 miles N.E. of Orbitello.

Soana, a mountain of France; 10 miles S. of Aoſta.

SOANDA, or Soandus, in *Ancient Geography*, a town of Cappadocia, between Therma and Sacæna, according to the Itinerary of Antonine.

SOANE, in *Geography*, a river of Hindooſtan, which riſes in the country of Allahabad, about 30 miles S.E. from Sohagepour, and runs into the Ganges, near Patna.

SOANEN, John, in *Biography*, a French prelate, was born at Rioms in 1647. His father was an attorney in the preſidial court of that city; his mother was niece of the learned Jeſuit Sirmond. In 1661 he entered the congregation of the Oratory at Paris, where he took for his confeſſor the celebrated father Queſnel. After teaching the languages and rhetoric in ſeveral of the ſeminaries of the ſociety, he devoted himſelf to pulpit ſervices, and with ſo much ſucceſs, that he became one of the four diſtinguiſhed preachers of the congregation, who were popularly denominated the four evangeliſts. Fenelon joined him with Maſſillon as models of pulpit eloquence. In 1695 he was placed in the ſee of Seneza, a biſhopric of ſmall revenue, but which, being in a retired ſituation, required little of the parade of office, and permitted him to expend the greateſt ſhare of his income in charity. To his various virtues as a Chriſtian paſtor, he united a firmneſs which enabled him to ſuſtain the part of a martyr to principle. On the publication of the bull Unigenitus, which contained a condemnation of Queſnel's opinions, he appealed againſt it to a future council, and publiſhed a paſtoral letter, in which he controverted its poſitions with great force of argument. Cardinal Fleury, reſolving to make an example of a diſobedient prelate, ſelected Soanen for a victim; and in 1727, aſſembling the council of Embrun, procured a condemnation of the licentious biſhop, who was ſuſpended from his prieſtly and epiſcopal functions, and exiled. In his retreat he had numerous viſitors, who paid him the reſpect due to his virtue and integrity. He died in the year 1740, at the age of 92, revered by the Janſeniſts as a ſaint, and condemned by the Moliniſts as a rebel. He was author of "Paſtoral Inſtructions," "Charges," and "Letters," which were printed, with his "Life," in 2 vols. 4to. and 8 vols. 12mo.

SOANES, in *Ancient Geography*, a people of Aſia, in the Colchide, being of the number of thoſe who were in the general aſſembly of Dioſcurias, and who inhabited the ſummits of mount Caucaſus, above the town of Dioſcurias, according to Strabo.

SOANGUR, in *Geography*, a town of Hindooſtan, in Guzerat; 50 miles S. of Surat. N. lat. 21° 10′. E. long. 73° 33′.

SOANK, a town of Hindooſtan, in Bahar; 45 miles S.S.E. of Bahar.—Alſo, a river of Hindooſtan, which riſes near Burwah, in Bahar, and runs into the Bramnee, near Khoud, in Oriſſa.

SOAP, in *Chemiſtry*, is a name for thoſe bodies which are compounds of the alkalies with fat and the fixed oils. The earths and the other metallic oxyds alſo combine with fat and oils, forming neutral compounds. The former have been called earthy, and the latter metallic ſoaps.

The ſoaps formed by the alkalies have the diſtinguiſhing character of being ſoluble in water and alcohol. The earthy ſoaps are perfectly inſoluble. And ſince any of the earths have a ſtronger attraction for oil than the alkalies, the alkaline ſoaps are always decompoſed by the earths. This occaſions the curdy appearance when ſoap is uſed with water containing any earthy or metallic ſalt. It is from this quality that waters are ſaid to be hard.

The earthy ſoaps are of a greyiſh-white colour, of a curdy appearance. The metallic ſoaps are of different colours. Both theſe and the earthy ſoaps are formed by adding a ſolution of an alkaline ſoap to a ſolution of an earthy or metallic ſalt. A precipitate is formed, which is the ſoap to be obtained. With a ſolution of iron containing the red oxyd, the ſoap is of an orange-red colour. It has the conſiſtency of a ſalve or plaſter, but by expoſure to the air it becomes dry and friable, but may be ſoftened by heat. When a ſimilar ſolution of ſoap is added to a ſolution of ſulphate of copper, a green ſoap is formed, which is a fluxible maſs like wax. Corroſive ſublimate, treated in this manner, gives a red ſoap. All the metallic oxyds may be combined with fat or oil in a ſimilar way.

Soap, in the *Manufactures* and *Domeſtic Economy*. This is confined to ſoaps made with the fixed alkalies, combined with different kinds of fat and oil. Theſe, in the manufacture of ſoap, are divided into two principal varieties, *viz.* hard and ſoft.

1. *Hard Soap.*—The alkali employed for hard ſoap is ſoda, generally obtained from the different ſea vegetables, and called by different names, according to the name of the plant in different countries. Moſt of the *algæ*, but particularly the *fucus* and *ſalſola*, afford ſoda by burning. The vegetables are firſt dried, and then burnt in pits formed with looſe ſtones. The earthy matter and the ſoda, with ſome neutral ſalts, fuſe into a crude maſs, in which ſtate it is ſold. This ſubſtance is furniſhed in great abundance from the Highlands of Scotland, under the name of *kelp*, and from Alicant in Spain, under the name of *barilla*. In France it is known by the name of *varec*; this being the name of the plant from which it is generally produced there.

It is commonly, however, in this ſtate that it comes to the ſoap-maker, varying frequently in its value, and often occaſioning much uncertainty in its employment. It ſhould be the firſt buſineſs, therefore, of the manufacturer, to aſſay the ſubſtance from which he gets his alkali, even before he purchaſes it. For this purpoſe a given quantity ſhould be dried and weighed. After reducing it to powder, it muſt be treated with hot rain-water, till the water coming from it has no taſte, reſerving all the portions of water added from time to time. Concentrate this liquid by evaporation, till the quantity of liquid is not more than three times the weight of the quantity taken to be aſſayed. Now weigh out a quantity of ſulphuric acid, ſay half the weight of the aſſay. From this quantity take ſmall portions at a time, and add them to the ſolution above-mentioned, ſtirring it at the ſame time with a wooden rod. When the eſcape of gas begins to diminiſh on the addition of freſh acid, let the additional portions be very ſmall. Now take bits of paper ſtained blue with litmus: on dipping one into the liquid, if more acid is wanting, the paper will not be changed, but the moment the paper is turned red by the liquid, ceaſe to add ſulphuric acid. Let the remaining acid be now weighed, in order to know what has been uſed, and note this down. Now take pure ſal ſoda (carbonate of ſoda) in well-formed cryſtals, exactly of the ſame weight with the firſt aſſay, and diſſolve it in three times its weight of pure water. Weigh out the ſame quantity of ſulphuric acid as before, and juſt follow the ſame ſteps as above directed, till the litmus paper juſt turns red, then weigh the remaining acid, to obtain the quantity uſed, and note down as before. Then ſay, as the acid conſumed by the ſal ſoda is to that conſumed by the aſſay, ſo is 100 to a number which will give the *per centage* of carbonate of ſoda contained in the crude alkali. Thirty *per cent.* of the carbonate of ſoda ſo indicated will be real ſoda, the only ſubſtance which combines with the fat to form ſoap. When the exact value of the alkali is known, it is then to be treated as follows, to prepare it for mixing with the fat.

The kelp or barilla is firſt to be pounded, and then mixed with one-fifth its weight of quicklime, in a large vat. Theſe vats are generally three or four in number to each boiler. They are frequently made with brick-work, from four to five-feet cubes, but ſometimes of caſt-iron. Beſides theſe vats for the infuſion of crude alkali, each of theſe has a ſimilar cavity under it. The bottom of the vat is even with the ground, the under vat being ſunk below, and is intended to receive the liquor which runs from a plug-hole in the upper vat, when the infuſion has gone on to a certain extent. One of theſe vats, with its under reſervoir, is ſufficient for one boiling, but they are generally all at work, in order to give time for the ſolution of the alkali from the crude maſs.

In charging a vat, the barilla, kelp, or potaſh, and ſometimes mixtures of theſe, are firſt coarſely powdered, and mixed with quicklime alſo coarſely powdered; ſome water is then thrown upon theſe to ſlake the lime. In the ſide of the vat ſome ſtraw is firſt placed about the plug-hole, to prevent bits from paſſing through. The vat is now charged, and water poured upon the materials till it ſtands conſiderably above the ſolid maſs. After ſtanding ſeveral hours the plug is withdrawn, to let out the ſolution into the lower reſervoir. The plug is now returned, and freſh water poured upon the materials. Some or all the firſt ley is now removed into one of the other lower reſervoirs before the ſecond infuſion is drawn off. This is done, that the ſoap-boiler may always have at command two leys of different degrees of ſtrength, as in the courſe of every boiling he finds it neceſſary to uſe ſometimes the weak and at other times the ſtrong.

The number of waters to be added to the materials depends upon the judgment of the workman, who by his taſte can tell when the water has diſſolved the whole of the alkali. The times of charging the vats are irregular with reſpect to the times of charging the boiler. Some one of the vats is conſtantly employed, in order to inſure a conſtant ſupply of the ley.

The boilers are made to hold from about 20 to 25 cwt. of ſoap; they are made in two parts, the lower part being about three feet in diameter, and the ſame in length: under the bottom of this the fire acts. The top part has a flange, to which the upper part is ſcrewed. The latter is nearly an hemiſphere, riſing above the floor juſt ſufficient to allow the workman to ſtir the ſoap when he ſtands up.

The ley being ready to lade out of the reſervoir, which is near to the boiler, the tallow or oil firſt weighed is put in. When it is ſufficiently melted, the workman begins by adding the ley, and ſtirring the mixture. The alkali and the oil ſoon begin to unite, forming a milky fluid. As more ley is added, and the ſtirring continued, the liquid thickens. This is continued generally for 30 hours, and frequently more, till ſmall portions of the ſoap, taken out from time to time, aſſume a proper conſiſtence, which the workman by conſtant experience underſtands. He now adds a quantity of common ſalt, which has the effect of ſeparating the watery part from the ſoap, which contains a portion of neutral ſalts, that exiſted in the crude alkali, and ſometimes alſo free alkali, eſpecially when more than enough has been added. The fire is now to be withdrawn, and the maſs left to cool. The watery part will be found at the bottom, and requires to be pumped out by a pump, which is a fixture on the ſide of the boiler. When this has been removed the fire is rekindled, and if the maſs does not melt freely, a little water is added. As ſoon as the whole becomes liquid, and is made uniform by agitation with wooden poles, the fire is again withdrawn, and the maſs allowed to aſſume a proper conſiſtence for lading. It is laded into ſquare moulds: theſe are compoſed of a number of ſtrata lying one upon another, ſo that when the ſoap has become ſolid, each layer of frame-work can be removed, beginning at the top, and the ſoap is cut into cakes with a piece of ſmall braſs wire at every interval: theſe cakes are afterwards cut into ſquare priſmatic pieces, in which ſtate they are ſold.

Some manufacturers proceed in a different manner in boiling the ſoap. In the method above deſcribed, and which is practiſed by a judicious ſoap-boiler in Derby, the watery part, or what is called the ſpent ley, is not ſeparated till all the ley is added. This method is called cloſe working, becauſe the liquid is of an uniform thickneſs all the time, till the ſalt is added: it then aſſumes what is called the granular form, in which the watery part is ſeparated from the ſoap, like the whey and the curd in making cheeſe. This ariſes from the ſoap being inſoluble in ſalt-water. In this ſtate the ſoap is ſaid to be open, to diſtinguiſh it from the ſtate in which it exiſts before the ſalt is added, and in which the ſoap is ſaid to be cloſed. In the open working the common ſalt is added at ſeveral intervals, in order to keep the ſoap ſeparated from the water. The fire is alſo withdrawn ſeveral times, and as many times the ſpent leys are pumped off. After each time, except the laſt, freſh ley is added and the ſtirring repeated. The proper ſtate for the ſoap is known by the appearance of the bubbles. The very hard ſoap, or that which is made with all ſoda, is not the moſt convenient for practice; it is neither ſo fit for waſhing the hands, nor ſo eaſily reducible to a pulpy ſtate for the different manufactures in which it is employed. The hard white ſoap, produced in the manufactory above alluded to, is in great repute from its whiteneſs and its proper conſiſtency. This ſoap is formed with tallow and a mixture of ſoda and potaſh. The boiler holds from about 25 to 27 cwt. of ſoap. The following are the average proportions of the materials employed; 13 cwt. 2 qr. 16 lbs. of tallow, 5 cwt. 3 qr. 12 lbs. barilla, 3 cwt. 2 qr. 6 lbs. American potaſh, 4 cwt. 2 qr. 7 lbs. quicklime, and 3 qr. 16 lbs. common ſalt (muriate of ſoda.) Theſe materials produce 1 ton 4 cwt. 0 qr. 1 lb. of white ſoap. The lime, the barilla, and the potaſh, are mixed together, and placed in the vat already deſcribed. In order to furniſh the ley which is added to the melted tallow, the lime is employed merely to rob the potaſh and ſoda of their carbonic acid, and of courſe does not enter into the compoſition of the ſoap. The neutral ſalts, which both the barilla and potaſh contain, are pumped out with the ſpent leys with a portion of uncombined alkali: of this we ſhall ſay ſomething hereafter.

Hence it will appear, that the ſoap is a compound of pure alkali, with the fat, and a portion of water.

In the making of ſoap, as in all other chemical combinations, the proportions appear to be definite. Every ſoap-boiler knows, that where too much ley is added to the fat, the exceſs will be found in the watery part under the ſoap; and that if the fat were in exceſs, the ſoap would be greaſy to the feel, and would otherwiſe ſhew the preſence of uncombined fat. Hence it will be found on analyſis, that the proportions will be uniform, becauſe they are definite. The quantity of ſoda which combines with olive-oil and tallow, is about 30 of the former to 212 of the latter; and ſince an atom of potaſh is to that of ſoda as 29.25 to 44.5, 45 of potaſh will combine with 212 of oil or tallow.

The following is an analyſis of ſoap by Darcet, Lelievre, and Pelletier:

Oil - - -	60.94
Soda - - -	8.56
Water - - -	30.5
	100

If the alkali were potaſh inſtead of ſoda, then the proportions would be,

Oil - - -	58.4
Potaſh - - -	12.3
Water - - -	29.3
	100

In the firſt of theſe analyſes, the ſoda is to the oil as 85 to 609, or as 1 to 7.28 nearly. In the ſecond, the potaſh is to the oil as 12.3 to 58.4, or as 1 to 4.6 nearly. The ſpecimen of ſoap before alluded to contains a mixture of potaſh and ſoda. The 3 cwt. 2 qr. 6 lbs. of American potaſh, according to the average value of that article, ought to give 2 cwt. 2 qr. of pure potaſh. By the above analyſis, the 1 ton 4 cwt. 0 qr. 1 lb. of ſoap ought to contain 7 cwt. 1 qr. 7 lbs. of water. There ought to be therefore only 16 cwt. 3 qr. 21 lbs. of the alkali and tallow. It appears, that in forming this ſpecimen of ſoap, 100 lbs. of common ſalt were added, which gives to the ſoap 55.5 lbs. of ſoda, and takes away from it 83.25 lbs. of potaſh. Hence, the alkali reſulting from the potaſh in this ſoap will be 1 cwt. 3 qr., and 55.5 lbs. of ſoda derived from the common ſalt, or 2 qr. 4 lbs. nearly. In order to know what ſoda is derived from the barilla, we muſt ſubtract the tallow and the alkali from the whole; that is (16 cwt. 2 qr. 27 lbs.) 1 cwt. 3 qr. of potaſh, 2 qr. of ſoda, and 13 cwt. 2 qr. 16 lbs. of tallow, will leave 3 qr. 6 lbs. of ſoda derived from the barilla.

The proportions of the ſoap in queſtion will, therefore, be, in 2689 lbs. of ſoap,

Tallow - - - -	1528	or	57
Soda - - - - -	146		5.4
Potaſh - - - - -	196		7.3
Water - - - - -	819		30.3
	2689		100

This reſult, although it contains a little too much of the mixed alkali to correſpond with theory, is ſtrikingly near the truth. We may therefore conclude, that ſoap, in general, contains from 8 to 12 *per cent.* of alkali, as more or leſs of each prevails, and about 30 *per cent.* of water. The hardeſt white ſoap made with ſoda would contain 8 *per cent.*; and the ſoft ſoap, in which potaſh alone is uſed, would be a little more than 12 *per cent.*

In the above ſpecimen of hard ſoap, it will be ſeen that 398 lbs. of crude potaſh furniſh 280 lbs. of real alkali, which is ſeven-tenths of the whole. With this were employed 656 lbs. of barilla, which furniſh 90 lbs. of real alkali. Now 192 lbs. of American potaſh will produce 135 lbs. of pure potaſh, and this will diſengage from 126 lbs. of muriate of ſoda, or common ſalt, 90 lbs. of pure ſoda. Hence 192 lbs. of American potaſh and 126 lbs. of ſalt will produce as much ſoda as 656 lbs. of barilla.

This weight of barilla, at the preſent price, coſts 10*l.* 5*s.*: 192 lbs. of potaſh will now coſt 6*l.* 17*s.*; and 126 lbs. of common ſalt, 1*l.* 17*s.* Theſe two ſums are 8*l.* 14*s.* The ſaving, therefore, in employing potaſh and common ſalt, in making even the beſt hard white ſoap, inſtead of barilla, is nearly 5 *per cent.* But if the two alkalies are to be contained in equal proportions, then about half the common ſalt only need be uſed, and the ſaving will be very conſiderable. It will alſo appear evident, that ſoap may be made of any degree of hardneſs, by uſing more or leſs of common ſalt with the potaſh; and that if no ſalt at all be uſed, the ſoap will be ſoft.

The difference of price between barilla and potaſh is often much more than at preſent in favour of uſing potaſh: this will make the ſaving above mentioned more conſpicuous.

It muſt alſo be remembered, that ſome ſalt is always uſed for the purpoſe of ſeparating the ſpent leys from the ſoap. This has been ſtated at about three-quarters of a cwt. to 24 cwt. of ſoap. It ſeems that a ſolution of ſalt of this ſtrength does not diſſolve ſoap.

Hard Soap, Yellow.—This ſoap is formed of ſimilar proportions of ſoda and tallow with the laſt; but it alſo contains roſin, and ſometimes palm oil.

The following are the average proportions of the materials for making yellow ſoap, which may be relied upon.

Tallow.	Roſin.	Palm Oil.	Barilla.	Potaſh.	Lime.	Soap produced.
Cwt. qr. lb.						
13 0 11	3 2 18	1 0 0	6 2 14	1 0 16	5 0 9	26 1 21

The whole weight of the materials, excluſive of the lime, and the refuſe of the potaſh and barilla, is equal to 24 cwt. 0 qr. 1 lb.; the ſoap, independent of the water it contains, is 18 cwt. 0 qr. 25 lbs.: this, taken from 24 cwt. 0 qr. 1 lb. leaves 5 cwt. 3 qr. 4 lbs. for the refuſe of the tallow, roſin, and palm oil. That the tallow muſt make much waſte will be eaſily conceived, from the moſt inferior kind being uſed. The roſin and oil muſt alſo yield much refuſe. This refuſe is found all together at the bottom of the pan after boiling, and is known in the manufactories under the name of *nigre.*

In boiling the yellow ſoap, the roſin, oil, and tallow are put into the boiler firſt. The ley is prepared in a ſimilar vat, and managed in other reſpects in the ſame mode as in forming the white ſoap.

The manner too of adding the ley from time to time, and the ſtirring, are juſt kept up in a ſimilar way, till the fatty matter is fully ſaturated. The time required for boiling the quantity of ſoap ſtated above, is ſometimes as much as three weeks, during which time it is kept in what is called the open ſtate, that is, the watery part is completely ſeparated from the ſoap. It would appear that this ſoap requires merely the preſence of the neutral ſalts in ley to keep it in the open ſtate. This ariſes probably from this being a leſs perfect ſoap, and leſs ſoluble in water. The ſoap appears in ſmall lumps, perfectly detached from the fluid. At the end of every day the ſoap is allowed to cool, when the thin part ſinks to the bottom: this is ſpent ley, and is pumped off every morning. The fire is again raiſed, and freſh leys added: the boiling and ſtirring go on again. This action is repeated till the fat is ſaid to be killed. This, as we have obſerved, takes ſometimes fifteen or twenty days. When this change is complete the fire is withdrawn, and the maſs allowed to cool: the laſt ley is pumped out. The addition of a little water, and the fire being raiſed, allow the ſoap to be diſſolved, and the refuſe, which is principally the ſubſtance we have called nigre, is left at the bottom, perfectly diſtinct from the ſoap. When the ſoap is of a proper conſiſtence for caking, it is transferred to the moulds, where it is treated in a manner ſimilar to that already deſcribed in the white ſoap.

It is a queſtion, whether making this inferior ſoap is ſo profitable to the manufacturer as is ſuppoſed. It has appeared, that in making the quantity of ſoap above ſtated, which is 26 cwt. 0 qr. 21 lbs., there are 5 cwt. 3 qr. 4 lbs. of refuſe, which is principally in the nigre. This refuſe will be found very trifling in the white ſoap; we think not more than $\frac{1}{25}$th of the weight of the ſoap. It will be evident, that in making the yellow ſoap, a great quantity of matter is uſed which never combines. Would it not be more economical to purify theſe materials before hand?

Soft Soap.—This differs in its compoſition from hard, in containing no alkali, but potaſh. We have ſeen that hard ſoap may be made not only with pure ſoda, as is the caſe in the manufactories in the ſouth of France, but that a tolerably hard ſoap, much better fitted for practice, is made with about equal portions of potaſh and ſoda.

Soft ſoap made with colourleſs fat, ſuch as tallow, is a white unctuous ſubſtance, about the conſiſtency of lard. If the fat be coloured, the ſoap partakes of the ſame. In France and other parts of the continent, it is generally coloured, ſometimes with metallic oxyds. Thoſe made with yellow oil are ſometimes coloured with indigo, which gives them a green colour. The oils employed are ſeldom olive-oil, but the cheaper oils, ſuch as rape-oil, the oil of hemp-ſeed, lint-ſeed, and others.

In Holland it was made with whale-oil. This oil was forbidden on ſome parts of the continent, on account of its diſagreeable ſmell. In this country, however, all the ſoft ſoaps are made with whale-oil, which gives a tranſparent maſs of a yellow colour. In commerce, however, we do not find it uniform in its colour. Beſides the yellow part, it appears interſperſed with white ſpots, giving the whole a ſtrong reſemblance to the inſide of a dried fig.

The proportions of potaſh and oil, for forming ſoft ſoap, will be eaſily inferred from what has been obſerved in the proportions of the other ſoaps. The white ſpecks are produced by adding a portion of tallow to the oil, when the boiler is charged. This addition does not improve the ſoap, but habit in commerce has rendered it indiſpenſable. The ley is prepared by adding to the potaſh about three-fourths its weight of quicklime, and the proceſs is continued as directed in making the hard ſoap, uſing the ſame apparatus. The ley, when prepared, is to be added to the oil and tallow in the boiler at intervals, ſimilar to thoſe in making the hard ſoap, and the ſtirring kept up in the ſame way, till the maſs aſſumes a proper conſiſtency. The experienced ſoap-maker will judge, when the materials are in proper proportions, by the appearance of the ſoap when boiling; hence he knows when to ceaſe to add more ley. Should a ſtranger to the proceſs of making either kind of ſoap have to perform the taſk, he would require to know the proportions in which the alkali ought to bear to the oil. He would weigh his oil or tallow when he put it into the boiler; he will aſſay his ley by the method laid down in the commencement of this article, and by that means know how much real alkali is contained in a given meaſure of his ley. He will by this means know nearly when he had added a ſufficient quantity of ley to ſaturate the oil or fat. In the ſoap made with ſoda, the real alkali muſt be to the oil as 1 to 7.28, and that with all potaſh muſt be as 1 to 5.1 nearly. This of courſe will be the proportion for ſoft ſoap. When the ſoft ſoap is of a proper conſiſtency for caking, it is poured into barrels, in which it is ſold.

Soaps, particularly the hard, are frequently reduced in their value, by the fraudulent practice of keeping them wet. The common or proper ſtate is when they contain about 30 *per cent.* of water; but they may, by a nefarious management, be made to contain 60 *per cent.* which is a great impoſition. This fraud, like many others, is detected when it is too late. It is found to loſe weight rapidly by expoſure to the air.

Before we cloſe this article, we may point out ſome means of economizing the uſe of the alkali in ſoap-making, which, in very extenſive manufactories, is worth attending to. In the firſt place, it ſhould be obſerved, that the ſpent leys always contain free alkali, and it is generally added a ſecond time, in order that as much as poſſible of it may be taken up. It is found, however, by experience, that ſome will ſtill be found in ſolution, which the fat will never take up. This is owing to the ſame liquid containing ſeveral neutral ſalts in ſolution. If this liquor be evaporated to a certain extent, and ſet to cool in ſhallow veſſels, the neutral ſalts will cryſtallize and ſeparate from the liquid to a certain extent. The liquid part may then be evaporated a ſecond time, and again cryſtallized. The liquid, after theſe ſalts have been ſeparated, may now be added to the fat, and the alkali will combine with it. If barilla or kelp is the alkali, then the liquid ought to have a little lime added, which evaporating, ſerves to take the carbonic acid from the ſoda. Without this precaution the carbonate of ſoda would cryſtallize with the other ſalts. With potaſh this precaution is unneceſſary.

The ſalts which are ſeparated from barilla and kelp are chiefly muriate and ſulphate of ſoda. The former may be uſed as a ſubſtitute for ſalt in the laſt part of the proceſs of boiling. The ſulphate of ſoda may be fuſed with ſawduſt or powdered coal in a reverberatory-furnace. The ſulphuret of ſoda is produced, from which the alkali may be recovered. Perfumed ſoaps are eaſily formed by adding the different eſſential oils while the ſoap is in a liquid form, but not while very hot, becauſe the perfume would evaporate. The ſaponaceous liquid, called milk of roſes, is formed by mixing the liquid obtained by expoſing potaſh to the air with roſe-water, and then adding this to oil of almonds, till the mixture becomes milky without being greaſy.

Ball Soap, commonly uſed in the North, is made with lees from aſhes and tallow. The lees are put into the copper, and boiled till the watery part is quite gone, and there remains nothing in the copper but a ſort of ſaline matter (the very ſtrength or eſſence of the ley); to this the tallow is put, and the copper is kept boiling and ſtirring for above half an hour, in which time the ſoap is made; and then it is put out of the copper into tubs, or baſkets, with ſheets in them, and immediately (whilſt ſoft) made into balls. Note, it requires nearly twenty-four hours, in this proceſs, to boil away the watery part of the ley.

The ſimpleſt, and upon the whole the moſt beautiful, ſoap, is the fine white ſoap prepared from olive-oil and ſoda, extracted from the beſt barilla, which is manufactured largely in the countries where the olive grows; particularly in the ſouth of France, for which Marſeilles is the moſt celebrated, in ſome parts of Italy, and in Tripoli. A ſimilar, but more expenſive ſoap, is made of ſoda and oil of almonds for medicinal purpoſes. (See Sapo *Amygdalinus.*) What is called in our country "Windſor ſoap" is of this kind, prepared with either of the above-mentioned oils. Common ſoap is manufactured principally by our ſoap-boilers from tallow or any other fat; and the alkali employed is either barilla or pearl-aſh, or a mixture of the two, according to the price and the practice of the manufacturer. But in order to obtain a ſtiff ſalt, recourſe is had to the action of common ſalt, as we have already mentioned. The olive-oil, or Marſeilles and other ſoaps, are ſometimes artificially "marbled," or ſtreaked throughout their whole ſubſtance with red or blue veins. This ſoap is harder than the white ſoap of the ſame materials, becauſe it requires to be dried to a greater degree in order to take the marbling. This is performed, by adding to the ſoap, as ſoon as it is completely made and ſeparated from the ſpent ley, a freſh quantity of ley, and immediately afterwards a ſolution of ſulphate of iron. A decompoſition between the two takes place, and a black oxyd of iron is ſeparated, which is entangled within the liquid ſoap. The boiler is then cooled, and the ley which ſettles is drawn off; after which the ſoap is again melted. A workman then ſtands over the boiler, and ſtirs the ſoap with a wooden inſtrument, while another throws in at intervals a quantity of colcothar, or brown-red oxyd of iron, ground up with water into an uniform liquid. This diffuſes both the oxyds through the ſoap, which is then cooled and framed. This proceſs requires ſome manual dexterity, ſo that the ingredients may be ſtirred together, and the marbling ſufficiently diffuſed through the whole maſs, without mixing it completely.

Soap is much uſed in waſhing and whitening linens, cleanſing woollen cloths from oil, whitening ſilk, and freeing it from the reſinous varniſh with which it is naturally covered; and for various other purpoſes, by the dyers, perfumers, hatters, fullers, &c.

The alkaline lixiviums, being capable of diſſolving oils more effectually than ſoap, might be employed for the ſame purpoſes; but when this activity is not mitigated by oil, as it is in ſoap, they are capable of altering, and even deſtroying entirely, by their cauſticity, moſt ſubſtances, eſpecially animal matters, as ſilk, wool, and others; whereas ſoap cleanſes from oil almoſt as effectually as pure alkali, without danger of altering or deſtroying, which renders it very uſeful.

The manufacture of ſoap in London, firſt began in the year 1524; before which time this city was ſerved with white ſoap from foreign countries, and with grey ſoap, ſpeckled with white, from Briſtol, and ſold for a penny a pound, and alſo black ſoap for a halfpenny the pound.

Soap, in the *Materia Medica.* Soaps, both hard and ſoft, have been applied to medical uſe. Well made hard ſoap, fit for medical uſe, has very little odour, and a nauſeous alkaleſcent taſte; is white, and of a firm conſiſtence; does not feel greaſy, and is devoid of any ſaline effloreſcence on the ſurface. With water it forms a milky opaque ſolution; and with alcohol a nearly tranſparent, ſomewhat gelatinous, ſolution. It is decompoſed by all the acids, and by many neutral ſalts, which combine with the alkali and form new compounds; hence hard water which contains ſulphate of lime does not properly diſſolve ſoap. According to the experiments of Darcet, Lelievre, and Pelletier, (ſtated in the preceding article,) 100 parts of newly made ſoap conſiſt of 60.94 oil, 8.56 alkali, and 0.503 water: but part of the water is loſt by keeping, and the ſoap becomes lighter.

Hard ſoap, triturated with vegetable reſins and thick balſams, incorporates with them into a compound; ſoluble, like the ſoap itſelf, in watery liquors; hence it proves an uſeful ingredient in reſinous pills, which of themſelves are apt to paſs entire through the inteſtines, but by the admixture of ſoap become diſſoluble in the ſtomach. It renders unctuous and thick animal matters diſſoluble in like manner in aqueous fluids, and hence may be preſumed to act as a menſtruum for theſe kinds of ſubſtances in the body, that is, to attenuate viſcid juices and reſolve obſtructions: ſuch, in effect, are the virtues which it appears to exert in cachectic, hydropic, and icteric caſes, in which laſt, particularly, its aperient and reſolvent powers have been often experienced. Solutions of it have been likewiſe found to diſſolve certain animal concretions of the harder kind, as the filaments which are ſometimes ſeen floating in the urine of rheumatic and arthritic perſons, the matter ſecreted in gouty joints, and the more compact urinary calculus; on theſe ſubſtances (at leaſt in the latter), though ſoap of itſelf acts more languidly than lime-water, yet, when joined to that menſtruum, it remarkably increaſes its activity; the diſſolving power of a compoſition of the two being, according to Dr. Whytt's experiments, conſiderably greater than that of the ſoap and lime-water unmixed: of the good effects of theſe medicines in calculous caſes there are ſeveral inſtances; but what their effects may be in gouty and rheumatic ones is not yet well known. See Lithontriptics, Stephens's *Medicine*, &c. and Stone.

Soap is regarded, in the materia medica, as purgative and lithontriptic; externally applied it is ſtimulant and deterſive. For internal uſe the hard ſoap only is employed. It is occaſionally ordered in habitual coſtiveneſs, and in jaundice, combined with rhubarb, or ſome bitter extract; but its power as a purgative is very limited, and it cannot act in any other way in relieving jaundice. It is more uſeful in calculous habits, in which, however, its action is altogether confined to the ſtomach; for as ſoap is decompoſed by the weakeſt acids, its alkaline baſe corrects the acidity ſo prevalent in the ſtomachs of calculous patints, and thus at leaſt aſſiſts in checking the increaſe of the diſeaſe. Soap is alſo beneficial in decompoſing metallic poiſons when taken into the ſtomach; and, as it is the antidote which can moſt readily be procured, ſhould always be early reſorted to. It is neceſſary in this latter caſe to give it in ſolution; of which a teacupful ſhould be drunk at ſhort intervals, till the effects expected from it be produced. In other caſes it is preferable to give it in ſubſtance. The doſe may be from grs. v to ʒſs, made into pills.

As an external remedy, ſoap is efficaciouſly uſed in frictions to ſprains and bruiſes; and much benefit has been derived from rubbing the tumid bellies of children labouring under meſenteric fever, with a ſtrong lather of ſoap every morning and evening.

From the properties of ſoap we may know, that it muſt be a very effectual and convenient anti-acid. It abſorbs acids as powerfully as pure alkalies and abſorbent earths, without having the cauſticity of the former, and without oppreſſing the ſtomach by its weight, like the latter. Soap is alſo one of the beſt antidotes to ſtop quickly, and with the leaſt inconvenience, the bad effects of acid corroſive poiſons, as aqua fortis, corroſive ſublimate, &c.

Soap is employed externally for diſcuſſing rheumatic pains, arthritic tumours, the humours ſtagnating after ſprains, &c. Some pretend that the indurated tophaceous concretions in arthritic joints, have been reſolved by the external uſe of ſoapy cataplaſms. Several compoſitions for external purpoſes are prepared in the ſhops.

The officinal preparations of ſoap are as follow: *viz.* "Pills of ſoap with opium," of Lond. Ph.; "Pills of compound ſquill;" "Aloetic pills" of Ed. Ph.; "Pills of aloes and aſſafœtida." (See Pills.) "Pills of aloes and ginger," of the Dub. Ph. are compounded of 1 oz. of hepatic aloes, 1 dr. of ginger-root in powder, $\frac{1}{2}$ oz. of ſoap, and $\frac{1}{2}$ dr. of eſſential oil of peppermint: let the aloes and ginger be rubbed together to a powder; then add the ſoap and the oil ſo as to form a maſs. This is an uſeful pill, and uſed with advantage for obviating the habitual coſtiveneſs of the ſedentary, and of leucophlegmatic habits. The doſe is from grs. x to grs. xv, or more:— "Soap plaſter." (See Emplastrum *Saponis*, and *Soap* Plaster.) "Cerate of ſoap," of the Lond. Ph. is compoſed of 8 oz. of hard ſoap, 10 oz. of yellow wax, 1 lb. of ſemivitreous oxyd of lead powdered, a pint of olive-oil, and a gallon of vinegar. Boil the vinegar on the oxyd of lead over a ſlow fire, ſtirring diligently till they incorporate; then add the ſoap, and boil again in a ſimilar manner, until the moiſture be entirely evaporated; and, laſtly, mix with the oil the wax previouſly melted. This cerate is occaſionally uſed as a cooling dreſſing. For the "compound ſoap liniment" of the Lond. Ph. ſee Liniment. The "Tincture of ſoap," commonly called "Liniment of ſoap," of the Ed. Ph., is prepared by digeſting 4 oz. of ſoap ſliced in 2 lbs. of alcohol for three days, and then adding 2 oz. of camphor, and $\frac{1}{2}$ oz. of the volatile oil of roſemary, frequently ſhaking the mixture. Theſe preparations are ſtimulant and anodyne, and may be beneficially applied againſt local pains, and in bruiſes, rubbed upon the parts. "The tincture of ſoap and opium" of Ed. Ph., commonly called "Anodyne liniment," is made in the ſame manner, and from the ſame ingredients as the other tincture of ſoap, only adding, at the beginning of the proceſs, one ounce of opium. The addition of the opium to the ſoap liniment renders it, in many caſes of rheumatiſm and local pains, more uſeful than the ſimple liniment.

The anodyne balſam, commonly called Bates's balſam, is prepared by digeſting two ounces of ſoap and half an ounce of opium, in a gentle ſand-heat, for three days, with eighteen ounces of rectified ſpirit of wine, and then adding ſix drachms of camphor and one drachm of oil of roſemary to the ſtrained liquor. This compoſition, with the addition of opium, is ſuppoſed to be more effectual for allaying violent pains than the common opodeldoc: it is alſo given internally in nervous colics, jaundices, &c.

Soft ſoap is conſiderably more acrid than the hard ſoap, and it is, therefore, employed only for ſome external purpoſes: a mixture of equal parts of our common ſoft ſoap and quicklime is uſed as a mild cauſtic. Lewis's Mat. Med. Thomſon's Lond. Diſp.

Soap, *Almond.* See Sapo *Amygdalinus*, and Soap, *ſupra.*

Soap, *Ammoniacal*, a white ſaponaceous compound, readily made by ſhaking any oil with liquid ammonia, which is much uſed medicinally as a ſtimulating application; but the union between theſe two is much weaker than between the fixed alkalies and oil, ſo that this will not harden; and by keeping for ſome time, the ingredients will partly ſeparate. In order to effect a more intimate union between them, muriated ammonia muſt be added to common ſoap.

Soap-*Lees.* See Lixivium *Saponarium.*

The term *ſoap-lees* is ſometimes uſed technically to denote the "ſpent ley," which is pumped out of the vat or ciſtern, after the ſoap has ſeparated; and which, being more or leſs alkaline, is reſerved either to be uſed again, or to be evaporated, ſo that the reſidue may be calcined for extracting the alkali.

Soap, *Starkey's*, is a combination of fixed vegetable alkali with eſſential oil of turpentine. It is ſo called from its inventor, who combined ſalt of tartar (carbonate of potaſh) with this oil, and obtained a ſaponaceous compound, to which many medicinal virtues have been aſcribed. It enters alſo into the compoſition of pills, named alſo from Starkey. As fixed alkalies are very difficultly made to unite with eſſential oils, Starkey found no other expedient for the preparation of his ſoap, than time and patience. His method conſiſts in putting dry alkali into a matraſs, and pouring upon it eſſential oil of turpentine to a height equal to the breadth of two or three fingers: in five or ſix months part of the alkali and oil will be thus combined together, and form a ſoap, which muſt be ſeparated from the mixture, and more of it will be afterwards formed in the ſame manner. The moſt commodious method, ſays Dr. Lewis, of obtaining the combination, is by throwing the ſalt, red-hot, into a heated mortar, immediately reducing it to powder; then pouring on it, whilſt hot, by little at a time, an equal quantity, or more, of the oil, and continuing to grind them together, ſo as to form a ſmooth ſoft maſs. Stahl, Rouelle, Beaumé, &c. have publiſhed proceſſes for this combination. Mr. Beaumé ſays, that it may be made in a few hours by triturating, during a long time, alkaline ſalt upon a porphyry, and adding to this ſalt, during the trituration, oil of turpentine. This medicine, which has an acrid alkaline taſte, and is very apt to deliquiate on being expoſed to air, was formerly celebrated, under the denomination of ſoap of tartar, univerſal corrector, &c. as a diuretic in nephritic complaints, and as a corrector of certain vegetables, particularly of opium: its virtues have not been fully determined by experience, nor does the preſent practice pay any regard to it.

Soap, *Volatile*, is of three kinds, *viz.* one compoſed of fixed alkalies and volatile oils; another of volatile alkalies and oils of the groſſer or more fixed kind; and the third, in which both the alkali and the oil are volatile. Of the firſt kind is Starkey's ſoap: thoſe of the ſecond ſort are obtained more readily. (See Linimentum *Volatile*, and Epithem *Volatile.*) Combinations of the latter kind, in a liquid form, have been deſcribed under Salts; and compoſitions of the ſame kinds may be obtained in a ſolid ſtate, by mixing the ſalt with the oil, and ſubliming them together.

Soap, *Laws relating to.* By 17 Geo. III. c. 52. no perſon, within the limits of the head office of exciſe in London, ſhall be permitted to make any ſoap, unleſs he occupy a tenement of 10*l.* a year, and be aſſeſſed to, and pay the pariſh rates; or elſewhere, unleſs he be aſſeſſed to, and pay to church and poor. By 24 Geo. III. c. 41. and 43 Geo. III. c. 69. every ſoap-maker ſhall annually take out a licence, for which he ſhall pay 2*l.* By 43 Geo. III. c. 68. ſched. (A), certain duties are laid on ſoap imported, as therein ſtated; and upon the exportation of ſoap made in Great Britain, and which hath paid the duties, the ſame ſhall be drawn back, by 43 Geo. III. c. 69. ſched. (C): but no drawback ſhall be allowed on the exportation of foreign ſoap imported. (27 Geo. II. c. 21.) By 43 Geo. III. c. 69. ſched. (A), certain duties are impoſed on ſoap made in Great Britain; and certain allowances ſhall be made for ſoap uſed in the manufactures of Great Britain, ſched. (C). Places of making are to be entered on pain of 200*l.* (10 Ann. c. 19. 47 Geo. III. ſeſſ. 2. c. 30.); and covers and locks to be provided under a forfeiture of 100*l.* (5 Geo. III. c. 43. 12 Geo. III. c. 40.) The furnace-door of every utenſil uſed in the manufacture of ſoap ſhall be locked by the exciſe officer, as ſoon as the fire is damped or drawn out, and faſtenings provided; and opening or damaging ſuch faſtening incurs a penalty of 100*l.* (17 Geo. III. c. 52. 24 Geo. III. c. 48. ſeſſ. 2.) Officers are required to enter and ſurvey at all times, by day or night, and the penalty of obſtructing is 50*l.*; and they may unlock and examine every copper, &c. between the hours of five in the morning and eleven in the evening, and the penalty of obſtructing is 100*l.* No ſoap-maker ſhall have any private pipe or conveyance, on pain of 200*l.*; and the penalty of obſtructing an officer who ſearches for it is 100*l.* No maker ſhall have more than one moveable pump, on penalty of 500*l.* Every maker of ſoap, before he begins any making, if within the bills of mortality, ſhall give twelve hours, if elſewhere, twenty-four hours' notice, in writing, to the officer, of the time when he intends to begin, on pain of 100*l.* No maker ſhall remove any ſoap unſurveyed, on pain of 20*l.*, without giving proper notice of his intention. And if any maker ſhall conceal any ſoap or materials, he ſhall forfeit the ſame, and alſo 500*l.* (1 Geo. III. ſtat. 2. c. 36.) And the penalty of privately making ſoap is forfeiture of the ſoap and materials, and 100*l.* (5 Geo. III. c. 43.) Perſons aſſiſting in making ſoap privately ſhall forfeit, for the firſt offence, 20*l.*; for the ſecond, 40*l.* or be liable to four months' impriſonment till it be paid. (47 Geo. III. ſeſſ. 2. c. 30.) Owners or renters of houſes where ſoap ſhall be privately made forfeit 200*l.* Every barrel of ſoap ſhall contain 256 lbs. avoirdupois, half-barrel 128 lbs., firkin 64 lbs., half-firkin 32 lbs., beſides the weight or tare of each caſk; and all ſoap, excepting hard cake ſoap and ball ſoap, ſhall be put into ſuch caſks and no other, on pain of forfeiture and 5*l.* (10 Ann. c. 19. 12 Ann. ſt. 2. c. 9.) The maker ſhall weekly enter in writing at the next office the ſoap made by him in each week, with the weight and quantity at each boiling, on pain of 50*l.*; and within one week after entry clear off the duties, on pain of double duty. (17 Geo. III. c. 52.) Cockets granted for ſhipping ſoap to be conveyed to any other part of the kingdom, ſhall expreſs the quality, quantity, and weight, the mark of the package, by whom made and ſold, and where conſigned, under penalty of forfeiture and ſeizure of the ſame and package. (23 Geo. II. c. 21.) No ſoap ſhall be imported, otherwiſe than in ſome package, containing at leaſt 224 pounds of hard ſoap, on pain of ſeizure and forfeiture, and alſo package; and the maſter of the veſſel ſhall forfeit 50*l.* If any perſon ſhall knowingly harbour or conceal any ſoap, unlawfully imported, or relanded after ſhipping for exportation upon debenture, he ſhall forfeit 50*l.* for every hundred weight, together with the goods and package. The maker ſhall keep juſt ſcales and weights, where he makes his ſoap, and permit and aſſiſt the officer to uſe them, on pain of 10*l.* (10 Ann. c. 19.) And by 10 Geo. III. c. 44. for inſufficient ſcales and weights, he ſhall forfeit 100*l.*

Soap-*Aſhes*, in *Agriculture*, the refuſe of ſoap-boilers, ſometimes termed ſoapers' aſhes. See Ashes.

Soap *Refuſe*, the compounds of oil, tallow, and other ſubſtances, with lime and pot-aſh, which are often met with and uſed as manures. Moſt ſorts of ſoapy mixtures are found to have much effect in promoting vegetation.

Soap-ſuds, or the waſhings of this ſort which are left and thrown away from large mills and manufactories, ſuch as thoſe of the ſilk and other ſimilar kinds, are found highly beneficial as manures themſelves, or for being mixed and blended up with other matters in this intention. The farmers, in ſome places, collect them by the hogſhead, at the rate of from 6*d.* to 1*s.*, and mix them up with earthy materials, ſo as to form rich compoſts, in conſequence of their containing portions of animal matter, gum, and alkali, eſpecially when taken from ſilk works. And the common ſoap-ſuds, which are generally waſted and thrown away, are ſaid to have been found of great utility in cold moiſt meadows; and would probably be more ſo, if employed in combination

bination with rich earthy ſubſtances. All the various refuſe matters of this ſort ſhould be collected, as they are capable of being uſed in this way with advantage to the farmer. See Saline *Manures*.

Soap-*Stone*, in *Mineralogy*, a variety of ſteatite. (See Steatite.) The name is derived from the colour, and the peculiar unctuous feel, which reſembles that of white ſoap. It is ſometimes ſtriped and mottled with veins and ſpots of a dull purple. When firſt quarried it is very ſoft, and yields to the nail; but gradually grows harder by expoſure to the air, though it never loſes the ſoapy feel by which it is characterized. The only part of England where ſoap-ſtone is procured is at the promontory of the Lizard, in Cornwall: it occurs in veins in ſerpentine, to which rock it ſeems nearly allied. A large quantity of this ſtone is uſed in the china manufacture at Worceſter. Its value ariſes from its great infuſibility, and its property of preſerving its whiteneſs in the furnace. The former it derives from the abſence of lime, or the alkalies; the latter from the abſence of metallic matter, of which a very ſmall portion only can be traced by chemical analyſis. The fracture of ſoap-ſtone is uneven and ſplintery; it is tranſlucent in minute fragments; it cracks and falls to powder in hot water.

Soap-*Earth*, *Smyrna*. See Flos *Aſiæ*, Natron, and Saponacea *Terra*.

SOAPBERRY-Tree, in *Botany*. See Sapindus.

The ſkin or pulp of the berries of the ſoapberry-tree is uſed as ſoap: they are of the ſize of a muſket-ball, with winged leaves, and are uſed in waſhing without any admixture of ſalt or oil. They perform the office of ſoap very well, as to the cleanſing of the linen, but being of a very acid nature, they rot it in time.

The Negroes in general uſe them for their coarſe apparel, which bears them much better than the finer linen worn by the Europeans.

It is ſaid, that this fruit is a medicine of ſingular and ſpecific virtue in chloroſes, and that a tincture or extract is preferable to the berry in ſubſtance; whence it may be preſumed, that the ſoapy matter is diſſoluble in ſpirit. Its medicinal virtue was firſt publiſhed by Marloe, in a letter to Mr. Boyle; but it is unknown in practice, and in the ſhops. Lewis.

SOAPERS' Waste, in *Agriculture*, the waſte materials of ſoap manufactories, and of other places where works of this nature are carried on, which are uſeful as manure. Theſe waſte matters have been recommended in this intention, moſtly on the ſuppoſition, that their effects principally depended upon the different ſaline matters which they contained; but it has been found, that the quantity of ſuch ſubſtances in them is very ſmall indeed, and that it principally conſiſts of mild lime and quicklime. It is ſaid that lime, when made wet with ſalt-water, yields more of this waſte than in other caſes, and is capable of being employed as manure, in certain caſes, with greater benefit than that of lime in its ordinary ſtate. This is a material which is very extenſively made uſe of in ſome diſtricts.

SOAPEY Rock, in *Geography*, a rock in the Engliſh Channel, cloſe to the Corniſh coaſt; 4 miles N.W. of Lizard Point.

SOAPWORT, in *Botany*, &c. See Saponaria.

SOAR, or Sour, anciently *Leire*, in *Geography*, a river of England, which riſes about five miles from Lutterworth, paſſes by Leiceſter, &c. and runs into the Trent on the borders of Nottinghamſhire, about three miles N.N.E. of Kegworth.

Soar, a fort of Hindooſtan, in Bahar; 23 miles N. of Durbunga. N. lat. 26° 30′. E. long. 86° 5′.

Soar-*Hawk*. See Falcon.

SOARA, in *Ancient Geography*, a river of India, on this ſide of the Ganges. Ptolemy.

SOASTUS, a river of India, which ran into the Cophas, according to Arrian.

SOATRIS, a town of Lower Mœſia, upon the Euxine ſea, between Marcianopolis and Anchiale, according to the Itinerary of Antonine.

SOATTO. See Soaggio.

SOAVE, Ital. was a muſical term, formerly, for ſinging or playing in a ſweet and pleaſing manner; but *dolce* has long ſupplied its place; which ſee.

SOAVO, in *Geography*, a town of Italy, in the Veroneſe; 10 miles E. of Verona.

SOAY, a ſmall iſland on the coaſt of Sutherlandſhire, near the entrance of Loch Inver. It affords good paſturage for ſheep. N. lat. 56° 29′. W. long. 6° 27′.

SOB, a river of Ruſſia, which runs into the Oby; 32 miles S.W. of Obdorſkoi.

SOBALA, in *Ancient Geography*, a town of Aſia Minor, in Caria. Steph. Byz.

SOBALASSARA, a town of India, on this ſide of the Ganges, which Ptolemy attributes to the Caſpiræi.

SOBANNUS, a river of India, on this ſide of the Ganges, the mouth of which is placed by Ptolemy between Pagraſa and Pithonobaſte.

SOBATZ, in *Geography*, a town of Sclavonia, on the river Save; 30 miles W.S.W. of Belgrade.

SOBERNHEIM, a town of France, in the department of the Rhine and Moſelle; 10 miles W.S.W. of Creutznach. N. lat. 49° 45′. E. long. 7° 45′.

SOBHA, in *Hindoo Mythology*, is a perſonification of beauty, and the name of a nymph celebrated in the annals of the Eaſt for her amours with *Kriſhna*; which ſee. See alſo Radha, for the tranſlation of a paſſage wherein ſhe is mentioned.

SOBIESKI's Shield, in *Aſtronomy*. See Scutum *Sobieſki*.

SOBIESKY, in *Biography*. See John, king of Poland.

SOBIESLAU, in *Geography*, a town of Bohemia, in the circle of Bechin; 10 miles E. of Bechin. N. lat. 49° 18′. E. long. 14° 34′.

SOBINKA, a town of Bohemia, in the circle of Boleſlau; 5 miles S.W. of Jung Buntzel.

SOBOTALE, in *Ancient Geography*, a town of Arabia Felix, which, according to Pliny, was the capital of the Atramites.

SOBOTKA, in *Geography*, a town of Bohemia, in the circle of Boleſlau; 11 miles E.S.E. of Jung Buntzel. N. lat. 50° 24′. E. long. 15° 11′.

SOBRADA, a town of Spain, in Galicia; 9 miles E.S.E. of Lugo.

SOBRADILLO, a town of Spain, in the province of Leon; 24 miles N.N.W. of Civdad Rodrigo.

SOBRALIA, in *Botany*, a genus dedicated, in the *Flora Peruviana*, p. 109, to the honour of Don Francis Martin Sobral, a diſtinguiſhed Spaniſh botaniſt. *De Theis*.

SOBRARVA, in *Geography*, a diſtrict and principality of Spain, included in Aragon, W. of Ribagorga, anciently a ſmall kingdom.

SOBRE BUENA, a name given by the Spaniards in America to a ſpecies of vanilla, which is greatly ſuperior to all the other kinds.

The pods of this are of the ſame ſhape with thoſe of the common vanilla, but are nearly twice as large. A bundle of about fifty of theſe uſually weighs five ounces, and ſuch a bundle of the ſobre buena kind often weighs eight. Theſe are full of a blackiſh balſamic liquor, in which are contained a number of ſmall ſeeds.

SOBREYRA, in *Botany*, a genus named in honour of John Sobreyra, a Spaniſh monk and a naturaliſt. *De Theis.*

SOC, Sok, or *Soka*, in *Law*, denotes juriſdiction; or a power or privilege to adminiſter juſtice, and execute laws.

The word is alſo uſed for the ſhire, circuit, or territory, in which ſuch power is exerciſed by him endued with ſuch juriſdiction.

Hence, alſo, the law Latin *ſoca*, uſed for a ſeignory or lordſhip infranchiſed by the king, with liberty of holding a court of his *ſoc-men* or *ſocagers*, that is, his tenants; whoſe tenure is hence called *ſocage*.

This kind of liberty ſtill ſubſiſts in ſeveral parts of England, under the name of *ſoke* or *ſoken*. Skene defines *ſoc* to be, *ſecta de hominibus ſuis in curia ſecundum conſuetudinem regni.* Brady makes mention of theſe liberties: *ſoc, ſac, tol, team, infangthef,* and *utfangthef.*

In the laws of Henry I. *ſoca* is alſo uſed as ſynonimous with franchiſe, for a privileged place, refuge, aſylum, or ſanctuary, &c. from the Saxon *ſocn*, or *ſocne*.

SOCAGE, or Soccage, in its moſt extenſive ſignification, ſeems to denote a tenure by any certain and determinate ſervice. And thus, our ancient writers conſtantly put it in oppoſition to chivalry, or knight-ſervice, where the render was uncertain.

Thus Bracton, if a man holds by a rent in money, without any eſcuage or ſerjeanty, *id tenementum dici poteſt ſocagium.* Littleton alſo defines it to be, where the tenant holds his tenement of the lord by any *certain* ſervice in lieu of all other ſervices, ſo that they be not ſervices of chivalry, or knight-ſervice: therefore, he tells us, that whatſoever is not tenure of chivalry is tenure in ſocage. The ſervice muſt therefore be certain, in order to denominate it ſocage; as to hold by fealty and 20*s.* rent; or by homage, fealty, and 20*s.* rent; or by homage and fealty, without rent; or by fealty and certain corporal ſervices, as ploughing the lord's land for three days; or by fealty only, without any other ſervice; for all theſe are tenures in ſocage.

Socage is of two ſorts; *viz. free* ſocage, where the ſervices are not only certain but honourable; and *villein* ſocage, where the ſervices, though certain, are of a baſer nature. See Villenage.

Such as hold by the former tenure are called, in Glanvil, and other ſubſequent authors, by the name of *liberi ſokemanni*, or tenants in free ſocage. This, in the nature of its ſervice, and the fruits and conſequences appertaining to it, was always much the moſt free and independent ſpecies of any. On this account, the learned judge Blackſtone aſſents to Mr. Somner's etymology of the word; who derives it from the Saxon appellation *ſoc*, which ſignifies *liberty* or *privilege*, and, being joined to a uſual termination, is called *ſocage*, ſignifying by it a free or privileged tenure. This etymology, he ſays, ſeems to be much more juſt than that of our common lawyers in general, who derive it from *ſoca, a plough*; becauſe in ancient time their ſocage-tenure conſiſted in nothing elſe, but ſervices of huſbandry, which the tenant was bound to do to his lord, as to plough, ſow, or reap for him; but that in proceſs of time, this ſervice was changed into an annual rent by conſent of all parties, and that, in reference to its original, it ſtill retains the name of ſocage, or plough-ſervice. But this by no means agrees with what Littleton himſelf tells us, that to hold by fealty only, without paying any rent, is tenure in ſocage; for here is plainly no commutation for plough-ſervice. Beſides, even ſervices, confeſſedly of a military nature and original, the inſtant they were reduced to a certainty, changed both their name and nature, and were called ſocage. It was the *certainty*, therefore, that denominated it a ſocage-tenure; and nothing ſurely could be a greater liberty or privilege, than to have the ſervice aſcertained, and not left to the arbitrary calls of the lord, as in the tenure of chivalry. Wherefore alſo Britton, who deſcribes ſocage-tenure under the name of *fraunke ferme*, tells us, that they are lands and tenements, of which the nature of the fee is changed by feoffment *out of chivalry* for *certain* yearly ſervices, and in reſpect of which, neither homage, ward, marriage, nor relief, can be demanded. Moreover, if ſocage-tenures were of ſuch baſe and ſervile original, it is hard to account for the very great immunities, which the tenants of them always enjoyed; ſo highly ſuperior to thoſe of the tenants by chivalry, that it was thought, in the reigns of both Edward I. and Charles II. a point of the utmoſt importance and value to the tenants, to reduce the tenants by knight-ſervice to *fraunke ferme*, or tenure by ſocage. It ſeems probable, therefore, that the ſocage-tenures were the relics of Saxon liberty, retained by ſuch perſons as had neither forfeited them to the king, nor been obliged to exchange their tenure for the more honourable, as it was called, but at the ſame time more burthenſome tenure of knight-ſervice. This is peculiarly remarkable in the tenure called gavelkind, which is generally acknowledged to be a ſpecies of ſocage-tenure; the preſervation of which inviolate from the innovations of the Norman conqueror, is a fact univerſally known. And thoſe who thus preferred their liberties were ſaid to hold in *free* and *common* ſocage. This tenure will, therefore, include all other methods of holding free-lands by certain and invariable rents and duties; and, in particular, petit ſerjeanty, tenure in burgage, and gavel-kind. Blackſt. Comm. book ii. cap. 6. Lord Littleton's Hiſt. of Hen. II. vol. iii. p. 158. 8vo.

Skene defines *ſocage*, a tenure of lands, by which a man is infeoffed freely, without wardſhip and marriage, paying to his lord ſome ſmall rents, &c. which is called *free* ſocage, &c. Several diviſions of ſocage are met with in law-writers, as *ſocage in capite*, &c. But by ſtat. 12 Car. II. it is ordained, that all tenures from and after the 24th of February, 1645, ſhall be adjudged and taken for ever, to be turned into free and common ſocage.

Socage, *Guardian in*. See Guardian.

SOCAGERS, in our *Old Writers*, ſuch tenants as held by the tenure called *ſocage*. They were otherwiſe called *ſoc-men*.

SOCANDAGO, in *Geography*. See Sagendago.

SOCCELLI, among the *Romans*, were ſwaths or bands, which covered the leg down to the ſoccus.

SOCCUS, Sock, in *Antiquity*, a kind of high ſhoe, reaching above the ankle, worn by the actors in the ancient drama, in the repreſentation of comic characters.

The ſoccus was much lower than the cothurnus, and was the diſtinguiſhing wear of the comedians; as the cothurnus was of the tragedians; hence ſoccus is frequently uſed for comedy itſelf. Comedy, ſays M. Fenelon, muſt talk in a humbler ſtyle than tragedy; the ſock is lower than the buſkin.

Soccus, in *Botany*. See Artocarpus.

SOCERGA, in *Geography*, a town of Iſtria; 7 miles S.E. of Capo d'Iſtria.

SOCHAN. See ZACHAN.

SOCHATSCHOW, a town of the duchy of Warſaw; 30 miles N. of Rava.

SOCHIAVO, a town of Italy, in the Belluneſe; 5 miles W. of Belluno.

SOCHOS, in *Ancient Geography*, a town of Aſia, in Syria, ſituated on the bank of the river Singas, in the ſouthern part of the town of Samoſata.

SOCIAL WAR, in *Roman Hiſtory*, commenced A.U.C. 663, on the following occaſion. M. Livius Druſus, tribune of the people, influenced by a view to the public welfare, formed a ſcheme to reconcile all orders of men, and put an end to all diſcontents, which he foreſaw would in proceſs of time, if not removed, produce a general inſurrection. With this view he propoſed a law for inveſting the Italian allies with all the privileges of Roman citizens. They remonſtrated that they paid conſiderable taxes; that, in time of war, their countries raiſed double the number of forces that were raiſed in Rome; that the commonwealth owed greatly to their valour that prodigious power which ſhe had acquired; and that it was but juſt they ſhould ſhare the honour of a ſtate, which they had helped to aggrandize both with their arms and treaſures. But this law of Druſus in their favour was oppoſed with great violence, not only by the ſenators and knights, but even by the people, who could not bear the thoughts of making thoſe their fellow-citizens, whom they looked upon as their ſubjects. In the mean time the Italian allies flocked to Rome from all parts to ſupport their protector, and determined to effect by force what they could not gain by favour. The death of Druſus, who was baſely aſſaſſinated for attempting to procure for them the right of citizenſhip, provoked the allies to ſuch a degree, that they recurred to arms, in order to do themſelves juſtice. The Marſi, Peligni, Samnites, Campanians, and Lucanians, and in ſhort all the provinces from the Liris to the Adriatic, revolted at once. Rome had never engaged more formidable enemies. As they had all ſerved in the ſame armies of the republic, they were as well diſciplined as her legions, and their leaders had learned the art of war under her moſt famous commanders. It is ſaid of the Marſi in particular, that Rome had never gained a victory in which they had not a great ſhare. The firſt ſtep they took in their revolt, was to erect themſelves into a republic in oppoſition to that of Rome. After many alternate ſucceſſes and defeats, the conſul, Julius Cæſar, deſirous to put an end to the war, drew up a law, which was confirmed by the ſenate, and enacted, that all the nations in Italy, whoſe alliance with Rome was indiſputable, ſhould enjoy the rights of Roman citizens. This law, called the Julian law, much abated the ardour of the enemy, and drew off ſeveral nations from the confederacy. The tribune, M. Plautius Sylvanus, in conjunction with Caius Papirius Carbo, one of his colleagues, put the laſt hand to the Julian law in favour of the allies, and got it confirmed by the people, and publiſhed in the following words: all the citizens of the allied cities, who ſhall be in Italy at the time of the promulgation of this law, ſhall be deemed citizens of Rome, provided they regiſter their names with one of the three prætors within ſixty days. This brought the Italians to Rome in ſuch numbers, that the new citizens became more numerous than the old; but, leſt this ſhould make ſtrangers maſters of the elections, and conſequently of the republic, the cenſors did not incorporate them in the thirty-five Roman tribes, but formed them into new tribes, who were to vote laſt. By this means all matters were determined by a majority of voices, before the new tribes gave their ſuffrages. The allies were ſenſible of this artifice, but diſſembled their diſſatisfaction, being reſolved, when an opportunity offered, to put themſelves upon a level with the old inhabitants of Rome. The tribune, Sulpicius, propoſed a law, that all the inhabitants of Italy, who had lately obtained the right of citizenſhip, ſhould be incorporated into thirty-five tribes, and conſequently have the ſame right of voting, each in his tribe, as others had, without any diſtinction, and got it paſſed. But when Sylla prevailed, all the laws of Sulpicius were declared void and null.

SOCIETY, SOCIETAS, an aſſemblage or union of ſeveral perſons in the ſame place, for their mutual aſſiſtance, ſecurity, intereſt, or entertainment.

Societies of men united together to procure their mutual ſafety and advantage, by means of their union compoſe nations or ſtates. Men are led to aſſociate for this purpoſe by the affections and inſtincts implanted in their nature, and by the wants and weakneſſes inſeparable from the conſtitution of both their bodies and minds, and from the condition they are appointed to occupy. They alſo poſſeſs the faculties of reaſon and of ſpeech, which render them capable of mutual intercourſe for their mutual advantage. Hence we may deduce that natural ſociety which is eſtabliſhed among mankind; and the general law of this ſociety is, that each ſhould do for others whatever their neceſſities require, and they are capable of doing, without neglecting what they owe to themſelves. This law ought to be obſerved by all the individuals of the human race, in order to live agreeably to their nature, and in conformity to the deſign of their common Creator: nor can it be neglected or violated, conſiſtently with a due regard to our own ſafety and happineſs.

Thus we ſee that the univerſal ſociety of the human race is an inſtitution of nature, and that it neceſſarily reſults from the nature of man: and, therefore, all men, whatſoever be their ſtation, are obliged to cultivate and diſcharge its duties. They cannot diſpenſe with it by any convention or private aſſociation. When they unite in civil ſociety, in order to form a ſeparate ſtate, or nation, they may juſtly enter into particular engagements, towards thoſe with whom they aſſociate; but they are ſtill under the obligation of performing their duty to the reſt of the human ſpecies.

As the end of the natural ſociety eſtabliſhed between all mankind is that of their affording aſſiſtance towards their own perfection, as well as that of the ſtate; and as the nations, conſidered as ſo many free perſons who live together in a ſtate of nature, are obliged to cultivate between each other this intercourſe of humanity; the end of the great ſociety eſtabliſhed by nature between all nations is alſo a mutual aſſiſtance for the improvement of themſelves and their ſtate. Accordingly, the firſt general law which the very end of the ſociety of nations diſcovers, is, that each nation ought to contribute all in its power to the happineſs and perfection of others: but the duties which we owe to ourſelves having a claim in our preference to thoſe which are incumbent upon us with reſpect to others, a nation ought, in the firſt place, to do whatever it can to promote its own happineſs and perfection. Moreover, as nations are free and independent of each other, in the ſame manner as men are naturally free and independent, the ſecond general law of their ſociety is, that ſuch nation ought to be left in the peaceable enjoyment of that liberty which it has derived from nature. From this liberty and independence it follows, that every nation is to judge of what its conſcience demands, of what it can or cannot do, of what is proper or improper to be done; and, conſequently, to examine and determine whether it can perform any office for another, without being wanting in what it owes to itſelf. Since men are naturally equal, and their rights and obligations are the ſame, as equally proceeding from nature, nations compoſed of men conſidered as ſo many free perſons, living together in a ſtate of nature, are naturally equal, and receive from nature the ſame obligations and rights; and hence we conclude, that what is permitted to one nation is permitted to all, and what is not permitted to one is not permitted to any other. The effect of all this is the producing, at leaſt externally, and among men, a perfect equality of rights between nations, in the adminiſtration of their affairs, and the purſuit of their pretenſions, without regard to the intrinſic juſtice of their conduct, of which others have no right to form a definitive judgment; ſo that what is permitted in one is alſo permitted in the other; and they ought to be conſidered in human ſociety as having an equal right. It is, therefore, neceſſary, on many occaſions, that nations ſhould ſuffer certain things to be done that are very unjuſt and blameable in their own nature, becauſe they cannot oppoſe it by open force, without violating the liberty of ſome particular ſtate, and deſtroying the foundation of natural ſociety. The rules that flow from this principle form what Mr. Wolff calls "the voluntary law of nations." Hence it follows, that all nations have a right to repel by force what openly violates the law of the ſociety which nature has eſtabliſhed among them, or that directly attacks the welfare and ſafety of that ſociety. At the ſame time, care muſt be taken not to extend this law to the prejudice of the liberty of nations. The general and common law of nations, with reſpect to the conduct of all ſovereign ſtates, ought to be meaſured by the end of the aſſociation that ſubſiſts between them. The ſeveral engagements into which nations may enter produce a new head of the law of nations, called "conventional," or "of treaties." Beſides, certain maxims, and cuſtoms conſecrated by long uſe, and obſerved by nations between each other as a kind of law, form the "cuſtomary law of nations," or, "the cuſtom of nations." Theſe three kinds of the law of nations, "voluntary," "conventional," and "cuſtomary," together compoſe the "poſitive law of nations." For they all proceed from the volition of nations; the "voluntary law," from their preſumed conſent; the "conventional law," from an expreſs covenant; and the "cuſtomary law," from a tacit conſent. See LAW *of Nations*, STATE, and GOVERNMENT.

Of ſocieties we have a great many kinds, diſtinguiſhed by the different ends propoſed by them: *civil ſocieties, trading ſocieties, religious ſocieties, literary ſocieties*, &c.

SOCIETY, in *Trade*, is a contract or agreement between two or more perſons, by which they bind themſelves together for a certain time, and agree to ſhare equally in the profits or loſſes which ſhall accrue in the affairs for which the ſociety or copartnerſhip is contracted.

We have ſeveral very conſiderable ſocieties of this kind; as the Merchant Adventurers, the Turkey, Eaſt India, Muſcovy, Eaſtland, Greenland, Spaniſh, African, South Sea, and Hudſon's Bay, companies: the inſtitutions, policies, &c. of which, ſee under the article COMPANY.

By the Roman law, the ſocial contract needs no other ſolemnity but the ſole conſent of parties, without any writing at all; but among us, articles of copartnerſhip are required. There is no contract in which probity is more required than in ſociety; inſomuch as the laws pronounce thoſe null that are made contrary to equity, and with deſign to deceive.

The French diſtinguiſh three kinds of mercantile ſociety; *ordinary ſociety*, called alſo *collective* and *general; ſociety in commendam* or *commandity;* and *anonymous ſociety*, called alſo *momentary* and *inconnue*.

The firſt is, where ſeveral merchants act alike in the affairs of the ſociety, and do all under their collective names, which are public, and known to every body.

Society in commendam, &c. is that between two perſons, one of whom only puts his money into ſtock, without doing any other office of a copartner; the other, who is called the *complementary* of the ſociety, diſpatching all the buſineſs under his own name.

Anonymous ſociety, is that where all the members are employed, each particularly in the common intereſt, and each is accountable for profits, &c. to the reſt, but without the public's being informed of them; ſo that the ſeller has only an action againſt the particular buyer, no other name appearing.

It is alſo called *momentary*, becauſe frequently made on particular occaſions, and ceaſing with them: as in the making a purchaſe, ſelling any commodity, &c.

Of this they diſtinguiſh four kinds: *ſociety by participation*, which is uſually formed by letters from one city to another, where a merchandize is to be bought or ſold. The ſecond is, when two or three perſons go together to fairs to buy goods. The third, when two or three perſons agree to buy up the whole of ſome commodity in any country to ſell it again at their own price. And the fourth is, when three or four perſons make a journey together to buy and ſell the ſame commodity. Beſide merchants, people of quality, &c. are admitted into theſe anonymous ſocieties.

SOCIETIES, *Religious*, are parties of perſons formed either to live regularly together, or to promote the intereſt of religion, or to cultivate it in themſelves.

Of the firſt kind are all congregations of religious; particularly the Jeſuits (ſee JESUITS), who are called the ſociety of Jeſus; though they more uſually call themſelves the company of Jeſus; the ſociety of the Sorbonne; the ſociety of St. Thomas de Villeneuve, inſtituted in 1660, by F. Ange le Prouſt; the ſociety of St. Joſeph, inſtituted in 1638; the ſociety of Bretagne, a reform of Benedictines, in 1606; and the ſociety of Jeſus, a religious military order, inſtituted by Pius II.; the ſociety of the Cord. See CORD.

Of the ſecond kind are, the

SOCIETY *for the Reformation of Manners*, and putting in execution the laws againſt immorality and prophaneneſs. A ſociety of this kind was ſet on foot about the time of the Revolution, by five or ſix private perſons in London, and was afterwards exceedingly increaſed by a number of members of all denominations.

Societies for this purpoſe have been occaſionally eſtabliſhed, not only in London, but in other principal towns, in a later period.

SOCIETIES, *Friendly*. See FRIENDLY *Societies*.

SOCIETIES, *Friendly*, in reference to *Agriculture*, ſuch as are eſtabliſhed for the purpoſe of relieving the labouring claſſes during the periods of ſickneſs, or when incapable of working. Many ſocieties of this nature have been formed in different parts of the kingdom within theſe few years, with much ſucceſs. And it has been remarked by Mr. Curwen, that to encourage the people to provide means of ſupport for themſelves, in caſes of ſickneſs and misfortune, is highly deſirable, both as to the effect it produces in making them more reſpectable members of the community, and in exempting pariſhes from the moſt enormous weight of poor rates.

On this ſubject it has been ſuggeſted by a late writer, after obſerving that ſuch eſtabliſhments would certainly be attended with very beneficial conſequences, that it might be highly proper to frame a law, whereby labourers of all deſcriptions ſhould be *compelled* to aſſign a portion of the fruits of their labour, during the time of their health and ſtrength, for the eſtabliſhing of a fund for their relief when overtaken by misfortunes. The forming of provident ſocieties or clubs, by which, during the time the members are in health and the vigour of life, they may, by ſmall conſtant weekly payments, make a ſuitable proviſion, from the produce of their own induſtry, againſt the period when ſickneſs, misfortune, old age, or infirmity may reach them, is, he thinks, a meaſure which, the more it is known, the more it will meet with the approbation of the public. And though, by ſome, ſuch ſocieties may be thought very remotely, if at all, connected with the ſubject of agriculture; to the more intelligent, the beſt means of providing for the induſtrious peaſantry, whoſe 'rough laborious hand' allows the wealthy to live in indolence and eaſe, will always be an intereſting ſubject. The more ſo it muſt prove, as the ſuggeſting of proper meaſures for that effect, if attended to, will infallibly remove, in a great degree, the load of poor rates, which hangs like a mill-ſtone about the neck of the Engliſh farmer; a load which, if effectual meaſures be not in a ſhort time adopted to remove, muſt neceſſarily be attended with conſequences of the moſt alarming nature, as its weight is increaſing with ſuch rapidity, that in a few years it muſt become altogether inſupportable.

And it has been well remarked by Dr. Anderſon, that friendly ſocieties, voluntarily entered into by the induſtrious poor, have relieved many a worthy character in the time of their ſickneſs, infirmities, misfortunes, and old age, in a more ample and comfortable manner than they would have been provided for by the pariſh levies. Why, he aſks, may not all the poorer ſort in their youth be compelled to provide, out of their induſtry, for their old age and infirmities? Why may not the poor of every pariſh be by law created into friendly ſocieties? Suppoſe the maſter of every ſervant and labourer was obliged to retain, out of the wages of each, three-pence a-week, and pay the ſame in the reſpective names of ſuch ſervants and labourers into the pariſh ſtock. When a ſervant or labourer removes from one pariſh to another, he might be entitled to a certificate from the pariſh he leaves, where he has drawn no pay of the amount of the ſum total he has contributed; and when he has gained a ſettlement in another pariſh, that pariſh might be entitled to draw on the firſt for the money the pauper has paid; ſo that every man may draw his fortune after him, which may prevent many a litigation reſpecting the ſettlement of the poor, and be a great ſpur to induſtry.

In the rural economy of the weſt of England, it has been ſtated by Mr. Marſhall, that ſeveral of theſe valuable inſtitutions have exiſted in Devonſhire for about thirty years; and that their good effects are ſo evident, that the encouragement of them ought to become a national object of the firſt magnitude; not more with a view to leſſen the preſent heavy burdens of the poor rates, than to inſtil into the lower claſſes of ſociety a principle of frugality, and a ſenſe of ſocial duties, which theſe meetings, under ſuitable regulations, cannot fail of producing.

The following is the plan laid down by Mr. Pew, who has paid much attention to the ſubject, and who obſerves, that if the collection of a ſmall but voluntary tax upon the ſober and induſtrious citizen, for his own uſe when in diſtreſs, be in ſome degree beneficial, he conceives that the collection of a ſtill ſmaller, though compulſory, tax upon all ranks of men, the idle, the improvident, and the irreſolute, as well as the induſtrious citizen, for the ſame purpoſe, would be a meaſure as much more beneficial as it is more extenſive. This he conceives to be capable of being effected in this way. 1. That a proper officer be appointed for ſuch an extent of diſtrict as he may be ſuppoſed conveniently to ſuperintend, to take a liſt of the names and places of abode of all males and females above the age of ſeventeen years, in the ſame manner as the liſt is made out for the militia. 2. That every ſuch male pay two-pence *per* week, and every ſuch female three farthings or one penny *per* week, into the hands of the above officer, for the purpoſes hereafter to be ſpecified. 3. That the above officer ſhall be empowered to furniſh employment for all ſuch as are willing to work, and who cannot find it for themſelves. Whether this officer ſhould be choſen annually in rotation, after the manner of an overſeer, or whether he ſhould be a permanent officer upon an adequate ſalary, will be a matter of future conſideration; but if the latter, he ſhould be paid by the community and not out of the fund. 4. That all the poor being thus ſure of employment, the maſter or miſtreſs for whom they work ſhould be juſtified in retaining theſe ſums reſpectively out of their wages; and whether they do ſo or not, they ſhould (in default of the individual) be anſwerable to the officer for its payment. All maſters and miſtreſſes of families ſhould in like manner be anſwerable for their ſervants; and all keepers of lodgings, &c. for their inmates. 5. That theſe ſums ſhould be carried weekly to the general treaſurer of the diviſion, who ſhould give ſufficient ſecurity for the ſame. 6. That out of this fund every male who is really incapable of labour, ſhould (by virtue of a certificate from the above officer) have a right to demand from the treaſurer five ſhillings *per* week for the firſt ſix months, ſhould his illneſs laſt ſo long, and four ſhillings *per* week after that period, until he again become capable of labour. And that every female ſhould have a right to demand two ſhillings and ſix-pence *per* week for the firſt ſix months, and afterwards two ſhillings *per* week, until ſhe be again able to work: ſhe ſhould alſo be entitled to four weeks full pay at every lying-in. Every male above the age of ſixty-five years, whether capable of labour or not, ſhould be entitled to four ſhillings *per* week during life. Every female, after the ſame age, two ſhillings. 7. Any perſon having three children under nine years of age, ſhould be entitled to one ſhilling and ſix-pence *per* week, until the eldeſt ſhould have attained the age of nine years; and if he has more than three under that age, he ſhould be entitled to one ſhilling and ſix-pence *per* week for each above that number; and if any one or more of his children ſhould happen to be idiotic, inſane, or otherwiſe ſo far diſabled, either in body or mind, as to be utterly incapable of labour, each of them ſhould ſtill be conſidered as under the age of nine years, and paid for accordingly.

If a mother ſhould be left a widow, with three children under nine years of age, ſhe ſhould be entitled to receive five ſhillings; if with two children, three ſhillings; and if with one child, one ſhilling and ſix-pence *per* week; if with more than three under that age, one ſhilling *per* week for each above that number; it being admitted that all her time is taken up by three, and allowance made for it, but that ſhe is capable of looking after, and taking care of, a greater number. The wives of men ſerving in the militia, and in the army or navy, ſhould, during the abſence of their huſbands, be conſidered and provided for in all reſpects as widows.

If a child ſhould be left an orphan, under nine years of age, two ſhillings *per* week ſhould be allowed from the fund for its maintenance; if more than one of the ſame family, one ſhilling and ſix-pence *per* week for each above that number. As there is probably no leſs friendſhip amongſt the lower than amongſt the higher orders of ſociety, it would generally happen that ſome friend or relation of the deceaſed would gladly take charge of the children, provided they could do ſo without eſſential loſs to themſelves. This regulation would effectually prevent that loſs; and to compenſate in ſome degree for the want of parental affection, ſix-pence *per* week more is allowed for the maintenance of an orphan, or a family of orphans, than for a child, or a family of children, who ſtill retain their mother. If, however, any beings ſhould be ſo uncommonly unfortunate as not to be thus adopted, the officer above-mentioned ſhould be obliged to provide a receptacle for them, which he will always be able to do for the ſum or ſums above-mentioned. 8. All children above nine years of age, if in health, ſhould, if they have no parents, or their parents are not able to provide for them, be put out after the manner of pariſh apprentices. 9. All perſons neglecting or refuſing to pay their contribution, ſhould be committed to the houſe of correction for the ſpace of ————. 10. If the fund ſhould at any time fall ſhort of the neceſſary demands upon it, the deficiency ſhould be made up by a pariſh rate, collected in the ſame manner as at preſent; but without any ſenſe of obligation on the part of the multitude, (for there would be no poor,) who ſhould, in all caſes, receive their relief in the nature of a demand. 11. If the fund (as moſt probably would happen) ſhould increaſe beyond the neceſſary demands upon it, the ſurplus ſhould, on no occaſion, be diverted to any other purpoſe than the benefit of the ſubſcribers; but when the price of grain exceeded that which brings it eaſily within the reach of the multitude (ſuppoſe ſix ſhillings or ſix ſhillings and ſix-pence the Wincheſter buſhel), every perſon who had three children or more under nine years of age, ſhould have a right to demand ſuch a ſum as, in proportion to the number of his family, would reduce the various neceſſary articles of life (taking wheat as the ſtandard) to a moderate price; and, indeed, he thinks, in all caſes, when the price of grain exceeds that proportion at which the induſtrious labourer can afford to come to market, ſound policy, as well as common humanity, requires that all large families ſhould be entitled to receive ſuch a ſum as above ſpecified, although it ſhould be neceſſary to collect a rate for the purpoſe.

He need not perhaps add, that every officer intruſted with money ſhould give ample ſecurity for his integrity, and the faithful diſcharge of his duty; that due checks ſhould be eſtabliſhed to prevent embezzlement; and that all accounts ſhould be made up and balanced ſo frequently as to prevent the probability of miſtakes. And ſtill more effectually to ſecure the complete execution of the plan, it would perhaps be neceſſary to appoint a general inſpector of the funds, who, with the aſſiſtance of a few ſubordinate officers, would probably be able to attend the whole kingdom.

And it is ſuppoſed by Mr. Donaldſon, that if this plan was carried into execution by the legiſlature, it muſt in its conſequences promote eſſentially the well-being of the great body of the people, as well as the intereſts of thoſe concerned in the commerce, manufactures, and agriculture of the country. But though the eſtabliſhment of friendly or provident ſocieties has, in numerous inſtances, been found productive of the moſt ſalutary effects; and would, if well ſupported and countenanced in every part of the kingdom by the contributions of the rich proprietors, render compulſory acts of parliament unneceſſary; yet as ſuch a mode, however deſirable, could probably never be generally adopted, it would certainly be the moſt effectual method to have an act of parliament for the purpoſe framed on the above principles: without this or ſome ſimilar regulation, ſuch ſocieties will probably never, he thinks, become ſufficiently general to fully anſwer the intention. The great beneficial effects that have reſulted from theſe ſocieties, in thoſe inſtances in which they have been eſtabliſhed in pariſhes, have been ſhewn in various ſtatements of them, and ſhould promote their adoption in others, which may eaſily be done by the principal proprietors in ſuch places taking the lead in forwarding ſuch inſtitutions. In the uſe of all ſuch regulations, or thoſe of any other ſimilar kinds, they ſhould conſtantly be brought forward and well adapted to the ſtates, conditions, and circumſtances of the ſituations, places, and times, in which, and at which, they are employed, in order that the beſt effects may be produced from them.

Society *for propagating the Goſpel in foreign Parts* was inſtituted by king William III. in 1701, for ſecuring a maintenance for an orthodox clergy, and making other proviſions for the propagation of the goſpel in the plantations, colonies, factories, &c.: to that end he incorporated the archbiſhops, ſeveral biſhops, and others of the nobility, gentry, and clergy, to the number of ninety, into a body, with privilege to purchaſe two thouſand pounds a-year inheritance, and eſtates for lives or years, with other goods, to any value.

They are directed by their charter to meet yearly, on the third Friday in February, to chooſe a preſident, vice-preſident, and other officers; and the third Friday in every month, to tranſact buſineſs, depute fit perſons to take ſubſcriptions for the ſaid uſes, and of all monies ſo received to give account to the lord chancellor, &c. Of this ſociety there is a ſtanding committee at St. Paul's Chapter-houſe, who prepare matters for the monthly meeting, which is held at St. Martin's library. They are truſtees of Codrington college, in Barbadoes, ſupported by plantations in that iſland.

Society *for promoting Chriſtian Knowledge* was begun in 1699, by ſome perſons of worth, &c. Its original deſign was to propagate religion in the plantations, to ſecure the pious education of the poor at home, and to reclaim thoſe that err in the fundamentals of Chriſtianity.

In the year 1701, they had procured conſiderable charities, and had tranſmitted the ſame to the plantations, in libraries, bibles, catechiſms, &c. with a voluntary maintenance for the ſeveral miniſters to be employed in the plantations. But the ſociety for propagating the goſpel in foreign parts being then inſtituted, they were incorporated, by charter, into the ſame: and thus diſcharged, as a particular ſociety, from the farther purſuit of that branch of their original deſign, which comprehended the appointment and payment of miſſionaries, as well as the diſtribution of books; whereupon they wholly turned themſelves to the other, and became very conſiderable, by great acceſſions from among the clergy and laity.

The members of the ſociety for promoting Chriſtian knowledge meet weekly, at the ſociety's office in Bartlett's Buildings, Holborn, to concert meaſures for raiſing charity for the education of poor children, and ſetting up ſchools for that purpoſe; as alſo for the more regular diſpoſal of pious books and catechiſms, for inſtruction of the ignorant, erroneous, &c. By the aſſiſtance of members of other religious ſocieties, they have procured ſubſcriptions for the education of above three thouſand children, who are placed out in ſchools about London, and taught reading, writing, pſalmody, &c. They have diſperſed great numbers of books among the poor, in the fleet, army, &c. and have procured ſeveral to be tranſlated into Welſh, and other foreign languages, and diſperſed accordingly. This ſociety for promoting Chriſtian knowledge is ſupported excluſively by members of the church of England. They have three treaſurers,

ſurers, a ſecretary, an aſſiſtant, a clerk and collector, with two aſſiſtants.

Society, *New England*, was firſt incorporated by an ordinance of parliament in 1649, by the name of the "Preſident and Society for the Propagation of the Goſpel in New England;" and empowered to receive and diſpoſe of monies in ſuch manner as ſhould beſt conduce to the preaching and propagation of the goſpel among the natives, and for the maintenance of ſchools for the education of their children; for which purpoſe a general collection was to be made in all the counties, cities, towns, and pariſhes of England and Wales. With the ſum of money thus collected, the ſociety was enabled to purchaſe an eſtate in land of between 500*l.* and 600*l.* a year. But upon the reſtoration of king Charles II. the charter became void, and colonel Bedingfield, a papiſt, who had ſold an eſtate of 322*l. per annum*, which had been ſettled for the uſes of this ſociety, repoſſeſſed himſelf of it, and refuſed to pay back the money which he had received for it. However, the corporation being revived, in 1661, by an expreſs charter, which ordained, that there be for ever within the kingdom of England, a "Society or Company for the Propagation of the Goſpel in New England and the Parts adjacent in America," the eſtate which had been detained by Bedingfield was reſtored by the chancellor's decree. The members of this ſociety are not to exceed forty-five; theſe and their ſucceſſors, to be choſen by the ſociety, are conſtituted one body corporate, with the powers and privileges uſual in ſuch caſes: and a power is likewiſe given them to appoint commiſſioners reſiding in New England to tranſact their buſineſs in thoſe parts. The honourable Mr. Boyle was appointed by charter the firſt governor of this company. See a copy of the charter in the Appendix to Dr. Birch's Life of Mr. Boyle.

Society *of the Sons of the Clergy*, was incorporated by king Charles II. in 1678, by the name of "The Governors of the Charity for Relief of the poor Widows and Children of Clergymen." This ſociety is under the direction and management of a preſident and vice-preſident, three treaſurers, and a court of aſſiſtants compoſed of forty members. Several hundreds of widows and children of the clergy have annually received conſiderable relief from this uſeful charity. See *Corporation of the Sons of the* Clergy.

Society *of Stewards and Subſcribers for maintaining and educating poor Orphans of Clergymen till of Age to be put Apprentice*, an eſtabliſhment formed in the year 1749, which has attained a conſiderable degree of proſperity, and which has received into its ſchool more than 700 children of both ſexes, moſt of whom have been apprenticed or otherwiſe provided for. This ſociety was incorporated by an act of parliament in the 48th year of Geo. III., and it is under the management of a preſident, vice-preſident, treaſurer, ſecretary, and committee, elected annually, at a general meeting in February. The committee conſiſts of the principal officers, a ſecretary, and of 20 other members, any eight of whom ſhall be deemed a board, who meet every month. See Clergy.

Society *for the Sons of the Clergy of the eſtabliſhed Church of Scotland*, was inſtituted at Edinburgh in February 1790, and was conſtituted a body corporate by his majeſty's royal charter in 1792. The views of this ſociety have been limited only to the ſons of clergymen, conceiving that its funds will be thus moſt advantageouſly employed, and propoſing other plans of beneficence which ſhall alſo comprehend the daughters of the clergy, as its funds increaſe.

Society *for promoting religious Knowledge among the Poor* commenced in the year 1750, for the purpoſe of giving bibles, teſtaments, and other good books, to thoſe who moſt needed them, and who were moſt likely to improve them. This ſociety is ſupported by an annual ſubſcription of the members, together with the donations and legacies of other contributors; and each ſubſcriber is intitled to a nomination of books in turn, correſponding to the amount of his ſubſcription. The ſociety meets every month.

Society *for promoting Chriſtian Knowledge in the Highlands and Iſlands of Scotland*, was firſt begun by the aſſociation of private contributors at Edinburgh, about the year 1701; their deſign was approved and encouraged by queen Anne, who, in 1708, iſſued her royal proclamation for this purpoſe: and, in 1709, ſhe granted a patent, conſtituting a certain number of the ſubſcribers a ſociety, or body politic, with full powers to receive donations and purchaſe lands, &c. not exceeding 2000*l.* a year, and with the profits of the ſame to erect and maintain ſchools, &c. Accordingly the lords of ſeſſion, under her majeſty's commiſſion, nominated eighty-two ſubſcribers to be the firſt members of this ſociety, who choſe a preſident, treaſurer, ſecretary, and other officers. They alſo choſe a committee of fifteen, who were to meet every month, or oftener, as occaſion required. There is a general meeting of the whole ſociety every three months, when they admit members, make general regulations, give orders to the committee, and ſettle their accounts. In 1710 the ſociety began to ſettle ſchools. In 1738 the king granted a new patent, to cauſe ſuch children as were found proper to be inſtructed in huſbandry, houſewifery, and manufactures; in purſuance of which the ſociety erected ſeveral working ſchools. The ſociety's firſt charter extends to popiſh and infidel countries beyond the ſeas, and four miſſionaries have been maintained for converting the native Indians in America to the Chriſtian faith. The ſociety has ſeveral correſponding members in London, who meet every quarter, to receive ſubſcriptions, donations, &c. Theſe form the Correſponding Board, which was eſtabliſhed in the year 1729; and which, after remaining long inactive, began, in 1773, to co-operate more cordially with their brethren in Scotland. Since that period an annual ſermon has been preached in commendation of the charity; and the preachers have been ſelected from various religious denominations with advantage to the charity.

There is alſo a charitable ſociety in London, correſponding with the incorporated ſociety in Dublin, for promoting the Engliſh Proteſtant charter-ſchools in Ireland; under the management of a treaſurer, a ſtanding committee of fifteen, and ſecretary, who meet once a month.

Society *for promoting Chriſtianity among the Jews, London*, was inſtituted in Auguſt 1808, and it has been conducted under the management of a committee, conſiſting of eighteen members, beſides the treaſurer and ſecretary, five of whom are a quorum; who meet on the firſt Friday in every month at the Jews' chapel in Spitalfields. The object of this ſociety being to relieve the temporal diſtreſſes of the Jews, as well as to promote their ſpiritual welfare, the committee are empowered, from time to time, to adopt ſuch meaſures for any ſuch purpoſes as the majority of the members preſent may approve. General meetings are held twice in the year, for receiving the reports of the committee; and two collection ſermons are preached at each of the half-yearly meetings, for the benefit of the ſociety, one in the eſtabliſhed church, and the other among the Diſſenters. A ſermon is addreſſed to the Jews every Lord's day evening, and a regular courſe of lectures is delivered every Wedneſday evening. Divine ſervice is performed in the morning and afternoon of every Sunday.

Society *for promoting the Diſcovery of the interior Parts of Africa.* See African *Aſſociation* and Africa.

Of the third kind are divers religious ſocieties, very properly ſo called: theſe were firſt ſet on foot in London about the year 1678, by a few young men, who agreed to meet weekly, for prayer, pſalmody, and ſpiritual conference. Theſe afterwards increaſed to forty diſtinct bodies, who ſet up public prayers in many churches where they were not before frequent, procured frequent adminiſtrations of the ſacrament, and maintained lectures on that ſubject, in one church or another, almoſt on every Sunday evening.

Society, *Marine*, was founded, principally, by the late Jonas Hanway, who convened a meeting of merchants and owners of ſhips, and propoſed their forming themſelves into a ſociety for giving clothing to landſmen and boys for the ſea-ſervice. A regular ſociety was formed, and a proper committee and other officers were appointed. By the regiſters of the ſociety it appeared, that from the 24th of July, 1756, the date of the commencement of this ſociety, to the 1ſt of February, 1772, it had clothed and fitted out 5451 men, and 6306 boys: and the total number to the 31ſt of December, 1808, amounted to 20,315 men, and 30,857 boys. By 12 Geo. III. c. 67, A.D. 1772, fifty-two governors were incorporated, from which number are appointed a preſident, ſix vice-preſidents, a treaſurer, and twenty-four (in 1808 the number was ſixty) aſſiſtants, veſted with full powers to carry the deſigns of the ſociety into execution. Boys ſerving out their apprenticeſhips at ſea, not being for a leſs time than four years, are entitled to the liberty of ſetting up and exerciſing trade or buſineſs in any place in Great Britain or Ireland. No ſuch apprentice is liable to be impreſſed into the king's ſervice till after the age of eighteen years. Seven governors conſtitute a general court, which is held four times in every year. The firſt local reſidence of this ſociety was in an office over the Royal Exchange; but it has ſince erected a convenient building in Biſhopſgate-ſtreet. Among the ornaments and decorations of this building, we may reckon the mauſoleum of the late captain Thomas Hanway, preſented to the corporation by his brother, Jonas Hanway, eſq. on the 1ſt of September, 1774. An annual ſubſcription of two guineas qualifies a governor for that year; two guineas *per annum*, paid during eight years ſucceſſively, or a donation of twelve guineas, qualifies a governor for life.

Society *of St. Patrick, Benevolent*, was eſtabliſhed on the 17th of March, 1784, by a conſiderable number of noblemen and gentlemen, either natives of Ireland or variouſly connected with it, for the purpoſe of imparting comfort to perſons of that kingdom in diſtreſs: one of their objects was the education of children born of Iriſh parents, reſiding in or near London. The duke of Kent is patron of this ſociety. The union of this ſociety with the Iriſh charitable ſociety, inſtituted in the year 1704, which continued its diſtributions till the year 1756, when it ceaſed to meet, was effected by the marquis of Buckingham and a committee, which ſettled a plan for this purpoſe. Twenty guineas conſtitute a governor for life, and three guineas an annual governor. The encouragement which this ſociety has met with has induced it to engage a piece of ground in St. George's Fields, for the purpoſe of erecting a ſuitable building by ſubſcription, where the children may by degrees be taken wholly under its own care. The ſub-committee meet every month, and the grand committee four times in the year. Its officers are, a patron, preſident, ſeven vice-preſidents, three auditors, &c. a treaſurer, phyſician, ſurgeon, and ſecretary.

Society, *Philanthropic*, commenced at a ſmall houſe on Cambridge-Heath, near Hackney; but as it proſpered, buildings have been erected in St. George's Fields, to which a chapel has been lately added. The inſtitution takes its date in the year 1788, and was formed for the prevention of crimes, and the reform of the criminal poor, by the encouragement of induſtry, and the culture of good morals among thoſe children who were training in vicious courſes, public plunder, infamy, and ruin. In December 1789, the number of wards for both ſexes under the ſociety's care was ſixty. The fund of the ſociety is employed as a manufacturing capital, the inſtruction for which will ſerve at any future time to afford the children employment when they are capable of being journeymen. The age of admiſſion is limited to the ages of ſeven and fourteen, and the children taken under the care of the ſociety are either the offspring of convicted felons, or ſuch as have themſelves been engaged in criminal practices. Thoſe of the firſt claſs are orphans; and thoſe of the ſecond claſs are ſuch as in many caſes have been guilty of offences at an age which ſaves them from legal puniſhment. Objects are admitted by the committee at its weekly meetings; and they are ſeldom taken younger than eight or nine, or older than twelve. After admiſſion, boys that have been delinquents are ſent in the firſt inſtance to the "Reform," a houſe at Bermondſey ſo called; where the ſyſtem is framed with a view to the amendment of the moral character by inſtruction: out of ſchool-hours they are ſet to pick oakum, that by remaining unemployed they may not acquire habits of idleneſs. When any of them appear, by the reports of the chaplain, to be ſufficiently reformed, they are transferred to the manufactory in St. George's Fields, and placed on the ſame footing with the reſt of the boys in that ſituation. The ſons of convicts, not having been themſelves criminal, are ſent at once to the manufactory, which contains, beſides accommodations for lodging about 100 boys, workſhops for carrying on the following trades, *viz.* printing, copper-plate printing, book-binding, ſhoe-making, tailor's work, rope-making, and twine-ſpinning. The profits of the trades are carried to the account of the ſociety, a portion being appropriated, by way of reward, to ſuch of the boys as are induſtrious, partly paid to them immediately, and partly reſerved for their uſe when they ceaſe to belong to the ſociety. The girls are placed in a building contiguous to the manufactory; but all intercourſe between them and the boys is effectually prevented by a wall of conſiderable height. The girls are brought up for menial ſervants: they make their own clothing, and ſhirts for the boys, and waſh and mend for the manufactory: beſides which, their earnings in plain work are conſiderable. When of proper age, they are placed out, at low wages, in reputable families, and receive rewards for good behaviour at the end of the firſt and third years of their ſervice, *viz.* one guinea at each period. A chapel has been erected for the convenience of their attending public worſhip.

Every general court muſt conſiſt of ſeven members at leaſt; and the committee, which conſiſts of twenty-four members, together with the principal officers, viſitors, and auditors, meet once a week, and three of them are competent to proceed to buſineſs. They appoint ſub-committees. A number of boys having ſerved a regular apprenticeſhip in the ſociety's manufactory, and received certificates of their honeſty and induſtry during the latter part of their ſervice, are now employed in town as journeymen to reſpectable maſters; and many of the girls are in ſervice, and have received the pecuniary rewards aſſigned them. The preſent officers are his royal highneſs the duke of York, preſident, twelve vice-preſidents, a treaſurer, four viſitors, three auditors,

ditors, a chaplain, reader at the chapel and ſecretary, two preachers, a phyſician, ſurgeon, apothecary, ſuperintendant, and ſteward.

Society, *Philological*, comprehends a ſchool for general inſtruction and clothing of the ſons of poor clergymen, naval and military officers, reduced tradeſmen, and mechanics. It was inſtituted in the year 1792, under the patronage of the duke of York, by Mr. Thomas Collingwood of Upper Titchfield-ſtreet, Mary-le-bone. This ſociety has adopted a plan of education more liberal than is uſually provided for in common ſchools of charitable inſtitutions. The ſchool is eſtabliſhed at Liſſon Green, Paddington. The committee, conſiſting of five members, meet every month, and a general court is held once a year. The officers are his royal highneſs the duke of York, a preſident, eleven vice-preſidents, three truſtees, a committee of twenty, a ſecretary, ſeveral maſters, a ſolicitor, phyſician, ſurgeon, apothecary, and collector.

Society, called the *African Inſtitution*, was eſtabliſhed for the important object of attempting the civilization of Africa, and of educating Africans. See *African* Institution.

Society *of Friends, for American Indian Civilization*, was inſtituted by the Friends in the year 1795, and the object of it has been proſecuted with their cuſtomary aſſiduity and perſeverance, and with ſuch ſucceſs, that the northern tribes of American Indians have been conſiderably influenced to adopt the arts of cultivation, as a prelude to their being capable of receiving the truths and bleſſings of religion. The whole fraternity of Quakers intereſt themſelves in the promotion of theſe objects.

Society, *Britiſh and Foreign Bible*. This ſociety, which has been extremely ſucceſsful in promoting the circulation of the holy ſcriptures, was eſtabliſhed in the year 1804; and almoſt as ſoon as it was embodied, lord Teignmouth became the preſident, and the biſhops of London, Durham, Saliſbury, and St. David's, with ſeveral noblemen and gentlemen of high reſpectability, accepted the office of vice-preſidents. Thus conſtituted and patronized, from the popularity of its plan, and the exertions of its conductors, it obtained a rapid eſtabliſhment in the world, and may be conſidered as poſſeſſing a larger and more efficient operation than was ever acquired by an inſtitution for charitable purpoſes to be met with on the page of hiſtory. Upon its appearance before the public, Wales and Scotland diſtinguiſhed themſelves by individual, congregational, and aſſociated contributions to its funds; and rivalled each other, and their fellow-citizens in England, by the promptitude of their ſupport. Ireland alſo joined in the work. The continent of Europe felt the impulſe which London had excited, and evinced the effects of it in local aſſociations for proſecuting the ſame common purpoſe. Aſia diſplayed a ſimilar ſpirit, and Calcutta became the ſeat of a correſponding committee, profeſſing, in the name and chiefly by the funds of the ſociety in London, to aid and encourage tranſlations of the ſcriptures into all the vernacular dialects of the Eaſt. In ſome parts of America there was a ſimilar union of Chriſtians upon kindred principles, and with the ſame object in view. Several of theſe aſſociations have been aſſiſted by voluntary donations from the Britiſh and Foreign Bible Society. "Thus," ſays the hiſtorian of this inſtitution, "the flame which was kindled in London has been propagated generally over more than three-fourths of the world, and is on its way for a ſtill more extenſive and particular diffuſion."

The ſeat and centre of this inſtitution is London: its larger component parts are to be traced in auxiliary ſocieties, formed under its encouragement, and contributory to its object and operation, in ſeveral of the moſt conſiderable towns throughout the united kingdom, in all the villages about the metropolis, and in conſpicuous ſtations throughout the other portions of the world, already enumerated. Its auxiliaries within the united kingdom are more than 150, and they comprehend ſome of the moſt important and commanding poſitions. On the continent it has three auxiliaries of great activity, and acting under very reſpectable patronage, in Stockholm, Berlin, and Baſle. Theſe ſtations, from their local ſituation, and the conveniencies with which they abound, are peculiarly favourable to the object of ſupplying the inhabitants of Europe with the ſcriptures, in their ſeveral languages. The Calcutta ſociety, conſiſting of Chriſtians of different denominations, and patronized, in a meaſure, by the exiſting government, will be able in time to furniſh bibles to the native Chriſtians, ſaid to amount to a million in number, and to produce correct verſions of the ſcriptures in the various languages of the Eaſt, and to open channels for their circulation among millions of people who have never yet heard of the divine miſſion of Jeſus Chriſt. In America the ſociety is aſſiſted in the proſecution of its object by the Bible Societies of Philadelphia, New York, Connecticut, Maſſachuſetts, New Jerſey, &c.; all produced by the example of the London ſociety, aided by its funds, and acting in avowed communication and harmony with it. "In addition to theſe regular and organized bodies, the ſociety has correſpondents of various deſcriptions in different parts of the world, actively engaged in promoting its deſigns, by diſperſing, at its expence, the ſacred oracles of divine truth to men of every nation under heaven."

In the firſt ſix years of the exiſtence of this ſociety it had iſſued from its depoſitory in London more than 325,000 copies of the ſcriptures, independently of thoſe which had been printed under its auſpices, beyond the limits of the united kingdom. In England it has printed the ſcriptures, at its own expence, in the Engliſh, Welſh, Gaelic, French, Spaniſh, Portugueſe, Italian, Dutch, Daniſh, Mohawk, Eſquimaux, Modern Greek, Manks, and native Iriſh languages. On the continent it has largely aided the printing of them in nearly twenty different languages. In Aſia it has promoted, by liberal contributions, the tranſlation and publication of them in a great variety of languages and dialects.

The object of this ſociety, which has already expended ſeveral hundred thouſand pounds, is diſtinctly and excluſively to promote, in the largeſt practicable extent, the circulation of the holy ſcriptures, without note or comment, both at home and abroad. By a fundamental law and regulation of the ſociety, the copies circulated in the language of the united kingdom are thoſe of the authorized verſion only. The conſtitution of the ſociety comprehends all denominations of Chriſtians, who profeſs to regard the holy ſcriptures as the proper ſtandard of religious truth. The members of the ſociety, be their ſubſcriptions what they may, provided they are not leſs than one guinea annually, are entitled to purchaſe bibles and teſtaments at reduced prices, to five times the amount of their annual ſubſcription. For a farther account of this ſociety, we refer our readers to its annual reports, which are now grown to the ſize of a moderate octavo volume.

Ten guineas conſtitute a member for life, and one guinea an annual member, five guineas an annual governor, and fifty pounds a governor for life. Its officers are a preſident, treaſurer, aſſiſtant ſecretary, collector, and bookſeller.

An auxiliary *Bible Society* was eſtabliſhed for the county of Surrey in 1812. Its officers are a preſident, twelve vice-preſidents, a treaſurer, and two ſecretaries.

Society, *Sunday School*, was eſtabliſhed, in 1796, for promoting free and Sunday ſchools in Wales, under the patronage of the prince of Wales. Its officers are a preſident, vice-preſident, treaſurer and vice-treaſurer, and ſecretary.

Society for promoting Sunday ſchools throughout the Britiſh dominions was inſtituted in 1785. See Schools.

Society *for the Suppreſſion of Vice,* was eſtabliſhed in Eſſex-ſtreet, in the Strand, in 1802. Its officers are a preſident, twelve vice-preſidents, a treaſurer, a ſecretary, and collector.

Society, *National,* for promoting the education of the poor in the principles of the eſtabliſhed church, in England and Wales, was inſtituted in 1811. The prince of Wales is patron, and the archbiſhop of Canterbury preſident: it has a great number of vice-preſidents, including all the biſhops, a treaſurer, and ſecretary.

Society, *Naval and Military Bible,* was inſtituted in 1780, for the purpoſe of diſtributing bibles among the ſoldiers and ſailors of the army and navy. One guinea conſtitutes a governor, and ten guineas a governor for life.

Society or *Fund for the Support of decayed Muſicians and their Families,* was eſtabliſhed in 1738, and incorporated in 1790.

This inſtitution had always been patronized by many of the firſt families in the kingdom, as honorary ſubſcribers; and the public in general eagerly attended the annual benefits, which, with the ſubſcriptions of the profeſſional members and gratuitous performance, produced a conſiderable ſum. But the benevolent ſpirit of the eſtabliſhment was narrowed, and inſufficient to furniſh means of comfort to the claimants already on their liſt, and conſequently precluded the augmentation of their number, till after that memorable event, the Commemoration of Handel in 1784, by which 6000*l.* were added to their fund, enabled the governors to enlarge and extend their bounty, by a more conſiderable allowance to the decayed claimants and their families already on their liſt, and to be leſs ſcrupulous in the admiſſion of new members.

Their majeſties and the royal family having been graciouſly pleaſed to countenance this eſtabliſhment, and honour it with their preſence, not only at all the commemoration performances, but at every ſubſequent annual benefit for its ſupport, increaſed its importance, and excited an ambition in the members to be under the immediate protection of his majeſty; which wiſh was moſt graciouſly complied with in 1790, by a permiſſion to incorporate themſelves under the title of the "Royal Society of Muſicians," till which period the inſtitution went under the title of "The Fund for the Support of decayed Muſicians and their Families."

Society *for bettering the Condition of the Poor,* was founded in 1796. Its object was to examine the cauſe of individual diſtreſs, to remove difficulties in the way of parochial relief, to facilitate the diſtribution of charitable benefactors, to inſpect workhouſes and charitable inſtitutions, in order to ſuggeſt improvements, and ſo aid the important cauſe of religious inſtruction to the mature and to the young.

Society *for aboliſhing the Method of ſweeping Chimnies by climbing Boys,* was inſtituted in 1802. Ten guineas conſtitute a perpetual, and one guinea an annual governor.

Society *for the Diſcharge and Relief of Perſons impriſoned for ſmall Debts,* was inſtituted in February, 1772. The debts, or compoſition for them, of the perſons that are relieved muſt not exceed 10*l.*; and the aged and infirm are preferred, as well as thoſe that have the largeſt families, and others who have loſt their liberty by unavoidable misfortunes, and not by fraud, vice, or extravagance. No debtor can be relieved a ſecond time. The annual ſubſcriptions are two guineas, and thoſe for life are twenty guineas. Similar in its object is the "Philanthropic Society" at Mile-End; the annual ſubſcription being only twelve ſhillings, and five guineas conſtituting a life-governor.

Society *of Friends of Foreigners in Diſtreſs,* was inſtituted A.D. 1806, to relieve the deſtitute in a ſtrange land, by pecuniary, medical, legal, and religious aid. One guinea conſtitutes an annual governor, and ten guineas a governor for life.

Society, *Hibernian,* was inſtituted A.D. 1806, for the purpoſe of providing every poor family in Ireland with a copy of the holy ſcriptures, eſpecially of the New Teſtament, to increaſe the number of their Sunday ſchools, to circulate religious tracts, and to give encouragement to preachers of approved characters. One guinea conſtitutes an annual member, and ten guineas a member for life.

Society, *Royal Humane,* was eſtabliſhed A.D. 1774, by Dr. Cogan and Dr. Hawes, for the recovery of the apparently dead by drowning, or by any other cauſes of ſuffocation. One guinea conſtitutes an annual member, and ten guineas a member for life. See Drowning.

Society *for teaching the indigent Blind.* See Blindness.

Society *for the Relief and Inſtruction of the Deaf and Dumb.* See Deafness.

Society *for the Eſtabliſhment of a literary Fund* was inſtituted A.D. 1790, for the relief of authors in diſtreſs, whoſe claims, ſtated in writing to the committee, are duly conſidered by them, and admitted, if proper, at their diſcretion, whilſt the names of the applicants are not diſcloſed. The annual ſubſcription is one guinea, and that for life is ten guineas. The ſociety's houſe is in Gerard-ſtreet, Soho.

Society *for the Relief of Widows and Orphans of Medical Men in London and its Vicinity,* grants to a widow, provided that her income does not exceed 30*l.*, and if ſhe has children, they have not more than 10*l. per annum* each, an annuity, and a ſum towards an apprentice fee when the children are fourteen years of age. Any orphan whoſe father was a member of the ſociety at his death, who has not more than 15*l. per annum,* alſo receives an annuity; and relief is granted to medical men themſelves, rendered incapable of attending to their buſineſs. Twenty guineas conſtitute a member for life, and one guinea an annual ſubſcriber; and a ſubſcriber of two guineas for fifteen years becomes afterwards a governor.

Society *for Relief and Support of diſabled Seamen, their Widows and Children, in the Merchant Seamen's Service,* was incorporated by ſtatute 20 Geo. II. to provide relief by penſions for ſeamen incapable of future ſervice by ſickneſs, wounds, or old age, and for the widows and children of thoſe that have been killed or wounded, provided they be under fifteen years of age, or, above that age, incapable of earning a ſubſiſtence by ſome infirmity. Relief is reſtricted to thoſe who have contributed 6*d. per* month out of his wages to this fund. Fifty pounds conſtitute a governor. The affairs of the ſociety are conducted at the merchant ſeamen's office, Royal Exchange, London.

Society, *Miſſionary,* was inſtituted in the year 1795, for the purpoſe of ſpreading the goſpel in foreign parts.

Society *for Miſſions to Africa and the Eaſt,* was eſtabliſhed by voluntary ſubſcription in the year 1799, for the converſion of the African and Eaſtern tribes. The miſſionaries fixed their ſtation at Sierra Leone, alſo on the Rio Pongas and Baſſia, where they have opened ſchools, and worſhip on the Lord's day; and as the ſlave-trade declines, or is aboliſhed, they flatter themſelves with ſucceſs. Many

Maroons and others are ſaid to have been converted, children baptized, and the civilization of the heathens, and their converſion to Chriſtianity, which muſt ever concur, are effected. The annual ſubſcription is one guinea, and a life-ſubſcription twenty guineas.

Society, *Naval Charitable*, was eſtabliſhed in 1791, for the relief of indigent orphans, widows, and children of ſea-officers, and alſo ſea-officers reduced by misfortunes to indigence. A *modus* has been ſettled for the ſubſcription; *viz.* by admirals 3*l.* 3*s.*, vice-admirals 2*l.* 2*s.*, rear-admirals 1*l.* 1*s.*, captains 10*s.* 6*d.*, lieutenants 5*s.*, phyſicians 10*s.*, ſurgeons 5*s.*, maſters 5*s.*, purſers 5*s.* The ſum given to each applicant is limited to 20*l.* A ſimilar charity was eſtabliſhed at the Admiralty in 1792.

Society *for the Converſion of Negroes*, was inſtituted by the zeal of the late biſhop Porteus, and was chartered in 1795 for the converſion, inſtruction, and education of the Negro ſlaves of the Britiſh Weſt India iſlands: for which purpoſe clergymen are employed as aſſiſtants to the parochial clergy there. The biſhop, highly to his honour, indulged the conſoling hope, "that the ſame beneficent ſpirit which by degrees extinguiſhed Pagan ſlavery, will alſo gradually, and without injury to any one, relieve mankind from the preſſure of this and every other ſpecies of perſonal and perpetual ſlavery." The ſubſequent *Abolition of the* Slave-trade (which ſee) has verified this expectation. The funds ariſe from the rents of eſtates veſted in the corporation of London, under decree of the court of chancery, upon the will of the honourable Robert Boyle.

Society, *Religious Tract*, began to circulate its ſmall uſeful tracts in the year 1799; and of theſe many have been tranſlated into the Daniſh, Portugueſe, French, and Spaniſh languages, and have been diſperſed amongſt the priſoners of war, and other foreigners in this country. Auxiliary ſocieties have been founded in ſeveral other countries. A donation of ten guineas conſtitutes a governor for life, and of half-a-guinea an annual governor.

Society, *Endeavour*, was inſtituted in 1794, for promoting the principles and duties of the eſtabliſhed church, by forming a library of orthodox divinity, and the diſtribution of books; the occaſional relief of indigence, with medical aſſiſtance, including midwifery, and inoculation. It is divided into two departments, *viz.* the eaſtern and the weſtern.

Society *of Schoolmaſters* was founded in 1798, in order to eſtabliſh a fund for the benefit of their widows and orphans, and for relief of ſchoolmaſters and uſhers become neceſſitous through age, infirmity, or misfortune. The fund conſiſts of joint ſtock, which conſtitutes a benefit ſociety, and the charitable fund, which is ſupported by contributions of the members of five guineas entrance money, and one guinea annually: benefactions are received from any other perſon, 21*l.* for life. The joint ſtock is ſhared among widows and children of decayed members in certain proportions, and this is diſpoſeable property: the charitable fund is employed in relieving members and their widows, educating their orphans, aſſiſting decayed ſchoolmaſters in general and their widows, and helping others who become neceſſitous.

Society called the *Scots Corporation.* See *Scots* Hospital.

Society *for rewarding Servants, Britiſh*, commenced in 1792, with a view of offering a reward for meritorious ſervice, either by a commutation of their probable future advantages for a preſent pecuniary conſideration, or by the immediate poſſeſſion of half the contingent annuity. Subſcribers of one guinea may nominate one male or female hired domeſtic ſervant, not exceeding fifty years of age, to be regiſtered for ſuch future rewards. Subſcribers of fifteen guineas have the ſame nomination. If ſervants have ſerved any ſubſcriber three years whilſt regiſtered, they will be entitled to 5*l.* *per annum*; if more than three years, 6*l.*, to be increaſed in proportion of 3*l.* for every three years' faithful ſervice to the ſame ſubſcriber during the regiſtry. In this manner debentures have been granted to 1151 ſervants.

Society *of the Stock-Exchange Fund.* See Stock-Exchange.

Society *of the Stranger's Friend* was conſtituted to relieve diſtreſs wherever it is found, and eſpecially when out of the reach of other aſſiſtance, and to give ſuch religious inſtruction as may be ſuitable to the perſons viſited at their own habitations. For this purpoſe the viſitors divide the town into diſtricts, and perſonally attend and relieve the objects of their compaſſion.

Society, *Unitarian*, was inſtituted in 1791 for promoting Chriſtian knowledge and the practice of virtue, by diſtributing books ſelected and approved by its members. The annual ſubſcription is one guinea, and ten guineas conſtitute a governor for life, who is entitled to a proportional allowance of books.

Society, *American Philoſophical*, was eſtabliſhed at Philadelphia in the year 1769, by the union of two ſocieties which had formerly ſubſiſted in that city, for promoting uſeful knowledge, under the direction of one patron, one preſident, three vice-preſidents, one treaſurer, four ſecretaries, and three curators, who are annually choſen by ballot. The ordinary meetings of this ſociety are held on the firſt and third Fridays of every month, from October to May incluſive. The ſociety was incorporated by charter 15th March, 1780, and has publiſhed ſeveral volumes of its Tranſactions, containing many ingenious papers on general literature and the ſciences, as well as reſpecting thoſe ſubjects that are peculiar to America.

A ſociety of a ſimilar kind, under the title of the "Academy of Arts and Sciences, &c." has been alſo eſtabliſhed at Boſton. See Academy.

A Royal Society of Sciences was inſtituted at Upſal about the year 1720: the meetings are monthly, and the Tranſactions are publiſhed quarterly, in 4to.

There is alſo another ſociety at Gottenburg, called the Royal Society of Sciences and Belles Lettres.

The Society of Natural Hiſtorians at Berlin was founded by Dr. Martini; in which place there is alſo a philoſophical ſociety.

The Royal Society of Gottingen was inſtituted by king George II. in 1751.

In France there have been ſeveral inſtitutions of this kind for the improvement of ſcience, recounted under Academy; ſee alſo Institute.

For other inſtitutions of a ſimilar nature, and their literary productions, ſee Academy, Journal, and Transactions.

Society, *Edinburgh, Philoſophical*, a ſociety which ſucceeded the Medical Society, and formed upon the plan of including all the different branches of natural knowledge and the antiquities of Scotland. Its riſe and progreſs towards its preſent ſtate are as follow.

In the year 1718, a literary ſociety was eſtabliſhed at Edinburgh by the learned Ruddiman and others, which, in 1731, was ſucceeded by another for the improvement of medical knowledge. In the year 1739, the celebrated Maclaurin conceived the idea of enlarging the plan of this ſociety, by extending it to ſubjects of philoſophy and literature.

rature. The inſtitution was accordingly new-modelled by a printed ſet of laws and regulations, the number of members was increaſed, and they were diſtinguiſhed from that time by the title of "The Society for improving Arts and Sciences," or more generally by the title of "The Philoſophical Society of Edinburgh." The meetings of this ſociety, interrupted in 1745, were revived in 1752; and, in 1754, the firſt volume of their collection was publiſhed, under the title of "Eſſays or Obſervations, Phyſical and Literary," which has been ſucceeded by other volumes. This ſociety, in conſequence of the ſuggeſtion of the profeſſors of the univerſity, and particularly of the principal, the Rev. Dr. Robertſon, and the concurrence of the members of the ſociety, was incorporated by royal charter, on the 29th of March, 1783, under the name of "The Royal Society of Edinburgh," inſtituted for the advancement of learning and uſeful knowledge. The firſt meeting was held on the firſt Monday of Auguſt, 1783; when were choſen a preſident, two vice-preſidents, a ſecretary, treaſurer, and a council of twelve perſons, who are choſen by ballot annually on the laſt Monday of November, and by whom the buſineſs of the ſociety is conducted. The ſociety conſiſts of ordinary and honorary members, the latter being reſtricted to perſons reſiding out of Great Britain and Ireland. The election of new members is made at two ſtated general meetings, held on the fourth Monday of January, and the fourth Monday of June. A candidate for the place of an ordinary member muſt ſignify, by a letter addreſſed to one of the members, his wiſh to be received into the ſociety; and he muſt then be publicly propoſed at leaſt a month before the day of election. If the propoſal be ſeconded by two of the members preſent, his name is to be inſerted in the liſt of candidates, and hung up in the ordinary place of meeting. The election is made by ballot, and is determined in favour of a candidate, if he ſhall have the votes of two-thirds of thoſe preſent, in a meeting conſiſting of at leaſt twenty-one members.

The members are divided into two claſſes, which meet and deliberate ſeparately: one of theſe claſſes is denominated the "Phyſical claſs," and comprehends within its department the ſciences of mathematics, natural philoſophy, chemiſtry, medicine, natural hiſtory, and whatever relates to the improvement of arts and manufactures. The other, denominated the "Literary claſs," has for its department literature, philology, hiſtory, antiquities, and ſpeculative philoſophy. Each of the claſſes has four preſidents and two ſecretaries, who officiate by turns. At the meetings of theſe claſſes the written eſſays and obſervations of the members of the ſociety, or their correſpondents, are read publicly, and become the ſubjects of converſation. The ordinary members, who uſually reſide in the city of Edinburgh or its vicinity, are expected to attend regularly the monthly meetings, and are required to defray, by an annual contribution, the current expences of the inſtitution. The members who reſide at ſuch a diſtance from Edinburgh, that they cannot enjoy the advantages ariſing from a regular attendance on the meetings of the ſociety, are not ſubjected to any contribution for defraying its expences, but have a right to attend thoſe meetings when they are occaſionally in Edinburgh, and to take part in all their proceedings. This ſociety has publiſhed ſeveral volumes of its Tranſactions, bearing ample teſtimony to the learning and ingenious reſearches and obſervations of their various authors.

SOCIETY, *Royal*. See ROYAL *Society*.

There is alſo an Experimental Society at Dublin, for promoting natural knowledge, which was inſtituted in 1777; the members meet once every week, and diſtribute three honorary gold medals annually for the moſt approved diſcovery, invention, or eſſay, on any mathematical or philoſophical ſubject. The ſociety is under the direction of a preſident, two vice-preſidents, and a ſecretary.

A Literary and Philoſophical Society, of conſiderable reputation, has been lately eſtabliſhed at Mancheſter, under the direction of two preſidents, four vice-preſidents, and two ſecretaries. The number of members is limited to fifty; beſides whom there are ſeveral honorary members, all of whom are elected by ballot; and the officers are choſen annually in April. Several valuable eſſays have been already read at the meetings of this ſociety, and ſeveral volumes have been publiſhed.

SOCIETY *of Antiquaries*. See ANTIQUARY.

SOCIETY *for the Encouragement of Arts, Manufactures, and Commerce*, was inſtituted in the year 1754, in purſuance of a plan formed in 1753, for the purpoſe of exciting emulation and induſtry in the improvement of ingenious and commercial arts, the various branches of agriculture, &c. by honourable and pecuniary rewards. It was ſet on foot by lord Folkſtone, lord Romney, Mr. Shipley, Dr. Hales, and a few other gentlemen; but its importance and utility ſoon gained a very conſiderable acceſſion of members and ſubſcribers. This ſociety, according to its preſent conſtitution, is under the direction and management of one preſident, ſixteen vice-preſidents, the chairmen of the ſeveral committees of accounts, correſpondence, polite arts, agriculture, manufactures, mechanics, chemiſtry, colonies, and trade; in each of which department there are two, a principal ſecretary, an aſſiſtant ſecretary, regiſter, collector, and meſſenger. The office is in the Adelphi.

Every perſon, deſiring to be a member, muſt be propoſed by ſome member at one meeting, and ballotted for at a ſucceeding meeting, and if he be choſen by two-thirds of the members preſent, he is deemed a perpetual member on payment of twenty guineas, or elſe a ſubſcribing member on payment of any yearly ſum not leſs than two guineas.

The proceedings of the ſociety are regulated by a body of rules and orders eſtabliſhed for this purpoſe; all queſtions are determined by holding up of hands or ballot, and no matter can be confirmed without the aſſent of the majority at two meetings. They invite the public in general to propoſe ſubjects for encouragement, and whatever is deemed deſerving attention is referred to the conſideration of a committee, which makes a report to the whole ſociety, where it is approved, rejected, or altered. Their premiums, which have been very extenſively beſtowed, are either ſums of money, or the ſociety's medals in gold or ſilver.

Their meetings are every Wedneſday evening, from the ſecond Wedneſday in November to the end of May, and at other times on the firſt and third Wedneſday in every month.

In the Memoirs of Agriculture, and other economical arts, by Mr. Doſſie, Bailey's machines of the Society of Arts, and the Tranſactions of the Society, of which they have publiſhed a great number of volumes, we may ſee how various, extenſive, and liberal the plan, which this ſociety has adopted and purſued.

Similar ſocieties, particularly with a view to the improvement of agriculture, have been eſtabliſhed in different parts of the kingdom.

The Society inſtituted at Bath, in the year 1777, for the encouragement of agriculture, arts, manufactures, and commerce, deſerves particular mention. The Tranſactions publiſhed by this ſociety contain many valuable experiments and obſervations, particularly relating to agriculture, which

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merit the attention of all agriculturaliſts and farmers in the kingdom.

Society or *Board of Agriculture*, a ſociety or board of this kind, which was eſtabliſhed at London, under the authority of government, for the purpoſe of promoting agriculture and the internal improvement of the country. It was inſtituted in or about the year 1793, and conſiſts, according to the charter of its incorporation, of a preſident, of ſuch ſeveral members, by virtue of their different offices, as are therein mentioned, and of thirty ordinary members, moſtly members of parliament: beſides which, of ſo many honorary members as they may think proper, and of ſuch a number of correſponding members, natives or foreigners, as may be neceſſary for the purpoſes of the inſtitution, the former of whom have the right of being preſent at all deliberations of the ſociety, but not the latter. Neither of them, however, have the power of voting upon any queſtion.

The preſident, and a part of the ordinary members, to the number of five, may and are capable of being changed annually on the twenty-fifth day of March. The four vice-preſidents may likewiſe be annually changed, and new ones named and appointed at the ſame time, as well as the treaſurer, and ſecretary. But the under ſecretary, the clerk or clerks, with the ſurveyors, &c. are not ſubject to annual change.

It cannot be doubted or diſputed, that the plans and objects which this eſtabliſhment has in view, are extremely important, diverſified, and comprehenſive, as they relate not only to the improvement of the agriculture itſelf, but to the whole of the internal economy and management of the country. They will probably, however, be beſt underſtood by conſulting the ſmall tract, which contains an account of the origin of the eſtabliſhment and its progreſs for three years afterwards, publiſhed in 1796, by its firſt preſident, ſir John Sinclair.

The conſequence and utility of ſuch an inſtitution as this, when under judicious and able management, muſt obviouſly be very great, not only to this nation, and the community at large, but alſo in its example to others, where no ſimilar eſtabliſhments have yet taken place.

Under ſuch ſort of regulation and management, it is unqueſtionably capable of promoting improvements in many different ways, and with many different deſigns and intentions, ſo as to be of the utmoſt beneficial conſequence to the general intereſts of the country as a whole. Its means are now likewiſe much more ample and ſufficient for accompliſhing ſuch purpoſes, than they were on its firſt foundation, as they have been, in ſome meaſure, increaſed ſince that period.

It may in ſhort, by the combination of ingenuity and talent which it affords, be the means of promoting and extending a better, more full, and wider cultivation of the ſoil and territory of the country, ſomewhat in proportion to the increaſing population, wealth, luxury, and wants of the community; of collecting and embodying the numerous uſeful ſcattered facts and practices on the ſubject, which have been ſpread throughout the different diſtricts of the kingdom; and of providing and diſperſing a more full and correct body of information on all parts of the ſubject, ſo as to render the nature of the land, the objects of cultivation, and the modes of performing it, more clearly underſtood, and approach nearer to the ſtate of perfection. In theſe ways, it may alſo be the cauſe of exciting and drawing a greater and more careful attention to all matters of the agricultural kind, than has hitherto been the caſe, in all thoſe who either poſſeſs rank, property, or talents, in the different claſſes of ſociety, all through the country; which, by operating upon the vaſt maſs of knowledge that has been drawn together, muſt have the effect of giving riſe to an almoſt boundleſs variety of intereſting improvements in the profeſſion, both as a ſcience, and an uſeful practical art. Some, indeed, have been ſo much perſuaded of this, that they have indulged the notion and ſuppoſition of the inſtitution becoming of the greateſt advantage and importance to the country. Its utility and benefits muſt, however, require ſome length of time, before they can fully diſplay themſelves, as is the caſe in all ſimilar eſtabliſhments.

Societies, *County Agricultural*, the various ſocieties of this nature, which are formed and eſtabliſhed in different counties and parts of the country, for the purpoſe of improving and bettering the ſtate of the agriculture and rural management of them. Theſe kinds of ſocieties are now inſtituted in almoſt every part of the kingdom, and muſt have conſiderable effect in rendering the local modes of managing lands in ſuch ſituations more perfect and beneficial, as well as in ſpreading and diffuſing the knowledge of the improvements, which are progreſſively made in the art of cultivation, in a more full, complete, and extenſive manner. Though ſome, who are by no means deficient in intelligence or information, may have doubted of the utility and advantage of theſe inſtitutions, there can be no reaſon, on the whole, for ſuppoſing that they have not been beneficial to the intereſts of the nation. As there is probably nothing which is more conducive to general improvement, than a rational ſpirit of inquiry, inveſtigation, and experiment, the eſtabliſhment of theſe kinds of ſocieties would ſeem to have had a direct diſpoſition and tendency to excite and bring forth ſuch a ſpirit, as well as to extend it, which has been of the utmoſt advantage in guiding and directing the attentions and exertions of practical farmers to thoſe methods and objects of management, which are the moſt ſuitable and likely not only to be beneficial to themſelves, but to the whole nation and community at large.

It is not improbable, however, but by having more regard in reſpect to their regulations and the general objects of their conſideration, as well as to the various local circumſtances which are connected with them, they may be rendered a great deal more uſeful and efficient than they are at preſent, by producing a much greater competition among the ſmaller claſſes of cultivators, and by contributing to a far more exact knowledge of the nature of ſoils, the dimenſions of farms, and the real profits and benefits to be derived from them.

In ſhort, the utility and expediency of inſtitutions of this ſort muſt always be, in ſome meaſure, in proportion to the increaſe of population, and the general wants of the country, in ſo far as food is required.

Moſt of the ſocieties of this deſcription, which have been eſtabliſhed in this country, comprehend, beſides the various local regulations, which relate particularly to themſelves, the whole or a great part of the plan and objects which are compriſed in the different county reports on the ſtate of agriculture, which have been publiſhed by the Board. See Surveys of the Board of Agriculture.

Many of theſe ſocieties exiſted long before the Society or Board of Agriculture was eſtabliſhed.

Theſe ſocieties, beſides being uſeful in promoting and diſſeminating all ſorts of valuable improvements in the local rural managements and practices of the particular diſtricts to which they belong, ſuch as in fencing, draining, tilling, ploughing, ſowing, harrowing, cutting, ſecuring, watering, paſturing, ſtocking, and feeding different kinds of land or ſoil; alſo in breeding, rearing, improving, and encouraging the various ſorts of live-ſtock, in furthering planting in different modes, in bettering the tools and machinery of the art, in diſtinguiſhing and encouraging good labourers and ſervants, in regulating and ſuiting leaſes, in eſtabliſhing neceſſary and convenient fairs and markets, and in promoting any other beneficial undertakings of the ſame kind; may be highly important, and of great utility, in circulating and diffuſing more extenſively the information and inſtruction collected and brought into order by the Society or Board of Agriculture.

There are many other ways in which ſuch ſocieties may alſo contribute in benefiting the agricultural intereſts of the nation.

Society, *Horticultural, of London*, was inſtituted in 1804, under a preſident, a council, three treaſurers, and ſecretary.

Society, *Aſiatic*, an inſtitution planned by the late illuſtrious ſir William Jones, and actually formed at Calcutta, on the 15th of January, 1784, for the purpoſe of tracing the hiſtory, antiquities, arts, ſciences, and literature, of the immenſe continent of Aſia. As it was reſolved to follow as nearly as poſſible the plan of the Royal Society of London, of which the king is patron, the patronage of the Aſiatic Society was offered to the governor-general and council, as the executive power in the territories of the company. By their acceptance of this offer, Mr. Haſtings, as governor-general, appeared among the patrons of the new ſociety; "but he ſeemed in his private ſtation as the firſt liberal promoter of uſeful knowledge in Bengal, and eſpecially as the great encourager of Perſian and Shanſcrit literature, to deſerve a particular mark of diſtinction;" he was requeſted, therefore, to accept the honorary title of preſident. This was handſomely declined in a letter from Mr. Haſtings, in which he requeſted "to yield his pretenſions to the gentleman whoſe genius planned the inſtitution, and was moſt capable of conducting it to the attainment of the great and ſplendid purpoſes of its formation." On the receipt of this letter, ſir William Jones was nominated preſident of the ſociety; and we cannot give the reader a view of the object of the inſtitution in clearer language than that which he employed in his firſt diſcourſe from the chair.

"It is your deſign, I conceive (ſaid the preſident), to take an ample ſpace for your learned inveſtigations, bounding them only by the geographical limits of Aſia; ſo that, conſidering Hindooſtan as a centre, and turning your eyes in idea to the north, you have on your right many important kingdoms in the Eaſtern peninſula, the ancient and wonderful empire of China, with all her Tartarian dependencies, and that of Japan, with the cluſter of precious iſlands, in which many ſingular curioſities have too long been concealed: before you lies that prodigious chain of mountains, which formerly perhaps were a barrier againſt the violence of the ſea, and beyond them the very intereſting country of Tibet, and the vaſt regions of Tartary, from which, as from the Trojan horſe of the poets, have iſſued ſo many conſummate warriors, whoſe domain has extended at leaſt from the banks of the Ilyſſus to the mouths of the Ganges: on your left are the beautiful and celebrated provinces of Iran, or Perſia, the unmeaſured, and perhaps unmeaſurable deſerts of Arabia, and the once flouriſhing kingdom of Yemen, with the pleaſant iſles that the Arabs have ſubdued or colonized; and farther weſtward, the Aſiatic dominions of the Turkiſh ſultans, whoſe moon ſeems approaching rapidly to its wane. By this great circumference the field of your uſeful reſearches will be encloſed; but ſince Egypt had unqueſtionably an old connection with this country, if not with China, ſince the language and literature of the Abyſſinians bear a manifeſt affinity to thoſe of Aſia, ſince the Arabian arms prevailed along the African coaſt of the Mediterranean, and even erected a powerful dynaſty on the continent of Europe, you may not be diſpleaſed occaſionally to follow the ſtreams of Aſiatic learning a little beyond its natural boundary; and, if it be neceſſary or convenient that a ſhort name or epithet be given to our ſociety, in order to diſtinguiſh it in the world, that of *Aſiatic* appears both claſſical and proper, whether we conſider the place or the object of the inſtitution, and preferable to *Oriental*, which is in truth a word merely relative, and though commonly uſed in Europe, conveys no very diſtinct idea.

"If now it be aſked, What are the intended objects of our inquiries within theſe ſpacious limits? we anſwer, *Man* and *Nature*; whatever is performed by the *one*, or produced by the *other*. Human knowledge has been elegantly analyſed according to the three great faculties of the mind, *memory*, *reaſon*, and *imagination*, which we conſtantly find employed in arranging and retaining, comparing and diſtinguiſhing, combining and diverſifying, the ideas which we receive through our ſenſes, or acquire by reflection: hence the three main branches of learning are, *hiſtory*, *ſcience*, and *art*; the firſt comprehends either an account of natural productions, or the genuine records of empires and ſtates; the ſecond embraces the whole circle of pure and mixed mathematics, together with ethics and law, as far as they depend on the reaſoning faculty: and the third includes all the beauties of imagery and the charms of invention, diſplayed in modulated language, or repreſented by colour, figure, or ſound.

"Agreeably to this analyſis, you will inveſtigate whatever is rare in the ſtupendous fabric of nature, will correct the geography of Aſia by new obſervations and diſcoveries; will trace the annals and even traditions of thoſe nations who from time to time have peopled or deſolated it; and will bring to light their various forms of government, with their inſtitutions civil and religious; you will examine their improvements and methods in arithmetic and geometry; in trigonometry, menſuration, mechanics, optics, aſtronomy, and general phyſics; their ſyſtems of morality, grammar, rhetoric, and dialectic; their ſkill in chirurgery and medicine; and their advancement, whatever it may be, in anatomy and chemiſtry. To this you will add reſearches into their agriculture, manufactures, and trade; and whilſt you inquire with pleaſure into their muſic, architecture, painting, and poetry, will not neglect thoſe inferior arts by which the comforts and even elegancies of ſocial life are ſupplied or improved. You may obſerve that I have omitted their languages, the diverſity and difficulty of which are a ſad obſtacle to the progreſs of uſeful knowledge; but I have ever conſidered languages as the mere inſtruments of real learning, and think them improperly confounded with learning itſelf: the attainment of them is, however, indiſpenſably neceſſary; and if to the Perſian, Armenian, Turkiſh, and Arabic, could be added not only the Shanſcrit, the treaſures of which we may now hope to ſee unlocked, but even the Chineſe, Tartarian, Japaneſe, and the various inſular dialects, an immenſe mine would then be open, in which we might labour with equal delight and advantage."

Of this ſociety eleven volumes of the Tranſactions have been publiſhed, which are replete with information in a high degree curious and important; and we hope that the European world will ſoon be favoured with another. The much-to-be lamented death of the accompliſhed preſident may indeed damp the ſpirit of inveſtigation among the members;

bers; for to conquer difficulties ſo great as they muſt meet with, a portion ſeems to be neceſſary of that enthuſiaſm which accompanied all the purſuits of ſir William Jones; but his ſucceſſors will, we truſt, uſe their utmoſt endeavours to have the plan completed of which ſir William gave the outlines.

SOCIETY *for working Mines*, an aſſociation not long ago formed on the continent of Europe. This inſtitution originated at an accidental meeting of ſeveral mineralogiſts at Skleno, near Schemnitz, in Hungary, collected to examine a new method of amalgamation. The object of the ſociety is phyſical geography; mineralogy founded on chemiſtry; the management of ore in the different operations which it undergoes; ſubterraneous geometry; the hiſtory of mining; founderies, and the proceſſes for the extraction of the metals from the ores, either by fuſion or amalgamation, in every inſtance applied to practice. The end of this inſtitution is to collect, in the moſt extenſive ſenſe, every thing that can aſſiſt the operations of the miner, and to communicate it to the different members, that they may employ it for the public good, in their reſpective countries. Each member muſt conſider himſelf as bound to ſend to the ſociety every thing which will contribute to the end of its inſtitution; to point out, with preciſion, the ſeveral facts and obſervations; to communicate every experiment which occurs, even the unſucceſsful ones, if the relation may ſeem to be advantageous to the public; to communicate to the ſociety their examination of ſchemes, and their opinions on queſtions propoſed by it; and to pay annually two ducats (about 18*s.* 6*d.*) to the direction every Eaſter. The ſociety, on the other hand, is bound to publiſh every novelty that ſhall be communicated to it; to communicate to each member, at the member's expence, the memoirs, deſigns, models, productions, and every thing connected with the inſtitution; to anſwer all the neceſſary demands made, relating in any reſpect to mining; and to give its opinion on every plan or project communicated through the medium of an honorary member.

The great centre of all intelligence is to be at Zellerfield, in Hartz, Brunſwick: but the ſociety is not fixed to any one ſpot: for every particular ſtate ſome practical mineralogiſt is nominated as director. Among theſe are the names of baron Born, M. Pallas, M. Charpentier, M. Prebra, and M. Henkel. Their office is to propoſe the members; to take care that the views of the ſociety are purſued in the different countries where they reſide; to anſwer the requeſts of the members of their country who are qualified to make them; in caſe of the death of a director, to chooſe another; and the majority is to determine where the archives and the ſtrong box is to be placed.

All the eminent mineralogiſts in Europe are members of this ſociety. It is erected on ſo liberal and ſo extenſive a plan, that we entertain the higheſt hopes of its ſucceſs; and have only to add, that we wiſh much to ſee the ſtudy of ſeveral other ſciences purſued in the ſame manner.

SOCIETY, *Britiſh, for extending the Fiſheries, and improving the Sea-Coaſts of this Kingdom*, was inſtituted in 1786. The end and deſign of this ſociety will beſt appear from their charter, of which we preſent an abſtract.

The preamble ſtates, "the great want of improvement in fiſheries, agriculture, and manufactures, in the Highlands and iſlands of North Britain; the prevalence of emigration, from the want of employment in thoſe parts; the proſpect of a new nurſery of ſeamen, by the eſtabliſhment of fiſhing towns and villages in that quarter. The act therefore declares, that the perſons therein named, and every other perſon or perſons who ſhall thereafter become proprietors of the joint ſtock mentioned therein, ſhall be a diſtinct and ſeparate body politic and corporate, by the name of "The Britiſh Society for extending the Fiſheries and improving the Sea-Coaſts of this Kingdom:"—that the ſaid ſociety may raiſe a capital joint ſtock, not exceeding 150,000*l.*, to be applied to purchaſing, or otherwiſe acquiring, lands and tenements in perpetuity, for the building thereon, and on no other land whatever, free towns, villages, and fiſhing ſtations:—that the joint ſtock ſhall be divided into ſhares of 40*l.* each:—that no one perſon ſhall, in his or her name, poſſeſs more than ten ſhares, or 500*l.*:—that the ſociety ſhall not borrow any ſum or ſums of money whatſoever:—that the ſums to be advanced for this undertaking, and the profits ariſing therefrom, ſhall be divided proportionably to the ſum ſubſcribed; and that no perſon ſhall be liable for a larger ſum than he or ſhe ſhall have reſpectively ſubſcribed:—that one or two ſhares ſhall entitle to one vote and no more in perſon or by proxy, at all meetings of proprietors; three or four ſhares to two votes; five, ſix, or ſeven ſhares, to three votes; eight or nine ſhares to four votes; and ten ſhares to five votes, and no more:—that more perſons than one inclining to hold in their joint names one or more ſhares, ſhall be entitled to vote, by one of ſuch perſons, according to the priority of their names, or by proxy:—that bodies corporate ſhall vote by proxy under their ſeal:—that all perſons holding proxies ſhall be proprietors, and that no one perſon ſhall hold more than five votes by proxy:—that the affairs of the ſociety ſhall be managed by a governor, deputy-governor, and thirteen other directors, to be elected annually on the 25th of March, from among the proprietors of the ſociety, holding at leaſt one full ſhare, by ſigned liſts of their names, to be tranſmitted by the proprietors to the ſecretary of the ſociety:—that five proprietors, not being governor, director, or other officer, ſhall be in like manner annually elected to audit the accounts of the ſociety:—that there ſhall be one general meeting of the proprietors annually, on the 25th of March:—that occaſional general meetings ſhall be called, on the requeſt of nine or more proprietors:—that the general meetings of the proprietors ſhall make all bye-laws and conſtitutions for the government of the ſociety, and for the good and orderly carrying on of the buſineſs of the ſame:—that no transfer ſhall be made of the ſtock of the ſociety for three years from the 10th of Auguſt 1786:—that the caſh of the ſociety ſhall be lodged in the bank of England, bank of Scotland, or the royal bank of Scotland:—that no director, proprietor, agent, or officer of the ſociety, ſhall retain any ſum or ſums of money in his hands beyond the ſpace of thirty days, on any account whatſoever:—that all payments by the ſociety ſhall be made by drafts on the ſaid banks, under the hands of the governor or deputy-governor, counterſigned by the ſecretary or his deputy, and two or more directors:—and that the books in which the accounts of the ſociety ſhall be kept ſhall be open to all the proprietors."

The inſtitution of this public-ſpirited ſociety was in a great meaſure owing to the exertions of the patriotic John Knox; who, in the courſe of twenty-three years, traverſed and explored the Highlands of Scotland no leſs than ſixteen times, and expended ſeveral thouſand pounds of his own fortune in purſuing his patriotic deſigns.

SOCIETY, *Britiſh Wool.* See *Britiſh* WOOL *Society.*

SOCIETY, *Geological*, was inſtituted in 1811, under a preſident, four vice-preſidents, treaſurer, two ſecretaries, and a foreign ſecretary.

SOCIETY, *Mineralogical*, was inſtituted in 1799; but it is now incorporated with the former.

SOCIETY, *Entomological, of London*, inſtituted in 1806, has a preſident, vice-preſident, treaſurer, and ſecretary, ſeveral fellows, and a printer.

SOCIETY, *Linnean*, was founded in 1788, and incorporated in 1802. Its preſident is ſir James Edward Smith; it has a council, a treaſurer, ſecretary, and librarian. Its houſe is in Gerard-ſtreet, Soho. It has already (1816) publiſhed eleven volumes of its Tranſactions.

SOCIETY, *Mathematical*, in Criſpin-ſtreet, Spitalfields, was eſtabliſhed in 1717. It is under the conduct of a preſident, treaſurer, and ſecretary.

SOCIETY *for the Improvement of Naval Architecture*, was founded in 1791. The object of it is to encourage every uſeful invention and diſcovery relating to naval architecture, as far as ſhall be in their power, both by honorary and pecuniary rewards. They have in view particularly to improve the theories of floating bodies, and of the reſiſtance of fluids; to procure drafts and models of different veſſels, together with calculations of their capacity, centre of gravity, tonnage, &c.; to make obſervations and experiments themſelves, and to point out ſuch obſervations and experiments as appear beſt calculated to further their deſigns, and moſt deſerving thoſe premiums which the ſociety can beſtow. But though the improvement of naval architecture in all its branches be certainly the principal object of this inſtitution, yet the ſociety do not by any means intend to confine themſelves merely to the form and ſtructure of veſſels. Every ſubordinate and collateral purſuit will claim a ſhare of the attention of the ſociety, in proportion to its merits; and whatever may have any tendency to render navigation more ſafe, ſalutary, and even pleaſant, will not be neglected.

This inſtitution owes its exiſtence to the patriotic diſpoſition and extraordinary attention of Mr. Sewell, a private citizen of London, who (though engaged in a line of buſineſs totally oppoſite to all concerns of this kind) has been led, by mere accident, to take ſuch ocular notice of, and make ſuch obſervations on, the actual ſtate of naval architecture in this country, as naturally occurred to a man of plain underſtanding, zealous for the honour and intereſt of his country, and willing to beſtow a portion of that time for the public good, which men of a different deſcription would rather have devoted to their own private advantage. His attention was the more ſeriouſly excited, by finding that it was the opinion of ſome private ſhip-builders, who, in a debate on the failure of one of our naval engagements, pronounced, that ſuch "would ever be the caſe while that buſineſs (the conſtruction of our ſhips of war) was not ſtudied as a ſcience, but carried on merely by precedent; that there had not been one improvement in our navy that did not originate with the French, who had naval ſchools and ſeminaries for the ſtudy of it; and that our ſhips were not a match for thoſe of that nation, either ſingly or in a fleet, &c. &c."

In a ſhort time the ſociety were enabled to offer very conſiderable premiums for particular improvements in the conſtruction of our ſhipping, &c. &c. and alſo to encourage our philoſophers, mathematicians, and mechanics, to make ſatisfactory experiments, tending to aſcertain the laws of reſiſtance of water to ſolids of different forms, in all varieties of circumſtances. On this head the reward is not leſs than 100*l.* or a gold medal. Other premiums of 50, 30, and 20 guineas, according to the importance or difficulty of the particular ſubject or point of inveſtigation, are likewiſe offered, for different diſcoveries, inventions, or improvements. The terms of admiſſion into the ſociety are a ſubſcription of two guineas annually, or twenty guineas for life.

SOCIETY *of Civil Engineers*. This ſociety took its riſe from the following circumſtances. Before or about the year 1760, a new era in all the arts and ſciences commenced in this country. Every thing which contributes to the comfort, the beauty, and the proſperity of a country, moved forward in improvement, ſo rapidly and ſo obviouſly, as to mark that period with particular diſtinction. It was about this time that manufactures were extended on a new plan, by the enterprize, the capital, and, above all, by the ſcience of the men of deep knowledge and perſevering induſtry engaged in them. It was ſeen that it would be better for eſtabliſhments to be placed in new ſituations, adapted to the obtaining raw materials, and the labour of patient and retired induſtry, than to endure the vexations that perpetually occur in corporate towns, and the wages of their extravagant workmen. This produced a new demand, not thought of till that period, in this country,—*internal navigation.* To make communications from factory to factory, and from warehouſes to harbours, as well as to carry raw materials to and from ſuch eſtabliſhments, became abſolutely neceſſary. Hence aroſe thoſe works, not of pompous and uſeleſs magnificence, but of real utility, which have been carried on to a degree of extent and magnitude, to which as yet there is no appearance of limitation.

The *ancient harbours* of this iſland, it may be ſaid, have ever been an example in the hiſtory of mankind. The ſea-ports were ſuch as nature had formed, and were but little better, notwithſtanding ſome jettees and piers of defence, which had been made and altered, without knowledge or judgment, at municipal expence. This general ſituation of things gave riſe to a new profeſſion and order of men, denominated "civil engineers." In almoſt all other poliſhed nations of Europe this was a profeſſion encouraged or inſtituted by the governments of thoſe countries, of itſelf, and by itſelf; but in this country, the formation of a body of ſuch men was left to chance; there was no public eſtabliſhment, except common ſchools, for rudimental knowledge neceſſary to all arts, naval, military, mechanical, and others.

Civil engineers, then, are a ſelf-created ſet of men, whoſe profeſſion owes its origin, not to power or influence, but to the encouragement of a great and powerful nation:—a nation become ſo from the perſevering induſtry of its manufacturing workmen, and their ſuperior knowledge in chemiſtry, mechanics, and natural philoſophy. The ſame period gave riſe to an aſſociation of a few gentlemen, of whom Mr. Smeaton was one, who propoſed that they might form themſelves into a ſociety for the advancement of the ſcience of civil engineering, and in March 1771 it was eſtabliſhed, and the members met on Friday evenings, at the Queen's Head tavern, Holborn. It did not increaſe rapidly, for in twenty years the numbers were leſs than ſeventy, and of theſe, there were only about fifteen who were real engineers, employed in public works, or private undertakings of great magnitude. The other members were either amateurs, or ingenious workmen and artificers connected with, and employed in, works of engineering. A regiſter was kept of the names of its members; and a communication of ideas and knowledge, in the particular walks of each member, were, at the ſame time, the amuſement and the buſineſs of the meetings. In this manner the ſociety proceeded till 1792, when it ceaſed to exiſt, by mutual conſent of the principal members. This diſſolution was occaſioned by the ill-treatment which Mr. Smeaton experienced from one of the members, who was under very particular obligations to him, but whoſe name is not mentioned in connection with the act of flagrant ingratitude. See ENGINEERS.

An attempt was afterwards made to rebuild the ſociety, and to place it on a better and more reſpectable foundation; but before the plan could be matured, Mr. Smeaton was no more. In April 1793, the new ſociety was, however, formed under the denomination of "The Society of Civil Engineers." It conſiſted of three claſſes: 1. Of ordinary members, to conſiſt of real engineers, actually employed as ſuch in public or in private ſervice. 2. Honorary members, to conſiſt of men of ſcience and gentlemen of rank and fortune, who had applied themſelves to ſubjects of civil engineering; and who might, for knowledge, have been real engineers, had it not been their good fortune to have it in their power to employ others in this profeſſion; and alſo of thoſe who are employed in other public ſervice, where ſuch and ſimilar kinds of knowledge are neceſſary. 3. Honorary members, conſiſting of various artiſts, whoſe profeſſions and employments are neceſſary, or extremely uſeful, as well as connected with civil engineering. The meetings of this ſociety are, we believe, ſtill held every other Friday during the ſeſſion of parliament. It may be mentioned, that the ſociety never meet without paying a juſt and natural tribute of reſpect to the memory of Mr. Smeaton, of whom we have already given a biographical article, to which may now be added the following anecdotes, communicated to the public by his daughter Mrs. Mary Dixon.

It was a maxim of this excellent man, that "the abilities of the individual are a debt due to the common ſtock of public happineſs or accommodation." This appears to have governed his actions through life: he devoted his time to the cultivation of talents by which he might benefit mankind. The arrangement of his time was governed by a method as invariable as inviolable; for profeſſional ſtudies were never broken in upon by any one; and theſe, with the exception of ſtated aſtronomical obſervations, wholly engroſſed the forenoon. His afternoons were regularly occupied by practical experiments, or ſome other branch of mechanics: and he had ſo complete a command over his thoughts, that his mind was not more entirely devoted to his profeſſion in one diviſion of time, than abſtracted from it in another. "Himſelf," ſays his daughter, "devoted to his family with an affection ſo lively, a manner at once ſo cheerful and ſerene, that it is impoſſible to ſay whether the charm of converſation, the ſimplicity of inſtruction, or the gentleneſs with which they were conveyed, moſt endeared his home. A home, in which from infancy we cannot recollect to have ſeen a trace of diſſatisfaction, or a word of aſperity to any. Yet with all this he was abſolute! and it is for caſuiſtry in education, or rule, to explain his authority; it was an authority as impoſſible to diſpute as to define."

At one period the princeſs Aſkoff, after having in vain uſed every perſuaſion to induce Mr. Smeaton to accept a *carte blanche* from the empreſs of Ruſſia, as a recompence for directing the vaſt projects which her majeſty had in view, ſaid, "Sir, you are a great man, and I honour you! You may have an equal in abilities, perhaps; but in character you ſtand ſingle. The Engliſh miniſter, ſir Robert Walpole, was miſtaken, and my ſovereign has the misfortune to know, there is one man, at leaſt, who has not his price."

Early in life Mr. Smeaton attracted the notice of the duke and ducheſs of Queenſbury, from a ſtrong reſemblance which Smeaton bore to their favourite Gay, the poet. The commencement of this acquaintance was ſingular, but the continuance of their eſteem and partiality laſted through life. Their firſt meeting was at Ranelagh, where, walking with Mrs. Smeaton, he obſerved an elderly lady and gentleman fix an evident and marked attention on him. After ſome turns they ſtopped him, and the ducheſs ſaid, "Sir, I do not know you, but ſo ſtrongly do you reſemble my poor dear Gay, we muſt be acquainted; you ſhall go home and ſup with us; and if the minds of the two men accord as much as their countenances, you will find two cheerful old folks, who can love you well, and I think you can as well deſerve it." The invitation was accepted, and as long as the duke and ducheſs lived, the friendſhip was uninterrupted. In the courſe of this, he effected the abolition of that inconſiderate indiſcriminate play among people of ſuperior rank and fortune, which compels every one to join, and at their own riſk. Mr. Smeaton deteſted cards, and his attention never following the game, he played like a child. The game was pope Joan, the general run of it was high, and the ſtake in *pope* had accidentally accumulated to a very ſerious ſum. It was Smeaton's turn by deal to double it, when, regardleſs of his cards, he buſily made ſome minutes on a ſcrap of paper, and put it on the board. The ducheſs eagerly aſked what it was; and he as coolly replied, "Your grace will recollect the field in which my houſe ſtands may be about 5 acres, 3 roods, and 7 perches, which, at 30 years' purchaſe, will be juſt my ſtake; and if your grace will make a duke of me, I preſume the winner will not diſlike my mortgage." The joke had the proper effect, and they never after played but for the mereſt trifle. See Smeaton's Reports, vol. i.

SOCIETY *of Artiſts of Great Britain*, which conſiſts of directors and fellows, was incorporated by charter in 1765, and empowered to purchaſe and hold lands, not exceeding 1000*l.* a year. The directors of this ſociety, annually elected, are to conſiſt of twenty-four perſons, including the preſident, vice-preſident, treaſurer, and ſecretary; and it is required that they be either painters, ſculptors, architects, or engravers, by profeſſion.

SOCIETY *of Engravers* was eſtabliſhed in 1802, under the patronage of the prince of Wales, a preſident, vice-preſident, treaſurer, and honorary ſecretary, &c.

SOCIETY *of Painters in Oil and Water-Colours* was eſtabliſhed in 1804, under a preſident, treaſurer, ſecretary, and committee of management.

SOCIETY *of Architects* was inſtituted in 1791; and the *Architectural Society* was formed in 1806, under a preſident, two vice-preſidents, a ſecretary, and treaſurer.

SOCIETY *for Inſurance*, &c. See ASSURANCE and INSURANCE.

SOCIETY, *Medical.* To this claſs belong ſeveral ſocieties, the principal of which in our own country are the following; *viz.* the Medical Society of London, inſtituted in the year 1752, on the plan recommended by lord Bacon (De Augm. Scient. lib. iv. cap. 2.), to revive the Hippocratic method of compoſing narratives of particular caſes, in which the nature of the diſeaſe, the manner of treating it, and the conſequences, are to be ſpecified; to attempt the cure of thoſe diſeaſes, which, in his opinion, have been too boldly pronounced incurable; and, laſtly, to extend their enquiries after the powers of particular medicines in the cure of particular caſes. The collections of this ſociety have been already publiſhed, under the title of "Medical Obſervations and Inquiries," in ſeveral volumes:—Society of Phyſicians in London, inſtituted about the year 1764, the members of which, who muſt be merely licentiates of the College of Phyſicians, are elected by ballot, and meet once a fortnight on Wedneſday evening, for the purpoſe of converſing on the prevailing diſeaſes, &c. and dine together once in a quarter:—the Medical Society in Crane-court, inſtituted in 1773, under the direction of a council, conſiſting of a preſident, treaſurer, librarian, three phyſicians, three ſurgeons, three apothecaries, and three ſecretaries: the members meet once a fortnight, on Tueſday evening, and their council is annually elected in January, when an oration is delivered by one of the members on ſome medical ſubject :—Society for the Improvement of Medical Knowledge in London, eſtabliſhed in 1782, for the purpoſe of collecting uſeful eſſays and obſervations for publication : the meetings of this ſociety are held once a fortnight, on Tueſday evening, and the members dine together once a quarter ; on which occaſion candidates for admiſſion are ballotted for : the ſociety is under the direction of a preſident, treaſurer, two ſecretaries, and a committee for reviſing and ſelecting papers for publication, who are elected annually by ballot :—the Medical Society of Edinburgh, to which the public are indebted for ſix volumes of curious and uſeful eſſays, collected principally by the late Dr. Monro, from June 1731 to June 1736 ; but this ſociety was afterwards united to another, called the Philoſophical Society :—the Medical Society of Edinburgh, incorporated by royal charter in 1778, under this title : this inſtitution appears to have been coeval with the eſtabliſhment of a regular ſchool of phyſic in the univerſity, though none of its records of an earlier date than 1737 are now preſerved : the ordinary members of this ſociety are elected by ballot, and three diſſentients exclude a candidate ; an ordinary member may alſo be elected an honorary member, who enjoys the privileges of the others, and receives a diploma, but is freed the obligation of attendance, delivering papers in rotation, &c. to which the ordinary members are ſubject ; but in this caſe the votes muſt be unanimous ; the meetings of this ſociety are held every Saturday evening, in their own hall, during the winter ſeaſon, when papers on medical ſubjects are delivered by the ſeveral members in rotation ; and four of theſe are annually elected to fill the chair in rotation, with the title of annual preſidents.

The Royal Medical Society of Paris was inſtituted in 1776. The members are divided into aſſociates ordinary, limited to thirty, honorary to twelve, extraordinary to ſixty, and foreign to ſixty, and correſpondents. This ſociety has publiſhed ſeveral volumes of Memoirs in 4to.

The Medical and Chirurgical Society of London, in Verulam Buildings, Gray's-Inn, was eſtabliſhed in 1805. Its council conſiſts of a preſident, and 15 vice-preſidents : it has a treaſurer, two ſecretaries, and a foreign ſecretary.

Society, *Philoſophical*, deſignated by the ſtyle and title of the " Royal Inſtitution," was eſtabliſhed in the year 1799, and in its charter of incorporation, ſtates that it is formed with a view " of diffuſing the knowledge and facilitating the general introduction of uſeful mechanical improvements ; and for teaching, by courſes of philoſophical lectures and experiments, the application of ſcience to the common purpoſes of life." In the execution of this plan, a ſpacious and commodious houſe was purchaſed in Albemarle-ſtreet, where convenient rooms have been prepared for the reception and public exhibition of all ſuch new mechanical inventions and improvements as ſhall be thought worthy of public notice, and proper to be publicly exhibited ; and, more eſpecially, of all ſuch contrivances as tend to increaſe the conveniencies and comforts of life, to promote domeſtic economy, to improve taſte, or to advance uſeful induſtry. Working models are provided and exhibited, of ſuch new mechanical inventions as are applicable to the common purpoſes of life. A lecture room is alſo fitted up for philoſophical lectures and experiments ; a complete laboratory and philoſophical apparatus, with the neceſſary inſtruments for making philoſophical and chemical experiments, are provided ; and men of the firſt eminence, in various branches of ſcience, are engaged for carrying into full effect this important and uſeful part of the plan. A library well furniſhed with books in various departments of literature and ſcience is alſo provided. Acceſs to the library and lectures may be had on certain conditions.

Societies of a ſimilar kind, but in a leſs perfect and ſplendid ſtate, although in ſome reſpects no leſs uſeful, are the London, Surrey, and Ruſſel inſtitutions. See the article London.

Society *of London*, *Philoſophical*, which owed its riſe and preſent flouriſhing ſtate, in a very great degree, to the active and perſevering exertions of the ingenious T. J. Pettigrew, eſq. was founded in October 1810. The *objects* of this ſociety, ſtated in its addreſs to the public, are to foſter genius, to eradicate unphiloſophical prejudice, to increaſe the knowledge of nature and of man, to deſtroy, as much as poſſible, the falſe definition of words, which has been ſo juſtly reprobated by Bacon and Locke, as the origin of ſophiſtry and miſconception ; but, above all, to remove the barrier erected by pedantry againſt univerſal knowledge, and to ſubdue an *eſprit de corps*, which has been introduced into philoſophy, tending to confine it within the narrow limits of ſects, and preventing its natural diffuſion among mankind. The *means* adopted to attain theſe objects are, firſt, to promote a literary taſte by the erection of a library common to all the members ; humbly to diffuſe more widely a familiarity with ſcience by lectures in every department of philoſophy ; and thereby to cultivate a correct mode of reaſoning, by ſubjecting thoſe lectures to a rigorous ſubſequent inveſtigation, and by introducing diſcuſſions which correſpond with the general objects of the ſociety. In this ſociety there are three claſſes of members, *viz.* ordinary, honorary, and correſponding. Every ordinary member pays at his entrance the ſum of two guineas, which ſhall be repeated annually ; he ſhall alſo ſubſcribe to the regulations of the ſociety ; and upon withdrawing himſelf forfeit all title to the property of the ſociety. No perſon ſhall be deemed eligible as an honorary member, unleſs he be author of ſome ſcientific work of celebrity, or profeſſor of ſome branch of philoſophy ; and the ſame qualifications are required in a correſponding member, except in the caſe of ſuch ordinary members, removed from town, as the council may think proper to admit. A perſon propoſed for admiſſion muſt be recommended by three members, whoſe names, together with that of the perſon nominated, ſhall be hung up in the ſociety's lecture-room fifteen days previous to his being ballotted for by the council. In ballots, three black balls ſhall be conſidered as a rejection. Each member ſhall be allowed to introduce three perſons at the ordinary meetings of the ſociety ; and he ſhall alſo be permitted to borrow books of the ſociety. The ſociety ſhall meet on every Thurſday, at eight o'clock in the evening, and a lecture ſhall be delivered at every alternate Thurſday, and the intermediate meetings ſhall be occupied in diſcuſſing the preceding lecture, or in the diſcuſſion of ſome philoſophical queſtion, which may have been ſubmitted to and approved of by the council. The ſociety ſhall meet every alternate Tueſday evening at the ſame time, to converſe on philoſophical ſubjects, or for the reading of papers previouſly preſented to and approved of by the council. In the diſcuſſions and proceedings of the ſociety, theological and political ſubjects ſhall not be admitted.

The buſineſs of the ſociety is conducted by a preſident, eight vice-preſidents, a treaſurer and ſecretary, two curators, a regiſtrar and aſſiſtant, and a council compoſed of eighteen members ; all of theſe are elected annually. The patrons of the ſociety are the dukes of Kent and Suſſex. The number of members already amounts to 200, and the library conſiſts of about 500 volumes. In both theſe reſpects the ſociety is receiving numerous acceſſions.

Society *Iſlands*, in *Geography*, a cluſter of ſix iſlands in the Pacific ocean, ſo called by captain Cook in 1769, becauſe they lie contiguous to each other, ſo that he did not think it proper to diſtinguiſh them by any other names than thoſe by which they were known to the natives; *viz.* Ulietea, Otaha, Bolabola, Huaheine, Tubai, and Maurua. See each reſpectively. They are ſituated between S. lat. 16° 10′ and 16° 55′, and between W. long. 150° 57′ and 152°. Ulietea and Otaha lie within about two miles of each other, and are both incloſed within one reef of coral rocks, ſo that there is no paſſage for ſhipping between them. This reef forms ſeveral excellent harbours; and though the entrances into them are narrow, yet a ſhip within them is exempt from all injury. The inhabitants, climate, and produce, are ſimilar, in many reſpects, to thoſe of Otaheite, from which iſland they are not above 50 leagues diſtant towards the N.W. Captain Cook ſays, "while we were employed about theſe iſlands, we expended very little of the ſhip's proviſions, and were very plentifully ſupplied with hogs, fowls, plantains, and yams, which we hoped would be of great uſe to us in our courſe to the ſouthward; but the hogs would not eat European grain of any kind, pulſe, or bread-duſt, ſo that we could not preſerve them alive; and the fowls were very ſoon ſeized with a diſeaſe that affected the head, ſo that they continued to hold it down between their legs till they died: much dependence, therefore, muſt not be placed in live-ſtock taken on board at theſe places, at leaſt not till a diſcovery is made of ſome food which the hogs will eat, and ſome remedy for the diſeaſe of the poultry."

SOCIETY-*Land*, a townſhip of America, in the ſtate of New Hampſhire and county of Hillſborough; containing 199 inhabitants.

SOCII, ALLIES, among the Romans. See ALLIANCE and SOCIAL *War*.

SOCINIANS, in *Eccleſiaſtical Hiſtory*, a ſect of Antitrinitarians, who are ſaid to have derived this denomination from the illuſtrious family of the Sozzini, which flouriſhed a long time at Sienna, in Tuſcany, and produced ſeveral great and eminent men; and, among others, Lælius and Fauſtus Socinus, who are commonly ſuppoſed to have been the founders of this ſect. Lælius was the ſon of Marianus, a famous lawyer, and diſtinguiſhed by his genius and learning, as well as by the luſtre of an unblemiſhed and virtuous conduct. Having conceived a diſguſt againſt popery, and diſapproving many doctrines of the church, he left his country in 1547; and having paſſed four years in viſiting France, England, Holland, Germany, and Poland, he at laſt fixed his reſidence at Zurich, in Switzerland, where he died in 1562, in the thirty-ſeventh year of his age. Although he adopted the Helvetic confeſſion of faith, and profeſſed himſelf a member of the church of Switzerland, he entertained doubts with reſpect to certain doctrines of religion, which he communicated to ſome learned men, whoſe judgment he reſpected, and in whoſe friendſhip he could confide. However, his ſentiments were propagated in a more public manner, after his death; as Fauſtus, his nephew and his heir, is ſuppoſed to have drawn from the papers he left behind him, that religious ſyſtem, upon which the ſect of the Socinians was founded. This Fauſtus Socinus was born at Sienna in 1539; and having continued many years in his own country, twelve of which he ſpent in the court of the grand duke of Tuſcany, he determined, in the year 1574, and the thirty-fifth of his age, to withdraw from Italy into Germany. During this period he had laboured under many diſadvantages in the purſuit of knowledge, and his ſtudies had been chiefly confined to the rudiments of logic and juriſprudence; but at Baſil, where he firſt reſided after his voluntary exile, he devoted himſelf for three years to the ſtudy of theology, under the direction and aſſiſtance of the writings of his uncle Lælius; and in 1577 he began to propagate his religious opinions without reſerve or diſguiſe. In 1578 he was invited by Blandrata, a perſon of eminence in Tranſylvania, to compoſe the commotions which were occaſioned by a party under the lead of Francis David, in the Antitrinitarian churches of that country. But failing of ſucceſs, he removed to Poland in 1579, zealouſly wiſhing to join himſelf to the Unitarian churches; but here he ſuffered many vexations, and much oppoſition, from a conſiderable number of perſons, who looked upon ſome of his tenets as highly erroneous. At length, however, he vanquiſhed the animoſity of his enemies by his gentleneſs and firmneſs, by his addreſs and eloquence, and the favour and protection of the nobility, with which he was honoured, and lived to form the Unitarians into one community, under his own ſuperintendency and direction. Having retired to a village about nine miles from Cracow, he there cloſed his life, in the year 1604; and the following epitaph was inſcribed on his tomb:

> "Tota licet Babylon deſtruxit tecta Lutherus,
> Muros Calvinus, ſed fundamenta Socinus:"

i. e. Luther deſtroyed the houſes of Babylon, Calvin the walls, but Socinus ſubverted the foundations. The ſentiments of Socinus, with regard to the principal theological ſubjects controverted among Chriſtians, will appear in the following abſtract of them from his own writings; ſome of which were publiſhed during his own life, and ſome after his death; and the collection of them, in two volumes, folio, forms part of the "Bibliotheca Fratrum Polonorum." With regard to the nature and character of Chriſt, Socinus maintained, that he was a man, conceived and formed in the womb of the Virgin, without the intervention of a man, by the power of the divine ſpirit; on this account he was, in a peculiar ſenſe, God's own and only begotten ſon, as no other perſon ever was the ſon of God in the ſame way, by the immediate origin of his being. Moreover, he was conſtituted the ſon of God by his reſurrection from the dead, and was then begotten by God, when God raiſed him from the dead. As to thoſe paſſages which have been ſuppoſed to aſſert Chriſt's exiſtence in the heavenly world, previous to his birth and appearance among men, he explains them, by alleging that Chriſt himſelf, after he was born, and before he entered on the office aſſigned him by his Father, was, in conſequence of the divine counſel and agency, in heaven, and remained there for ſome time; that he might hear from God, and being with him, as the Scripture ſays, might ſee thoſe things which he was to announce to the world, in the name of God himſelf; though he explains John, iii. 13, as figurative language. Accordingly, in explaining the firſt words of St. John's goſpel, *In the beginning was the word*, &c. he obſerves, that the terms, *in the beginning*, do not relate to eternity, but to the order of thoſe things which John was about to write concerning Jeſus Chriſt; imitating Moſes, who, in writing his hiſtory, opens his introduction with this word *beginning*, in reference to the tranſactions which he was about to record. And Jeſus is called the Word, he ſuppoſes, not on account of his nature or ſubſtance, but becauſe of the office he diſcharged when he revealed to us the word of the goſpel from the Father. *The word was with God*, *i. e.* Jeſus, as the word of God, before he was pointed out by the preaching of the Baptiſt, was known to God alone. And *the word was God:* the term God, ſays this commentator, does not denote ſubſtance, but authority, power, and beneficence, which were derived from the Father, and which entitled Chriſt, according to the opinion of this writer, to adoration and worſhip. His ideas of the efficacy of our Lord's death and mediation are utterly repugnant to thoſe that have been generally entertained by perſons called Calviniſts. Nothing, he ſays, can be more incompatible with each other, than a free pardon and ſatisfaction. He adds, no man of judgment and piety ought to entertain the idea of a ſatisfaction for ſin; ſince it plainly does very much derogate from the power and authority, or goodneſs and mercy of God; and though a propitiation be not the ſame thing as a ſatisfaction, and though God never refrained from the puniſhment of ſin, on account of any real ſatisfaction given him, yet it is certain, that in remitting the puniſhment of our ſins by Jeſus Chriſt no propitiation intervened; but God hath, from his free will, exhibited himſelf ſo propitious to us in Chriſt, as not to exact the puniſhment of our ſins, though he might juſtly have done it. However, he allows not only that the death of Chriſt, and the pouring out of his blood for us, was an offering and ſacrifice to God, but that this ſacrifice may be ſaid to have been offered up for our ſins in order to their being forgiven; yet he apprehended, that this ſacrifice, as far as it was expiatory, was offered by Chriſt, not on the croſs, but in heaven itſelf, after his reſurrection. To which purpoſe he obſerves, that Chriſt did not obtain eternal redemption for us before he entered into the holy place, and there aſſumed the prieſthood; and without a prieſthood no expiatory offering could be made.

Socinus does alſo expreſsly deny the diſtinct perſonality of the Holy Ghoſt, underſtanding by the Holy Spirit a divine energy or influence.

With reſpect to the nature and ſtate of man, Socinus thought, that the progenitor of our race was mortal, *i. e.* liable to death, by reaſon of his frame, and incapable of exemption, without an exertion of the divine favour and influence, which was not granted to him at creation; and, therefore, when the apoſtle aſſerts, that by ſin death entered into the world, he meant not natural mortality, but the neceſſity of dying, or eternal death. To this purpoſe he explains himſelf: Adam, if he had not ſinned, might have been preſerved from death by the kindneſs of God, though naturally mortal; or, if he had died, have been reſtored to life, and made immortal. By his ſin he did, as it were, refuſe to give himſelf and his poſterity this bleſſing; and, therefore, unleſs the favour of God be renewed to us, we muſt all die, and remain in the ſtate of the dead. As to the nature of the human ſoul, it ſeems to have been the opinion of Socinus, that, after this life, it doth not ſo ſubſiſt of itſelf, without the body, as to be capable of any reward or puniſhment, or any ſenſations at all. To the queſtion, whether the firſt man had any original righteouſneſs before he ſinned? Socinus replies, that if by original righteouſneſs be meant ſuch a condition that he could not ſin, this certainly was not the ſtate of Adam, as it is clear he did ſin. But if original righteouſneſs conſiſted in this, that his reaſon had the abſolute rule over his appetites and ſenſes, and invariably directed them, then the opinion of thoſe who aſcribe it to Adam is ſupported by no argument: hence it ſhould ſeem from Adam's fall, that there was no perfect harmony between them; and that his appetites and ſenſes had the dominion over his reaſon. If it be aſked, ſays Socinus, whether there is original ſin? he anſwers, this is the ſame as the inquiry, whether men, when they are born, becauſe they derive their origin from Adam, have, on account of his fall, contracted any guilt or puniſhment, or are obnoxious to either? Therefore, ſince the conſent of the will muſt conſtitute guilt, and there can be no puniſhment without antecedent guilt, it ſeems not at all poſſible that either of theſe ſhould pertain to a man when he is born, as he neither has, nor could have before, any uſe of his own will. If by original ſin be underſtood certain innate deſires, or evil concupiſcence in man, and a proneneſs to ſin, this opinion Socinus denies, and labours to refute; concluding upon the whole, that there is no ſuch thing as original ſin, *i. e.* a taint or pravity in conſequence of the ſin of the firſt man, neceſſarily produced, or by any means inflicted on the human race; and that no other evil neceſſarily flows to all his poſterity from that firſt tranſgreſſion, than by ſome means or other the neceſſity of dying; not indeed through the influence of that tranſgreſſion, but becauſe man, being naturally mortal, was on that account left by God to his own natural mortality, and what was natural became neceſſary as a puniſhment on the offender; conſequently, they who were born of him muſt be born in the ſame circumſtances, for he was deprived of nothing he naturally had or could have. From reaſoning on this ſubject, Socinus concludes, that there is a freedom of will in man, and that the powers of man are not ſo few and feeble, but that he may, with the aſſiſtance of God, obey the divine law by the right uſe and application of his powers. Divine aſſiſtance he conſiders as external and internal; and the latter, he ſays, is twofold: the one, when God by ſome means impreſſeth on the heart what he hath promiſed to them that obey him; and the other, when he inſtructs and illuminates the mind rightly to diſcern his will, in thoſe inſtances which cannot be expreſsly contained in his written word: however, this internal aſſiſtance belongs only to thoſe who have made good uſe of the external. The doctrine of predeſtination Socinus abſolutely denies, and he endeavours to account for the preſcience of the Deity, without admitting that notion of his decrees, which ſome divines have adopted. On the head of juſtification, Socinus obſerves, that God out of his mere mercy juſtifies us, *i. e.* pronounces us righteous, and grants us forgiveneſs of ſins, and eternal life; but he requireth from us, before this be done, that we believe in Chriſt, *i. e.* confide in and obey him; and our good works, or the obedience we render to Chriſt, though not the efficient or meritorious cauſe, are the *ſine qua non*, or indiſpenſable pre-requiſite of our juſtification before God, and eternal ſalvation. But if any ſhould deviate from this obedience, by falling into ſin, and continuing therein, they ceaſe to be juſtified; nevertheleſs, by repentance and amendment of life, they may be juſtified again: but this ſecond repentance, he ſays, is not in our power, God granting an ability for it to whom he pleaſeth.

Socinus denied the perpetuity of baptiſm, as an ordinance in the church, alleging that it was not preſcribed for thoſe who in any other way have publicly given their names to Chriſt, or from their earlieſt years have been educated in the Chriſtian diſcipline; or if it is to be retained in theſe days, he apprehends it ſhould be retained principally on account of thoſe who have been converted from other religions to the Chriſtian. He farther thought, that, in order to the right adminiſtration of baptiſm, it is previouſly neceſſary that the baptized perſon ſhould be a believer, and he, therefore, reckoned the practice of infant baptiſm unſcriptural and erroneous.

After this compendious abſtract of the chief theological ſentiments of Socinus, it is proper to obſerve, that, according to the uſual manner of ſpeaking, all are denominated Socinians, whoſe opinions bear a certain affinity to the ſyſtem of Socinus: but, in a ſtrict and proper ſenſe, they only are deemed the members of this ſect, who embrace wholly, or with few exceptions, the form of theological doctrine, which Socinus either drew up himſelf, or received from his uncle, and delivered to the Unitarian brethren, or Socinians, in Poland and Tranſylvania. Their ſentiments are explained at large in their Catechiſm, printed ſeveral times under the title of "Catecheſis Eccleſiarum Polonicarum, unum Deum Patrem, illiuſque Filium unigenitum, una cum Sancto Spiritu, ex ſacra Scriptura confitentium." See *Catechiſm of* Racow.

The Socinians, like other ſects diſtinguiſhed by one general denomination, are divided into ſeveral parties. Some differ from Socinus with regard to the worſhip of Chriſt; ſome deny the eternity of the future puniſhment of the wicked; and ſome apprehend it contradictory to maintain God's foreknowledge of future contingencies, &c. See Budnæans, Farnovians, and Semijudaizers.

The chief ſchool of the Socinians was at Racow, where they obtained the grant of a ſettlement, and there all their firſt books were publiſhed. But in the year 1638, in conſequence of the intemperate zeal of ſome ſtudents of the Unitarian academy in this city againſt Popery, a law was enacted at Warſaw, by which it was decreed, that the academy of Racow ſhould be deſtroyed, its profeſſors baniſhed, the printing-houſe of the Socinians deſtroyed, and their churches ſhut up. This law was immediately executed; and ſimilar edicts were enacted in other parts of Poland. In 1658 another ſevere act was publiſhed by a diet held at Warſaw, requiring all the Socinians to leave the kingdom for ever, and denouncing capital puniſhment againſt all who ſhould profeſs their opinions, or harbour their perſons. This terrible edict was renewed in 1661; and in conſequence of theſe meaſures, the Socinians ſought an aſylum among their brethren in Tranſylvania: a conſiderable number was diſperſed through the adjacent provinces of Sileſia, Brandenburgh, and Pruſſia, where their poſterity ſtill ſubſiſt. Others repaired to Holland and England. In Tranſylvania they ſtill continue numerous; and are much at their eaſe. In Holland their number is not conſiderable; and all who profeſs themſelves ſuch are by law excluded from the general toleration which prevails in that kingdom. They are called Collegians.

As to the preſent ſtate of the Socinians in Poland, a late writer obſerves, that ſince their ſuppreſſion they have had churches, which have aſſembled in private houſes, woods, or fields, as opportunity permitted; and theſe aſſemblies have been conducted under the inſpection of regular miniſters, educated at Leyden and Amſterdam. Since the edict of 1661, they have been included by the Romiſh party under the general name of Diſſidents: however, in thoſe parts of Poland, which by the late partition fell to the lot of Pruſſia, Ruſſia, or the emperor, they have now their liberty in common with their other diſſident brethren, and their public places of worſhip. The only ſociety of Socinians in England was that formed by Mr. John Biddle, under the patronage of Mr. Thomas Firmin, and his adherents were called Bidellians; but this name was loſt in the more common appellation of Socinians, or, what they preferred, Unitarians. They differed from Socinus, and the foreign Unitarians, in maintaining the perſonality of the Holy Spirit. This ſociety does not appear to have ſubſiſted after the death of Biddle; nor have the Socinians, though their ſentiments have been adopted by ſeveral, made any figure as a community in England. The moſt diſtinguiſhed Socinian writers, in Poland, were Crellius, Smalcius, Volkelius, Slichtingius, Wolzogenius, Przipcovius, and Staniſlaus Lubianicius: to this number ſome have added Grotius; and in later times we might enumerate Le Clerc, Biddle, Lardner, Lowman, Fleming, Lindſey, Prieſtley, &c. See on this ſubject Socini Oper. tom. i. and ii. paſſim. Moſheim's Eccl. Hiſt. vol. iv. p. 167, &c. 8vo. Toulmin's Life of Socinus, paſſim. See Unitarians.

SOCK. See Soccus.

Sock and *Scythe-Land*. See Husband-*Land*.

Sock, in *Agriculture*, provincially the ſhare of a plough, or that part that opens the land; but properly the iron part, or ſock, which is put upon it. They are of different kinds, as ſharp-pointed and feathered on the edge, &c.

The ſharp-pointed ſock is the moſt proper and beſt adapted for all the rough ſtony ſorts of land, being the leaſt in danger of being thrown out of work in them. They are, therefore, the moſt commonly employed. The feather-edged ſock is the moſt uſeful in all ſuch ſoils as are in a great meaſure free from ſtones, though they may be rough on the top. They are, however, occaſionally made uſe of in other circumſtances and caſes. The feathers of them vary conſiderably in their nature and forms; ſome being ſmall and flat, others large and upright, ſo as to ſuit different purpoſes and intentions.

There is alſo a mixed kind of ſock, which has not only a pointed part, but a feathered one likewiſe. This is found very uſeful in ploughing, in many caſes, where the lands are of the leſs ſtony kinds.

All the different kinds of ſocks ſhould be made in ſuch a manner as to fit the ſheath, or fore-part of the head of the plough in the moſt exact manner, as much in the buſineſs of ploughing depends upon this being nicely adjuſted. See Plough.

Sock, *Paring*, that ſort of ſock which is made uſe of on any common plough, for the purpoſe of paring off the ſurface of ſward land. A ſock of this kind may be ſeen at *fig.* 9. *Plate Paring Ploughs*, which has an upright cutting feather, with an outſide cutting wing, and a middle hollow part to be put upon the ſheath or head of any common plough. It is very convenient and uſeful on many occaſions, as it is capable of being employed upon any plough which the farmer may chance to have by him.

SOCKE, the drainage of a farm-yard, or any other yard where dung is laid. See Farm-*Yard*.

Socke-*Pit*, the receiver or receptacle of the farm-yard drainage or liquids.

SOCKET. Ball and ſocket. See Ball.

SOCKETS, in a *Ship*, are the holes which the pintles of the murthering pieces go into.

SOCKIA, in *Geography*, a town of Arabia, in the province of Hedsjas; 75 miles S. of Medina.

SOCKNA, a town of Africa, in Fezzan; 150 miles N.N.W. of Mourzouk.

SOCLE, or Zocle, in *Architecture*, a flat, ſquare member under the baſes of pedeſtals, of ſtatues, vaſes, &c. which it ſerves as a foot, or ſtand.

The word is French, formed from the Italian *zoccolo*, or the Latin *ſoccus*, the ſhoe of the ancient comic actors. Vitruvius calls it *quadra;* we frequently denominate it *plinth*.

Socle, *Continued*, is a kind of continued ſtand, or pedeſtal, without either baſe or corniche, ranging round the whole building; called, by Vitruvius, *ſtereobata;* and, by the French, *ſoubaſſement*.

SOCLO, in *Geography*, a river on the coaſt of the iſland of Mindoro, which runs into the ſea, N. lat. 22° 56′. E. long. 121° 15′.

SOCMEN, or Sokemen, *Socmanni*, ſuch tenants as held their lands and tenements in *ſocage;* but the tenants in ancient demeſne ſeem moſt properly to be called *ſocmans*. See Soc and Villenage.

SOCNA, in our *Old Writers*, a privilege, liberty, or franchiſe. The word is Saxon.

SOCO, in *Ornithology*, the name of a Braſilian bird of the heron-kind, the *ardea Braſilienſis* of Linnæus, remarkable,

able, beyond all the reſt of that genus, for the length of its neck. It is very common in the Braſils; it is ſmaller than the common heron; its beak is ſtrong, ſtraight, and ſharp; its tail ſhort; its head and neck brown, and variegated with black; and its body is of the ſame colours in different variegations, but its wings have a mixture of whiteneſs. See HERON.

SOCOA, in *Geography*, a ſea-port of France, in the department of the Lower Pyrenées; 8 miles S.S.W. of Bayonne. N. lat. 43° 14′. W. long. 1° 36′.

SOCOCA, a town of Peru, in the dioceſe of La Paz; 80 miles E.S.E. of Lipas.

SOCOH, Soco, *Socho*, or *Shoco*, in *Ancient Geography*, a city of Judah (Joſh. xv. 35. 1 Sam. xvii. 1.), repaired by Heber (1 Chron. iv. 18.), and the place in which his family reſided; and afterwards fortified by Rehoboam. (2 Chron. xi. 7.) According to Euſebius, there were two cities named *Socoh*, the higher and the lower; 9 miles from Eleutheropolis towards Jeruſalem.

SOCOME, in our *Law-Books*, &c. a cuſtom of grinding corn at the lord's mill.

There is a *bond-ſocome*, where the tenants are bound to it; and *love-ſocome*, where they do it freely, out of affection to the lord. See MOLTA.

SOCONUSCO, in *Geography*, a province of Mexico, in the audience of Guatimala, bounded on the north by the province of Chiapa, on the eaſt by Vera Paz and Guatimala, on the ſouth by the Pacific ocean, and on the weſt by the Pacific ocean and Guaxaca. The climate is very hot, the rainy ſeaſon from April to September, and ſtorms are very frequent; ſo that the country is far from being either healthy or pleaſant; nor does the ſoil produce much corn, but it affords great quantities of indigo and cocoa-nuts, which are exported by ſea to all the other parts of New Spain. The few Spaniards of this country are very opulent.

SOCONUSCO, or *Guevetlan*, a town of Mexico, capital of a province of the ſame name, ſituated on a river near the North Pacific ocean; 460 miles S.E. of Mexico. N. lat. 15° 28′. W. long. 94° 36′.

SOCORRO, an iſland in the North Pacific ocean, about 20 miles in circumference, uninhabited, and barren; about 200 miles W. from the coaſt of Mexico. N. lat. 18° 30′. W. long. 120° 40′.

SOCOS, a ſmall iſland in the Atlantic, near the coaſt of Africa. S. lat. 19° 45′.

SOCOTAI, a town of Upper Siam; 30 miles S.W. of Porſelouc. N. lat. 17° 30′. E. long. 117°.

SOCOTAN, a town of Perſia, in the province of Arokhage; 120 miles E. of Arokhage.

SOCOTORA, or SOCOTRA, an iſland in the Arabian ſea, about 25 leagues from Cape Guardafu, in length about 24 leagues, and in breadth 16. Its ſhore is bold, and affords ſafe anchorage and good ports: two of its harbours and bays, *viz.* thoſe of Benin and Cora, are particularly diſtinguiſhed, on account of the ſecurity they give to ſhipping againſt every wind that blows. Of this iſland, though much frequented by different trading nations, very various and contradictory accounts have been given by different authors. Some ſay that it has only one town, called "Tamart," or "Tamary;" whilſt others ſay, that this is the chief of three towns; and others again ſtate, that it has neither town, village, nor houſe, and that the inhabitants ſhelter themſelves from the heat of the ſun in ſubterraneous dens and caves. It is agreed, however, that the iſland is populous and fertile, under the government of a prince, or ſultan, who was tributary to the ſheriffs of Arabia. The inhabitants are moſtly Mahometans, who denominate themſelves Arabs, and who reſemble them in their manners and language. The whole iſland abounds in cattle and fruit, with which, beſides ſome other commodities, they trade to Goa, where they are more favourably received than the native Arabs, who are not allowed to enter that town without paſſports. The produce of the iſland conſiſts chiefly in aloes, for which it is proverbially famous, frankincenſe, ambergris, dragon's blood, rice, dates, and coral, which paſs from Goa to many parts of the Indies, and to all the kingdoms of Europe. The Eaſt India ſhips formerly ſtopped here, when diſappointed of their paſſage by the monſoons; but of late the periods of theſe winds have been ſo well aſcertained, that this port is entirely neglected. N. lat. 12° 15′. E. long. 54°.

SOCRATES, in *Biography*, an ancient moral philoſopher, eminently diſtinguiſhed by his principles and conduct, and proverbially recognized as one of the wiſeſt and beſt men, whoſe name and character hiſtory has recorded. He was born at Alopece, a village near Athens, in the fourth year of the 77th Olympiad, B.C. 469. His parentage was obſcure; his father, Sophroniſcus, being a ſtatuary, and his mother, Phænareta, a midwife; and at an early age he was employed in his father's buſineſs, and is ſaid to have executed ſtatues of the habited Graces, which were allowed a place in the citadel of Athens. His patrimony, upon the death of his father, was only the ſmall ſum of 80 minæ, or about 300*l.*; and this ſum he loſt by the diſhoneſty of a relation, with whom his father had entruſted it. Thus reduced to the neceſſity of ſupporting himſelf by manual labour in the exerciſe of his profeſſion, as a ſtatuary, he could only command occaſional intervals, which he devoted to the ſtudy of philoſophy. He ſoon, however, obtained the patronage of Crito, a wealthy Athenian, who engaged him in the office of inſtructing his children; and in this ſituation he availed himſelf of the opportunities, which were thus afforded him, of attending the public lectures of the moſt eminent philoſophers. Ardently devoting himſelf to his favourite purſuits, he choſe, for his firſt preceptor, Anaxagoras; and when he left Athens, he attached himſelf to Archelaus. Prodicus, the ſophiſt, was his preceptor in eloquence, Evenus in poetry, Theodorus in geometry, and Damo in muſic; and he alſo derived conſiderable aſſiſtance in his education from Aſpaſia, a woman highly celebrated for her intellectual as well as perſonal accompliſhments, to whoſe houſe perſons of the moſt diſtinguiſhed character reſorted. So diligent and ſo ſucceſsful was Socrates in the improvement of theſe advantages, that his endowments, both natural and acquired, attracted attention; and he appeared at Athens, equally diſtinguiſhed as a true philoſopher and a good citizen. The military valour of Socrates was no leſs conſpicuous than the other qualities which were more adapted to a retired life; nor did he decline any ſervice, however hazardous or difficult, which private friendſhip or the public intereſt demanded. On one occaſion he preſerved the life and arms of Alcibiades, when he fell wounded in an engagement, in which they were jointly concerned; and in order to encourage the riſing merit of this noble youth, he declined the prize of valour, which was unqueſtionably due to himſelf, and gave his vote that it might be beſtowed on Alcibiades. On another occaſion, he hazarded his own life, in order to reſcue Xenophon, who was left wounded on the field of battle, and carried him on his ſhoulders till he was out of reach of the enemy.

Socrates, declining military expeditions, ſettled at Athens; and he was upwards of 60 years, before he undertook to ſerve his country in any civil office. Accordingly he was choſen to repreſent his own diſtrict in the ſenate of 500; and though he was firſt treated contemptuouſly by his colleagues,

leagues, on account of his inexperience, he ſoon convinced them that in wiſdom and integrity he was much their ſuperior. No conſideration could ever induce him to give a vote, or ſanction a meaſure, that appeared to him to be contrary to juſtice and the laws; and in oppoſition to the thirty tyrants, whoſe proceedings ſeemed to him to be cruel and oppreſſive, he expoſed even his life to danger in ſupporting, with undaunted firmneſs, the rights of his fellow-citizens; and when they iſſued an order to apprehend a wealthy citizen of Salamis, which he diſapproved, he refuſed to execute it, alleging that he would rather ſuffer death himſelf, than be inſtrumental in inflicting it unjuſtly upon another. Theſe proofs of public virtue, both in a military and civil capacity, ſays one of his biographers, are ſufficient to entitle the name of Socrates to a diſtinguiſhed place in the catalogue of good citizens. But his higheſt honour and praiſe are thoſe which belong to him as a philoſopher and moral preceptor. Obſerving with regret how the Athenian youth were miſled, and even corrupted in their principles and taſte, by the mode of teaching that prevailed among ſpeculative philoſophers and artful ſophiſts, he determined to inſtitute a new and more uſeful method of inſtruction. He juſtly conceived the true end of philoſophy to be, not to make an oſtentatious diſplay of ſuperior learning and ability in ſubtle diſputations or ingenious conjectures, but to free mankind from the dominion of pernicious prejudices; to correct their vices; to inſpire them with the love of virtue, and thus conduct them in the path of wiſdom to true felicity. He, therefore, aſſumed the character of a moral philoſopher; and, looking upon the whole city of Athens as his ſchool, and all who were diſpoſed to lend him their attention as his pupils, he ſeized every occaſion of communicating moral wiſdom to his fellow-citizens. He paſſed his time chiefly in public. It was his cuſtom, in the morning, to viſit the places made uſe of for walking and public exerciſes; at noon, to appear among the crowds in the markets or courts; and to ſpend the reſt of the day in thoſe parts of the city which were moſt frequented. Sometimes he collected an audience about him in the Lyceum, (a pleaſant meadow on the border of the river Ilyſſus,) where he delivered a diſcourſe from the chair, whilſt his auditors were ſeated on benches around him. At other times he converſed, in a leſs formal way, with any of his fellow-citizens in places of common reſort, or with his friends at meals, or in their hours of amuſement; thus making every place to which he came a ſchool of virtue. Not only did young men of rank and fortune attend upon his lectures, but he ſought for diſciples even among mechanics and labourers.

The method of inſtruction, which Socrates chiefly made uſe of, was, to propoſe a ſeries of queſtions to the perſon with whom he converſed, in order to lead him to ſome unforeſeen concluſion. He firſt gained the conſent of his reſpondent to ſome obvious truths, and then obliged him to admit others, from their relation, or reſemblance, to thoſe to which they had already aſſented. Without making uſe of any direct argument or perſuaſion, he choſe to lead the perſon he meant to inſtruct, to deduce the truths of which he wiſhed to convince him, as a neceſſary conſequence from his own conceſſions. He commonly conducted theſe conferences with ſuch addreſs, as to conceal his deſign, till the reſpondent had advanced too far to recede. On ſome occaſions, he made uſe of ironical language, that vain men might be caught in their own replies, and be obliged to confeſs their ignorance. He never aſſumed the air of a moroſe and rigid preceptor, but communicated uſeful inſtruction with all the eaſe and pleaſantry of polite converſation.

The modeſty of Socrates was no leſs diſtinguiſhed than his wiſdom. He profeſſed "to know only this, that he knew nothing;" meaning by this declaration, which he often repeated, that he had no other intention than to convince his hearers of the narrow limits of the human underſtanding. Far from encouraging univerſal ſcepticiſm, he always ſpoke confidently and decidedly on moral ſubjects; but at the ſame time he wiſhed to expoſe to contempt the arrogance of thoſe pretenders to ſcience, who would not acknowledge themſelves to be ignorant of any thing. He preferred moral to ſpeculative wiſdom; and therefore condemned thoſe whoſe whole attention and time were occupied about abſtruſe reſearches into nature, and who took no pains to render themſelves uſeful to mankind. His favourite maxim was, "whatever is above us, doth not concern us." He eſtimated the value of knowledge by its utility, and recommended the ſtudy of geometry, aſtronomy, and other ſciences, only ſo far as they admit of a practical application to the purpoſes of human life. His great object, in all his conferences and diſcourſes, was to lead men into an acquaintance with themſelves; to convince them of their follies and vices; to inſpire them with the love of virtue; and to furniſh them with uſeful moral inſtructions. Cicero might, therefore, very juſtly ſay of Socrates, that he was the firſt who called down philoſophy from heaven to earth, and introduced her into the public walks and domeſtic retirements of men, that ſhe might inſtruct them concerning life and manners.

The moral leſſons which Socrates taught, he himſelf diligently practiſed; whence he excelled other philoſophers in perſonal merit, no leſs than in his method of inſtruction. His conduct was uniformly ſuch as became a teacher of moral wiſdom. His mind, through the whole of his life, was ſuperior to the attractions of wealth and power. His inſtructions were gratuitous, and he refuſed rich preſents, that were offered to him by Alcibiades and others, though his wife earneſtly importuned him to accept them. He wanted little for his own perſonal accommodation. In his clothing and food, he conſulted only the demands of nature. Although his fare was ſimple, he was hoſpitable; and ſometimes invited men of ſuperior rank to partake of his meals. On one of theſe occaſions, his wife complained of the incompetency of their proviſion for their gueſts; but to theſe complaints he merely replied, that if his gueſts were wiſe men, they would be ſatiſfied with the proviſions which his table afforded; if otherwiſe, they were unworthy of notice. "Whilſt others," ſays he, "live to eat, wiſe men eat to live." He knew, that temperance was conducive to health, and he found by experience that this was the caſe; for he eſcaped infection in the midſt of the plague which proved ſo fatal to his fellow-citizens.

Although he admired a fair external form, as the index of a mind poſſeſſed, or at leaſt capable, of moral beauty, and converſed freely with young perſons of both ſexes, in order to aſſiſt their progreſs in wiſdom and virtue; yet his enemies have never been able to fix upon him the charge of incontinence. "Modern calumnies," ſays our biographer, "which impute to this great man vices, with which he was never charged by his contemporaries, ought to be treated with univerſal contempt." In his domeſtic connection he was unfortunate, yet he converted this into an occaſion of exerciſing his virtue. Xantippe, of whom many tales, that are mere fabrications, are related, was without doubt a woman of a high and unmanageable ſpirit.

Socrates himſelf, however, allows that ſhe poſſeſſed many domeſtic virtues; and towards the cloſe of his life, and during his impriſonment, ſhe expreſſed great affection for her huſband; and, indeed, after twenty years' experience, it would have been ſtrange, if it had been otherwiſe. On all occaſions, however, at home and abroad, he maintained an unruffled equanimity of temper; always exerciſing that ſelf-command, which is founded on virtuous principles, and ſtrengthened by reflection and habit. In this reſpect he was the more praiſe-worthy, as he himſelf acknowledges, that he was, in his natural diſpoſition, prone to vice, but that he had ſubdued his inclinations by the power of reaſon and philoſophy. This divine power of reaſon was probably the genius, or demon, which, from time to time, gave him inſtruction. Without admitting every thing which his diſciples have ſaid on this ſubject, it is poſſible that Socrates might, in ſome degree, be influenced by ſuperſtitious credulity, concerning this demon; for Xenophon expreſsly atteſts, that he believed that the gods ſometimes communicate to men the knowledge of future events, and that, on this principle, he encouraged the practice of divination.

It was one of the maxims of Socrates, "that a wiſe man will worſhip the gods according to the inſtitutions of the ſtate to which he belongs." He taught, however, a doctrine concerning religion much more pure and rational, than that which was delivered to the people by the prieſts, and he reprobated the popular fables concerning the gods. Convinced of the weakneſs of the human underſtanding, and perceiving that the pride of philoſophy had led his predeceſſors into futile ſpeculations on the nature and origin of things, he judged it moſt conſiſtent with true wiſdom to ſpeak with caution and reverence concerning the divine nature. Nevertheleſs, there can be no doubt that, whilſt he did not deny the exiſtence of inferior divinities, he acknowledged the being and providence of one Supreme Deity, and paid homage, with a pious mind, to the ſovereign power.

In fine, Socrates, both on account of his abilities as a moral preceptor, and on account of his perſonal merit, unqueſtionably deſerves to be ranked in the firſt order of human beings. "The man," ſays Xenophon, "whoſe memoirs I have written, was ſo pious, that he undertook nothing without aſking counſel of the gods; ſo juſt, that he never did the ſmalleſt injury to any one, but rendered eſſential ſervices to many; ſo temperate, that he never preferred pleaſure to virtue; and ſo wiſe, that he was able, even in the moſt difficult caſes, without advice, to judge what was expedient and right. He was eminently qualified to aſſiſt others by his counſel; to penetrate into men's characters; to reprehend them for their vices; and to excite them to the practice of virtue. Having found all theſe excellencies in Socrates, I have ever eſteemed him the moſt virtuous and the happieſt of men."

Socrates, notwithſtanding the ſuperiority of his talents, the excellence of his character, and the number of his followers, who venerated and eſteemed him, had many enemies. They were chiefly intereſted *Sophiſts* (ſee SOPHIST), whoſe influence and whoſe emoluments were diminiſhed in conſequence of the prevalence of his doctrines and precepts. In order to degrade him in the eſtimation of the Athenian youth, and to reſtrain his popularity, they engaged Ariſtophanes, the firſt buffoon of the age, to write a comedy, in which Socrates ſhould be the principal character. Ariſtophanes, pleaſed with ſo promiſing an occaſion of diſplaying his low and malignant wit, undertook the taſk, and produced the comedy of "The Clouds," ſtill extant in his works. In this piece Socrates is introduced hanging in a baſket in the air, and thence pouring forth abſurdity and profaneneſs. The philoſopher, though he ſeldom viſited the theatre, except when the tragedies of Euripides were performed, attended the repreſentation of this play, at a time when the houſe was crowded with ſtrangers, who happened to be at Athens during the celebration of a Bacchanalian feſtival. When the performer, who repreſented Socrates, appeared upon the ſtage, a general whiſper paſſed along the benches on which the ſtrangers ſat, to inquire who the perſon was whom the poet meant to ſatirize. Socrates, who had taken his ſtation in one of the moſt public parts of the theatre, obſerved this circumſtance; and immediately, with great coolneſs, roſe up, to gratify the curioſity of the audience, and continued ſtanding during the remainder of the repreſentation. One of the ſpectators, aſtoniſhed at the magnanimity which this action diſcovered, aſked him, whether he did not feel himſelf much chagrined, to be thus held up to public deriſion. "By no means," replied Socrates, "I am only a hoſt at a public feſtival, where I provide a large company with entertainment."

Theſe efforts of envy and malice, however, were not of long duration. When Ariſtophanes attempted, the year following, to renew the piece with alterations and additions, the repreſentation was ſo much diſcouraged, that he was obliged to diſcontinue it. The conſequence was, that the Sophiſts, and other opponents of Socrates, who appear to have made uſe of the expedient of the theatrical repreſentation, in order to ſound the inclinations of the public, choſe to poſtpone the farther proſecution of their malignant intention to a more favourable opportunity.

From this time, Socrates continued, for many years, to proſecute his laudable deſign of inſtructing and reforming his fellow-citizens. But as he perſevered in oppoſing every kind of political corruption and oppreſſion, both under the democracy and oligarchy, the number of his enemies increaſed, and a conſpiracy, which had been long concerted againſt his life, was reſumed. Clandeſtine arts were uſed, after the diſſolution of the tyranny, to excite a general prejudice againſt him. The people were induſtriouſly reminded, that Critias, who had been one of the moſt cruel of the thirty tyrants, and Alcibiades, who had inſulted religion by defacing the public ſtatues of Mercury, and performing a mock repreſentation of the Eleuſinian myſteries, had, in their youth, been diſciples of Socrates. The minds of the people being thus inflamed, a direct accuſation was preferred againſt Socrates before the ſupreme court of judicature. His accuſers were Anytus, a leather-dreſſer, who had long entertained a perſonal enmity againſt Socrates, for reprehending his avarice, in depriving his ſons of the benefits of learning, that they might purſue the gains of trade; Melitus, a young rhetorician, who was capable of undertaking any thing for the ſake of gain; and Lycon, who was glad of an opportunity of diſplaying his talents. The accuſation, which was delivered to the ſenate under the name of Melitus, was this: "Melitus, ſon of Melitus, of the tribe of Pythos, accuſeth Socrates, ſon of Sophroniſcus, of the tribe of Alopece. Socrates violates the laws, in not acknowledging the gods which the ſtate acknowledges, and by introducing new divinities. He alſo violates the laws by corrupting the youth. Be his puniſhment death."

This charge was delivered upon oath to the ſenate, and Crito, a friend of Socrates, became ſurety for his appearance on the day of trial. Anytus, ſoon afterwards, ſent a private meſſage to Socrates, aſſuring him, that if he would deſiſt from cenſuring his conduct, he would withdraw his accuſation. But Socrates refuſed to comply with ſo degrading a condition, and, with his uſual ſpirit, replied, "Whilſt I live I will never diſguiſe the truth, nor ſpeak otherwiſe than my duty requires." The interval between the accuſation and the trial he ſpent in philoſophical converſations with his friends, chuſing to diſcourſe upon any other ſubject, rather than his own ſituation. Hermogenes, one of his friends, was much ſtruck with this circumſtance, and aſked him, why he did not employ his time in preparing his defence: "Becauſe," replied Socrates, "I have never in my life done any thing unjuſt." The eminent orator Lyſias compoſed an apology, in the name of his maſter, which he requeſted him to adopt; but Socrates excuſed himſelf by ſaying, that though it was eloquently written, it would not ſuit his character.

When the day of trial arrived, his accuſers appeared in the ſenate, and attempted to ſupport their charge in three diſtinct ſpeeches, which ſtrongly marked their reſpective characters. Plato, who was a young man, and a zealous follower of Socrates, then roſe up to addreſs the judges in defence of his maſter: but whilſt he was attempting to apologize for his youth, he was abruptly commanded by the court to ſit down. Socrates, however, needed no advocate. Aſcending the chair with all the ſerenity of conſcious innocence, and with all the dignity of ſuperior merit, he delivered, in a firm and manly tone, an unpremeditated defence of himſelf, which ſilenced his opponents, and ought to have convinced his judges. After tracing the progreſs of the conſpiracy which had been raiſed againſt him to its true ſource, the jealouſy and reſentment of men whoſe ignorance he had expoſed, and whoſe vices he had ridiculed and reproved, he diſtinctly replied to the ſeveral charges brought againſt him by Melitus. To prove that he had not been guilty of impiety towards the gods of his country, he appealed to his frequent practice of attending the public religious feſtivals. The crime of introducing new divinities, with which he was charged, chiefly, as it ſeems, on the ground of the admonitions which he profeſſed to have received from an inviſible power, he diſclaimed, by pleading, that it was no new thing for men to conſult the gods, and receive inſtructions from them. To refute the charge of his having been a corrupter of youth, he urged the example which he had uniformly exhibited of juſtice, moderation, and temperance, the moral ſpirit and tendency of his diſcourſes, and the effect which had actually been produced by his doctrine upon the manners of the young. Then, diſdaining to ſolicit the mercy of his judges, he called upon them for that juſtice, which their office and their oath obliged them to adminiſter, and profeſſing his faith and confidence in God, reſigned himſelf to their pleaſure.

The judges, whoſe prejudices would not ſuffer them to pay due attention to this apology, or to examine with impartiality the merits of the cauſe, immediately declared him guilty of the crimes of which he ſtood accuſed. Socrates, in this ſtage of the trial, had a right to enter his plea againſt the puniſhment which the accuſers demanded, and inſtead of the ſentence of death, to propoſe ſome pecuniary amercement. But he, at firſt, peremptorily refuſed to make any propoſal of this kind, imagining that it might be conſtrued into an acknowledgment of guilt; and aſſerted, that his conduct merited, from the ſtate, reward rather than puniſhment. At length, however, he was prevailed upon by his friends to offer, upon their credit, a fine of thirty *minæ*. The judges, notwithſtanding, ſtill remained inexorable: they proceeded, without farther delay, to pronounce ſentence upon him; and he was condemned to be put to death by the poiſon of hemlock. Socrates received the ſentence with perfect compoſure, and by a ſmile teſtified his contempt both for his accuſers and his judges. Then, turning to his friends, he expreſſed his entire ſatisfaction in the recollection of his paſt life, and declared himſelf firmly perſuaded, that poſterity would do ſo much juſtice to his memory as to believe, that he had never injured or corrupted any one, but had ſpent his days in ſerving his fellow-citizens, by communicating to them, without reward, the precepts of wiſdom. Converſing in this manner, he was conducted from the court to the priſon, which he entered with a ſerene countenance and a lofty mind, amidſt the lamentations of his friends.

On the day of the condemnation, it happened that the ſhip, which was employed to carry a cuſtomary annual offering to the iſland of Delos, ſet ſail. It was contrary to the law of Athens, that, during this voyage, any capital puniſhment ſhould be inflicted within the city. This circumſtance delayed the execution of the ſentence againſt Socrates for thirty days. So long an interval of painful expectation, however, only ſerved to afford farther ſcope for the diſplay of his conſtancy. When his friends were with him, he converſed with his uſual cheerfulneſs. In their abſence, he amuſed himſelf with writing verſes. He compoſed a hymn in honour of Apollo and Diana, and verſified a fable of Æſop. His friends, ſtill anxious to ſave ſo valuable a life, urged him to attempt his eſcape, or at leaſt to permit them to convey him away; and Crito went ſo far, as to aſſure him that, by his intereſt with the gaoler, it might be eaſily accompliſhed, and to offer him a retreat in Theſſaly; but Socrates rejected the propoſal, as a criminal violation of the laws; and aſked them, whether there was any place out of Attica which death could not reach.

News being, at length, brought of the return of the ſhip from Delos, the officers, to whoſe care he was committed, delivered to Socrates, early in the morning, the final order for his execution, and immediately, according to the law, ſet him at liberty from his bonds. His friends, who came thus early to the priſon that they might have an opportunity of converſing with their maſter through the day, found his wife ſitting by him with a child in her arms. As ſoon as Xantippe ſaw them, ſhe burſt into tears, and ſaid, "O Socrates, this is the laſt time your friends will ever ſpeak to you, or you to them." Socrates, that the tranquillity of his laſt moments might not be diſturbed by her unavailing lamentations, requeſted that ſhe might be conducted home. With the moſt frantic expreſſions of grief, ſhe left the priſon. An intereſting converſation then paſſed between Socrates and his friends, which chiefly turned upon the immortality of the ſoul. In the courſe of this converſation, Socrates expreſſed his diſapprobation of the practice of ſuicide, and aſſured his friends, that his chief ſupport in his preſent ſituation was an expectation, though not unmixed with doubts, of a happy exiſtence after death. "It would be inexcuſeable in me," ſaid he, "to deſpiſe death, if I were not perſuaded that it will conduct me into the preſence of the gods, who are the moſt righteous governors, and into the ſociety of juſt and good men: but I derive confidence from the hope, that ſomething of man remains after death, and that the condition of good men will then be much better than that of the bad." Crito, afterwards aſking him in what manner he wiſhed to be buried, Socrates replied, with a ſmile, "As you pleaſe, provided I do not eſcape out of your hands." Then, turning to the reſt of his friends, he ſaid, "Is it not ſtrange, after all that I have ſaid to convince you that I am going to the ſociety of the happy, that Crito ſtill thinks this body, which will ſoon be a lifeleſs corpſe, to be Socrates? Let him diſpoſe of my body as he pleaſes, but let him not, at its interment, mourn over it, as if it were Socrates."

Towards the cloſe of the day, Socrates retired into an adjoining apartment to bathe; his friends, in the mean time, expreſſing to one another their grief, at the proſpect of loſing ſo excellent a father, and being left to paſs the reſt of their days in the ſolitary ſtate of orphans. After a ſhort interval, during which he gave ſome neceſſary inſtructions to his domeſtics, and took his laſt leave of his children, the attendant of the priſon informed him, that the time for drinking the poiſon was come. The executioner, though accuſtomed to ſuch ſcenes, ſhed tears, as he preſented the fatal cup. Socrates received it without change of countenance, or the leaſt appearance of perturbation: then, offering up a prayer to the gods, that they would grant him a proſperous paſſage into the inviſible world, with perfect compoſure he ſwallowed the poiſonous draught. His friends around him burſt into tears. Socrates alone remained unmoved. He upbraided their puſillanimity, and entreated them to exerciſe a manly conſtancy, worthy of the friends of virtue. He continued walking, till the chilling operation of the hemlock obliged him to lie down upon his bed. After remaining, for a ſhort time, ſilent, he requeſted Crito (probably in order to refute a calumny which might prove injurious to his friends after his deceaſe), not to neglect the offering of a cock, which he had vowed to Eſculapius. Then covering himſelf with his cloak, he expired. Such was the fate of the virtuous Socrates! a ſtory, ſays Cicero, which I never read without tears.

The friends and diſciples of this illuſtrious teacher of wiſdom were deeply afflicted by his death, and attended his funeral with every expreſſion of grief. Apprehenſive, however, for their own ſafety, they, ſoon afterwards, privately withdrew from the city, and took up their reſidence in diſtant places. Several of them viſited the philoſopher Euclid, of Megara, by whom they were kindly received.

No ſooner was the unjuſt condemnation of Socrates known through Greece, than a general indignation was kindled in the minds of good men, who univerſally regretted that ſo diſtinguiſhed an advocate for virtue ſhould have fallen a ſacrifice to jealouſy and envy. The Athenians themſelves, ſo remarkable for their caprice, who never knew the value of their great men till after their death, ſoon became ſenſible of the folly, as well as criminality, of putting to death the man who had been the chief ornament of their city, and of the age, and turned their indignation againſt his accuſers. Melitus was condemned to death, and Anytus, to eſcape a ſimilar fate, went into voluntary exile. To give a farther proof of the ſincerity of their regret, the Athenians, for a while, interrupted public buſineſs; decreed a general mourning; recalled the exiled friends of Socrates; and erected a ſtatue to his memory in one of the moſt frequented parts of the city. His death happened in the firſt year of the ninety-ſixth Olympiad, and in the 70th year of his age. Brucker's Hiſt. Phil. by Enfield, vol. i.

Socrates, an eccleſiaſtical hiſtorian, was born and educated at Conſtantinople; and having ſtudied under the grammarians Helladius and Ammonius, he commenced his career at the bar. But after ſome time he relinquiſhed the profeſſion of a law-pleader, and engaged in writing his eccleſiaſtical hiſtory, which comprehends, in ſeven books, the interval of about 133 years, from the year 306, when Conſtantine was declared emperor, to the ſeventeenth conſulſhip of Theodoſius, A.D. 439, in which year Cave repreſents him as flouriſhing. Socrates, Sozomen, and Theodoret, may be conſidered as continuators of Euſebius of Cæſarea; and theſe three writers, who lived in the time of Theodoſius the younger, whoſe reign extended from the year 408 to 450, publiſhed their reſpective hiſtories, which are valuable monuments of antiquity, about the ſame time, near the end of this reign. Socrates ſeems to have been diſtinguiſhed by his moderation and candour, which we may infer from the freedom with which he cenſures the ſquabbles and contentions that ſubſiſted amongſt the Chriſtian clergy in thoſe times, and condemns the perſecution that occurred in the reign of Julian. From the candid manner in which he expreſſes his ſentiments concerning the Novatians, ſome perſons have erroneouſly concluded that he was one of their number.

As an hiſtorian, Socrates has the merit of being judicious in his obſervations upon men and things, and generally accurate in his chronology. He ſpeaks with great reſpect of the ſcriptures of the Old and New Teſtaments; and has expreſsly quoted the Acts of the Apoſtles, and the Epiſtles to the Romans, the Corinthians, the Galatians, the Coloſſians, and the Hebrews: he likewiſe takes notice of a various reading in 1 John, iv. 3. The work of Socrates was tranſlated into Latin by thoſe who made verſions of the other Greek eccleſiaſtical hiſtorians, and is uſually printed with them. The beſt editions are thoſe of Valeſius, fol. Paris, 1668, and of Reading, fol. Cant. 1720. Dupin. Lardner.

SOCRATIC Induction, in *Rhetoric*. See Induction.

Socratic *Philoſophy*, the doctrines and opinions, with regard to morality and religion, maintained and taught by Socrates.

As Socrates left nothing in writing, we are indebted to his illuſtrious pupils, Xenophon and Plato, for what is known both of his opinions and manner of teaching; and more eſpecially to the former, whoſe memoirs of Socrates contain more accurate information than the dialogues of Plato, becauſe he intermixes his own conceptions and diction with the ideas and language of his maſter. Accordingly it is related, that when Socrates heard Plato recite his Lyſis, he ſaid, "How much does this young man make me ſay, which I never conceived!" The diſtinguiſhing character of Socrates was that of a moral philoſopher; and to this purpoſe Xenophon denies that he ever taught natural philoſophy, or any mathematical ſcience, and charges with miſrepreſentation and falſehood thoſe who had aſcribed to him diſſertations of this kind, probably in this charge referring to Plato, in whoſe works Socrates is introduced as diſcourſing on theſe ſubjects.

The doctrine of Socrates concerning God and religion is rather practical than ſpeculative. But he did not neglect to build the ſtructure of religious faith upon the firm foundation of an appeal to natural appearances. He taught, that the Supreme Being, though inviſible, is clearly ſeen in his works, which at once demonſtrate his exiſtence, and his wiſe and benevolent providence. This point is eſtabliſhed, with great perſpicuity and force of reaſoning, in his conferences with Ariſtodemus, and with Euthydemus. "Reflect," ſays he, "that your own mind directs your body by its volitions, and you muſt be convinced that the intelligencer of the univerſe diſpoſes all things according to his pleaſure.—Can you imagine, that your eye is capable of diſcerning diſtant objects, and that the eye of God cannot, at the ſame inſtant, ſee all things; or that, whilſt your mind contemplates the affairs of different countries, the underſtanding of God cannot attend, at once, to all the affairs of the univerſe? Such is the nature of the Divinity, that he ſees all things, hears all things, is every where preſent, and conſtantly ſuperintends all events." Again: "He who diſpoſes and directs the univerſe, who is the ſource of all that is fair and good, who, amidſt ſucceſſive changes, preſerves the courſe of nature unimpaired, and to whoſe laws all beings are ſubject, this Supreme Deity, though himſelf inviſible, is manifeſtly ſeen in his magnificent operations. Learn, then, from the things which are produced, to infer the exiſtence of an inviſible power, and to reverence the Divinity."

Beſides the one Supreme Deity, Socrates admitted the exiſtence of beings who poſſeſs a middle ſtation between God and man, to whoſe immediate agency he aſcribed the ordinary phenomena of nature, and whom he ſuppoſed to be particularly concerned in the management of human affairs. Hence, ſpeaking of the gods, who take care of men, he ſays, "Let it ſuffice you, whilſt you obſerve their works, to revere and honour the gods: and be perſuaded, that this is the way in which they make themſelves known; for, among all the gods, who beſtow bleſſings upon men, there are none who, in the diſtribution of their favours, make themſelves viſible to mortals." Hence, he ſpoke of thunder, wind, and other agents in nature, as ſervants of God, and encouraged the practice of divination, under the notion, that the gods ſometimes diſcover future events to good men.

Concerning the human ſoul, the opinion of Socrates, according to Xenophon, was, that it is allied to the divine being, not by a participation of eſſence, but by a ſimilarity of nature; that man excels all other animals in the faculty of reaſon; and that the exiſtence of good men will be continued after death, in a ſtate in which they will receive the reward of their virtue. Although it appears that, on this latter topic, Socrates was not wholly free from uncertainty, the conſolation which he profeſſed to derive from this ſource in the immediate proſpect of death, leaves little room to doubt, that he entertained a real belief and expectation of immortality. The doctrine which Cicero aſcribes to Socrates, on this head, is, that the human ſoul is a divine principle, which, when it paſſes out of the body, returns to heaven; and that this paſſage is moſt eaſy to thoſe who have, in this life, made the greateſt progreſs in virtue.

The ſyſtem of morality which Socrates made it the buſineſs of his life to teach, was raiſed upon the firm baſis of religion. The firſt principles of virtuous conduct, which are common to all mankind, are, according to this excellent moraliſt, laws of God: and the concluſive argument by which he ſupports this opinion is, that no man departs from theſe principles with impunity. "It is frequently poſſible," ſays he, "for men to ſcreen themſelves from the penalty of human laws, but no man can be unjuſt, or ungrateful, without ſuffering for his crime: hence, I conclude, that theſe laws muſt have proceeded from a more excellent legiſlator than man." Socrates taught, that true felicity is not to be derived from external poſſeſſions, but from wiſdom, which conſiſts in the knowledge and practice of virtue; that the cultivation of virtuous manners is neceſſarily attended with pleaſure, as well as profit; that the honeſt man alone is happy; and that it is abſurd to attempt to ſeparate things, which are in nature ſo cloſely united as virtue and intereſt.

But it is impoſſible, ſays the author whom we are citing, in detached ſentences, to give the reader any tolerable idea of the moral doctrines of Socrates. We muſt therefore refer him, on this head, to that valuable treaſure of ancient wiſdom, the "Memorabilia" of Socrates; a work in which he will find his original converſations on many intereſting topics, related with that beautiful ſimplicity, which diſtinguiſhes the writings of Xenophon.

The followers of Socrates may be divided into three claſſes. The firſt claſs conſiſts of ſuch as were neither philoſophers by profeſſion, nor addicted to the ſtudy of philoſophy, but attended upon Socrates as a moral preceptor, for the purpoſe of correcting and improving their manners. Among theſe were ſeveral young men of the firſt rank in Athens, particularly Alcibiades and Critias. In this claſs may alſo be placed the poets Euenes and Euripides, and the orators Lyſias and Iſocrates. The ſecond claſs included all thoſe who, after his death, became founders of particular ſects, and, though they differed from each other greatly, were united under the general appellation of Socratic philoſophers. Theſe were Ariſtippus, the founder of the Cyrenaic ſect; Phædo, of the Eliac; Euclid, of the Megaric; Plato, of the Academic; and Antiſthenes, of the Cynic. The third claſs comprehends thoſe diſciples of Socrates, who, though their names are found in the catalogue of philoſophers, did not inſtitute any new ſect. The moſt diſtinguiſhed diſciples of the Socratic ſchool are Xenophon, Æſchines, Simon, and Cebes; for an account of whom, ſee their reſpective articles. Brucker's Hiſt. of Phil. by Enfield, vol. i.

SOCRATIS INSULA, in *Ancient Geography*, an iſland of the Arabic gulf, on the coaſt of Arabia Felix. Ptolemy.

SOCUNDA, a town of Hyrcania, according to Ammianus Marcellinus, named Socanaa by Ptolemy, who places it on the coaſt of the Caſpian ſea, between the mouths of the rivers Maxera and Oxus.

SOD, in *Agriculture*, a portion of turf or ſward, cut or dug up. It alſo ſignifies the ſoil or earth. The ſquare pieces of ſurface-turf and earth that are cut up in forming embankments and earth-fences are likewiſe termed ſods, and require nice cutting, ſo as to be exactly joined in performing the works. Sods are uſeful too in ſome other operations of the rural kind.

SOD-*Burning*, the practice of paring off the ſward or moſſy ſurface of the land. It is obſerved by Mr. Marſhall, in the Rural Economy of Weſt Devonſhire, that the moſt noticeable particular of management in the ſoil proceſs of that diſtrict, is that of "burning beat," as it is provincially termed; anſwering to the paring and burning, or more technically, ſod-burning, of other diſtricts; and that this operation in agriculture has been practiſed, in this weſtern part of the iſland, from time beyond which memory or tradition reaches. It has, he conceives, probably been imported from the oppoſite ſhore of the continent. And in an old tract, which he ſaw ſome years ago in the Britiſh Muſeum, this operation is termed *Devonſhiring*, and it is to this day called *Denſhiring*, in different diſtricts of the kingdom. He alſo further ſtates, that there are at preſent three diſtinct methods of ſeparating the ſward or ſod, provincially the "ſpine," from the ſoil. The one is performed with a "beating-axe," namely, a large adze, ſome five or ſix inches wide, and ten or twelve inches long, crooked, and ſomewhat hollow, or *diſhing*. With this, which was probably the original inſtrument employed in the operation, large chips, ſhavings, or ſods, are ſtruck off. It is ſtill uſed in rough uneven grounds, eſpecially where furze, or the ſtubs of bruſhwood abound. In uſing it, the workman appears to the eye of a ſtranger, at ſome diſtance, to be *beating* the ſurface as with a beetle, rather than to be chipping off the ſward with an edged tool. This operation is provincially termed "hand-beating." The next inſtrument in uſe is, he ſays, the ſpade, reſembling the paring ſpade, or breaſt-plough of other diſtricts; with, however, in ſome inſtances at leaſt, a notable addition, namely, a mould-board, fixed in ſuch a manner as to turn the ſod or turf as a plough turns the furrow-ſlice, thus becoming literally a breaſt-plough; a name which has probably been given to the implement in this ſtate, and continued to be applied to the ſpade or ſhare after the mouldboard was laid aſide.

It is added, that in working this tool, the labourer proceeds without ſtopping to divide the ſods into ſhort lengths; this part being done by women and children, who follow to break the turfs into lengths, and ſet the pieces on edge to dry. The price for "ſpading" is about three halfpence a ſquare perch, of eighteen feet, or 16*s.* or 17*s.* a ſtatute acre. Formerly, it is probable, this inſtrument was much uſed, but at preſent it appears to be chiefly in the hands of ſmall farmers.

It is ſtated, that the inſtrument at preſent uſed for ſeparating the ſpine or graſſy turf from the ſoil, by farmers in general, is the common team-plough, with ſome little alteration in the ſize and form of the ſhare, according to the fancy or judgment of the farmer or his ploughman, there being two different ways of performing the operation. The one is termed "velling," the other "ſkirting," or "ſkirwinking." In that for *velling*, the ſhare is made wide, with the angle or outer point of the wing or fin turned upward to ſeparate the turf entirely from the ſoil. But in that for *ſkirting*, the common one is uſed, but made perhaps ſomewhat wider than when it is uſed in the ordinary operation of ploughing. And that in this mode of uſing the plough, little more than half the ſward is pared off, turning the part raiſed upon a line of unmoved turf; as in the operation of ribbing, rice-balking, raftering, or half-ploughing. The paring of turf in this caſe is from one to two inches thick on the coulter margin, decreaſing in thickneſs to a thin feather edge, by which it adheres to the unmoved ſward. And after having lain ſome time in this ſtate to rot, or grow tender, it is pulled to pieces with rough harrows drawn acroſs the lines of turf; and having lain in this rough ſtate until it be ſufficiently dry, it is bruiſed with a roller, and immediately harrowed with light harrows, walking the horſes one way, and trotting them another, to ſhake the earth out more effectually from among the roots of the graſs; going over the ground again, and perhaps again, according to the ſeaſon, and the judgment of the manager, until moſt of the earth be diſengaged. The "beat" of fragments of turfs being ſufficiently dry, is gathered into heaps of five or ſix buſhels each; either with the "drudge," firſt into rows, and then drawing it along the rows into heaps; or is pulled together with long-toothed hand-rakes, adapted to the purpoſe. The former is more expeditious, and requires fewer hands; the latter gathers the beat cleaner, freer from earth, which is liable to be drawn together by the drudge. The "beat burrows" or heaps being rounded, and ſhook up light and hollow, a wiſp of rough ſtraw, a large handful, is thruſt, double, into the windward ſide of each heap; and a number of heaps being thus primed, a match or flambeau is formed, with "reed" or ſtraight unthraſhed ſtraw, one end of which being lighted, it is applied in ſucceſſion to the looſe ragged ends of the wiſp of ſtraw, which readily communicate the fire to the heaps. The centre of the heap being conſumed, the outſkirts are thrown lightly into the dimples or hollows, and the heaps rounded up, as at firſt, continuing to right up the burrows, until the whole of the beat be conſumed, or *changed*, by the action of the fire. And the produce of the firſt ſkirting being burnt and ſpread over the ſurface, the operation is ſometimes repeated by running the plough acroſs the lines of the firſt ſkirting; thus paring off the principal part of the ſpine; again dragging, rolling, harrowing, collecting, and burning, as in the former operation. This is a proceſs of very great importance in the ſyſtem of Devonſhire huſbandry, and by which vaſt advantages and improvements have been effected.

The practice is not now, however, had ſo much recourſe to as formerly, probably on account of its having been carried to too great a length in ſome caſes, and improper modes of cropping having been purſued after it in others; but where well underſtood, it is ſtill an excellent method of preparation in many inſtances and ſituations of land. The great advantages of it ſeem to conſiſt in the reduction and diminution, which it ſo readily affords to the more ſtiff, adheſive, tenacious, clayey ſorts of ſoils; and the quick, certain, and effectual manner in which it brings the inert and uſeleſs vegetable matters of them, into more proper ſtates for the purpoſe of ſupporting plants, in the way of manures, as crops.

It is moſt likely that this practice will be the moſt beneficial in all ſuch ſoils as contain an over-proportion of dead fibrous vegetable matter, or which loſe from about one-third to one-half of their weight by burning; and in all ſuch as contain their earthy conſtituent parts in a finely reduced ſtate of diviſion, ſuch, for inſtance, as ſtrong clays, marles, and ſome other ſimilar kinds: but that in light, coarſe, ſandy, and rich ſoils of other qualities, which contain proper proportions of earthy matters in their compoſition; and in every caſe where the ſtructure and qualities of them are in their preſent ſtates properly looſe, and the organizable matters in them properly and to a ſufficient extent ſoluble, this practice cannot be employed with ſucceſs, though it is ſometimes attempted upon them. The ſiliceous poor ſandy ſoils muſt always, it is ſuppoſed, be greatly hurt by it, as is evident from the practical reſults upon ſuch lands.

It is not improbable, but that in numerous caſes it may have failed, in conſequence of over-burning the turf, or ſome other miſmanagement in the practice, as there may, by ſuch means, be too great a diſſipation and waſte of ſome certain ſubſtances and matters, which are in their nature and properties not only neceſſary, but highly conducive to the fertility and improvement of the ſoil or land. That carbon, or the refuſe of burnt vegetable matters, is of this nature, there can now be no doubt, as the decompoſition of ſuch ſubſtances has fully ſhewn it. This material may, therefore, be too much carried off and deſtroyed in burning the turf of lands, either by combining too freely with the oxygen of the ſurrounding atmoſphere, in conſequence of too great a heat being kept up in the operation, and be thereby loſt in the form of carbonic acid gas; or by combining in too free a manner with certain proportions of hydrogen, ſupplied by the vegetable matter in conſequence of the increaſed heat, and by this means furniſhing a ſort of oleaginous fluid, which is diſſipated in large quantities with great rapidity, when a conſiderable extent of ſurface is expoſed to the air of the atmoſphere, during the time of burning the turf. It is therefore evident, on theſe as well as other accounts, that a ſlow dull ſmothering fire, and as ſmall an expoſure to the open air as poſſible, are both circumſtances particularly neceſſary to the proper effect and ſucceſs of this practice in many caſes, if not in all; as when theſe and ſuch like circumſtances are not well attended to and properly regulated, the aſhes and other matters which are produced, will be, in a great meaſure, deprived and deſtitute of thoſe fertilizing and enriching qualities and properties, which are ſo neceſſary and eſſential to ſubſtances of this kind. See Paring and Burning.

Sod-*Drain*, that ſort of drain which is formed and conſtructed either wholly, or in the greateſt part, of the ſods dug up from the land about them. Theſe ſorts of drains were formerly much in uſe, and thought highly of in ſome diſtricts and places, moſt likely on account of their cheapneſs; but they are now fallen into neglect and diſrepute, probably in conſequence of their want of ſecurity and durability, eſpecially in lands which are under the plough. They are, however, ſtill made uſe of occaſionally on paſture and ſward lands in ſome ſituations. The methods of making them differ in different caſes and circumſtances, according to the nature and kinds of land, being in ſome inſtances formed with much more ſolidity than in others, as may be ſeen under the articles SURFACE-*Drains* and DRAINING. They can perhaps, on the whole, be ſeldom had recourſe to with propriety, except in caſes where other kinds of more ſolid materials are procured with great difficulty.

SOD-*Fence*, any ſort of fence which is conſtructed of materials of this nature, either for incloſing land or defending it againſt the waters of rivers or the ſea. See FENCES.

Theſe kinds of fences, when made againſt the ſea or large rivers, ſhould have a good degree of ſlope, as two, three, or four feet, to one in height, according as the caſe may be. They have in ſome diſtricts, as in Lancaſhire, in many inſtances, a baſe of about forty feet, and ſlope upwards in the direction of the ſea as well as that of the land. The extent of baſe is, however, different in different places, as well as that of the ſlope or ſlopes. Fences of this nature againſt the ſea in the above county, coſt about 3*l.* the rod of eight yards in their conſtruction.

SOD-*Kiln*, any ſort of kiln which is built or conſtructed with ſods, for the purpoſe of burning lime or any other material of that kind. They are very common in ſome places. See KILN.

A very cloſe ſort of ſmothering heat is produced in this way, which readily converts any calcareous matters into lime of a good quality for uſe on land.

SOD-*Knife, Draining*, an implement of the knife kind, which is made uſe of with great advantage in ſcoring and cutting out the ſward or graſſy ſurface in forming drains. It is a very uſeful tool, performing the work in a neat manner.

SODA. See SODIUM.

SODA, in the *Materia Medica. Muriate of Soda.* See MURIATE *of Soda*, SALT, and SALTS. It is obſerved, (ſee Thomſon's Chemiſtry, cited by Mr. A. T. Thomſon in the London Diſpenſatory,) that the common ſalt of commerce contains ſmall portions of muriate of magneſia, muriate of lime, and ſulphate of lime; and for the ſeparation of theſe, the ſalt is to be diſſolved in four times its weight of pure water, and into the filtered ſolution muſt be dropped firſt muriate of barytes, and then ſubcarbonate of ſoda, as long as any precipitate falls. Then filter and evaporate the clear fluid ſlowly till the ſalt cryſtallizes, which is pure muriate of ſoda. This pure muriate of ſoda is inodorous; its taſte is ſtrictly ſalt; and, when pure, perfectly devoid of any degree of bitterneſs. It is in regular cubes, which are not affected by expoſure to the atmoſphere. When it deliqueſces, it contains muriate of magneſia. Its cryſtals decrepitate when heated; and in a red heat melt, loſing about two *per cent.* of their weight; and in a ſtill greater heat the ſalt is volatilized, undecompoſed, in white fumes. Its ſpecific gravity is 2.126. It is equally ſoluble in cold and in hot water, nearly three parts of either being required to diſſolve one of ſalt. It conſiſts, according to Kirwan, of 38.88 of acid, 53.00 ſoda, and 8.12 water in 100 parts. It is decompoſed by ſulphuric acid and nitric acid.

As an article of the Materia Medica, this ſalt is tonic and anthelmintic in moderate doſes; purgative in larger; and externally ſtimulant. In the ordinary mode of uſing it, the tonic power of ſalt operates in aſſiſting the proceſs of digeſtion; and, conſequently, taken more freely, it proves uſeful in dyſpepſia, and in correcting the weakened ſtate of the inteſtines, which favours the propagation of worms. In large doſes it is ſaid to check vomiting of blood, and may be uſed as a purgative; although it is ſeldom employed. But the purgative quality of ſea-water does not altogether depend on this ſalt, as it contains a much larger proportion of muriate of magneſia, which is alſo purgative. As a local ſtimulant, its ſolution in tepid water, in the proportion of ℥ſs or ℥j to oj of water, forms the common domeſtic enema. It is uſed alſo as a fomentation to ſprains and bruiſes; and diſſolved in a large proportion of water, forms the beſt ſtimulant general bath, whether uſed cold, or in a tepid, or a hot ſtate.

With a view to the firſt intentions, the doſe of muriate of ſoda may be from grs. x to ʒj; but to operate by ſtool from ℥ſs to ℥j is neceſſary, largely diluted.

The officinal preparations of this ſalt are as follow; *viz.* "dried muriate of ſoda," which is prepared, according to the Dub. Ph., by taking any quantity of muriate of ſoda, and roaſting it over the fire in an iron veſſel, ſlightly covered, until it ceaſe to decrepitate, occaſionally agitating. According to Kirwan, 100 parts of cryſtallized muriate of ſoda contain 8.12 of water, which are nearly diſſipated by the heat, and the ſalt is thus rendered of a more uniform ſtrength. It is chiefly employed for the diſtillation of MURIATIC *Acid*, (ſee that article,) which is obtained colourleſs from the dried ſalt.

Muriatic acid of the Lond. Ph. is prepared by firſt mixing $1\frac{1}{2}$lb. of ſulphuric acid with half a pint of diſtilled water in a glaſs retort, and when the mixture is cold, adding to it 2lbs. of muriate of ſoda dried: then pouring a pint of the water into the receiver, and having fitted to it the retort placed in a ſand-bath, diſtil over the muriatic acid into this water, with a heat gradually raiſed, until the retort becomes red-hot. The ſpecific gravity of muriatic acid is to that of diſtilled water as 1.170 to 1.000. If a piece of limeſtone be immerſed in a fluid-ounce of it, diluted with water, the quantity diſſolved ought to be half an ounce. The Edinb. Ph. directs the *muriatic acid* to be prepared by firſt expoſing 2lbs. of muriate of ſoda in a pot to a red heat for a ſhort time, and when it is cold, putting it into a retort; then pouring 16 oz. of ſulphuric acid, mixed with 1lb. of water, and cooled, upon the muriate of ſoda; and finally diſtilling from a ſand-bath with a moderate fire, as long as any acid comes over. The ſpecific gravity of this acid is to that of diſtilled water as 1.170 to 1.000. According to the Dubl. Ph. 6lbs. of ſulphuric acid are diluted with the ſame quantity of water; and after it is cold, it is added gradually to 6lbs. of muriate of ſoda, dried and put into a glaſs retort; and then the liquor is diſtilled until the reſiduum becomes dry. The ſpecific gravity of this acid is to that of diſtilled water as 1.170 to 1.000.

This acid, for a farther account of which ſee MURIATIC *Acid*, is tonic and antiſeptic. It has been uſed with effect in typhus fevers, and in ſome cutaneous eruptions. It is a common and uſeful addition to gargles, in the proportion of from fʒſs to fʒij in f℥vj of any fluid, in ulcerated ſore-throats and cancrum oris; and in a very highly diluted ſtate, ♏viij in f℥iv of water, it has been recommended as an injection in gonorrhœa. It has alſo been regarded as an antidote in general ſyphilitic affections; but this opinion has been ſhewn by Mr. Pearſon to be erroneous: nevertheleſs, by its ſalutary effect on the ſtomach and general health, it is capable of ameliorating the appearance of venereal ulcers, and of reſtraining for a time the progreſs of the diſeaſe, when it is deſirable to gain time previouſly to the commencement of a mercurial courſe. The doſe is from ♏x to ♏xx, in a ſufficient quantity of water. Morveau, in 1773, diſcovered the important power of muriatic acid, in the ſtate of gas, for neutralizing putrid miaſmata ; and thus it is uſed as an agent for deſtroying infection in ſick rooms and hoſpitals, diſengaged by pouring ſulphuric acid on common ſalt.

The officinal preparations of muriatic acid are as follow ; "muriate of barytes" (ſee Salts) : the "ſolution of muriate of lime" (ſee Lime and Muriate *of Lime*), which, according to the Edinb. Ph., is prepared by mixing 16 oz. of muriatic acid with 8 oz. of water, and gradually adding 9 oz. of the harder variety of carbonate of lime (*viz.* white marble) broken into ſmall pieces : when the effervefcence is finiſhed, digeſt for an hour ; then pour off the fluid, and reduce it by evaporation to dryneſs : diſſolve the reſiduum in its weight and a half of water, and filter the ſolution. This "water of muriate of lime" is prepared, according to the Dubl. Ph., by adding gradually 2 oz. of diluted muriatic acid to 1 oz. of chalk reduced to a coarſe powder, and when the effervefcence is finiſhed, filtering the ſolution. This ſolution is colourleſs, and has a diſagreeable, bitter, acrid taſte ; it is decompoſed by the ſulphuric, nitric, phoſphoric, fluoric, and boracic acids ; the neutral ſalts into which theſe enter ; and the alkalies and alkaline carbonates which precipitate the lime. In the ſolid ſtate, 100 parts of muriate of lime, after being expoſed to a red heat, conſiſt of 42 of acid, 50 of lime, and 8 of water. By mixing four parts of it with an equal quantity of ſnow, a degree of cold is produced capable of ſinking the mercury in the thermometer from 32° to 40° below 0° of Fahrenheit. Muriate of lime is deobſtruent and tonic. Fourcroy introduced it into practice, and it has been much recommended as a remedy in ſcrophulous and glandular diſeaſes. Mr. T. Thomſon ſays, that he has given it with evident advantage in bronchocele, and that he has witneſſed greater benefit reſulting from the continued uſe of it in the varied forms of ſcrophula, than from any other remedy with which he is acquainted. Its operation is ſimilar to that of muriate of barytes : but the danger of an over-doſe is leſs to be dreaded, and its good effects are more uniform and certain. The doſe of the ſolution is from ♏xx to fʒj, in a ſufficient quantity of water, repeated twice or thrice a day.

Another preparation of muriate of ſoda is "muriate of antimony." (See Antimony.) For an account of the "precipitated ſubmuriate of mercury," and of the "ammoniated ſubmuriate of mercury," ſee Mercury.

The *ſub-borate of ſoda*, (for the chemical properties of which ſee Borax,) purified by ſolution and cryſtallization, is inodorous, and has a ſtyptic, cool, and alkaleſcent taſte ; and as an article of the materia medica, it is refrigerant and detergent. It is not given internally : and its chief application is in aphthous affections of the mouth, and exceſſive ſalivation. It is uſed either in the form of powder mixed with ſugar, or diſſolved in water, and united with honey as a lotion. See Honey.

The *carbonate of ſoda* is prepared, according to the Lond. Ph., by adding 3 oz. of ſubcarbonate of ammonia to a ſolution of 1lb. of ſubcarbonate of ſoda, in a pint of diſtilled water ; then expoſing the mixture in a ſand-bath to a heat of 180° for three hours, or until the ammonia be expelled, and finally ſetting it apart to cryſtallize. The reſiduary liquor may be evaporated in the ſame manner, and ſet apart again to cryſtallize. This ſalt does not appear to poſſeſs any advantages ſuperior to thoſe of the ſubcarbonate as a remedy, and may therefore be regarded as a redundant preparation.

The *ſubcarbonate of ſoda* of the Lond. Ph. is prepared by boiling 1lb. of impure ſoda (barilla) powdered, in a gallon of boiling diſtilled water for half an hour, and filtering the ſolution ; then evaporating it to two pints, and ſetting it apart for cryſtallization : the liquor that remains is thrown away. The *carbonate of ſoda* of the Edinb. Ph., formerly "purified fixed foſſile alkali," is prepared by bruiſing any quantity of impure carbonate of ſoda (ſee Carbonate *of Soda*), and then boiling it in water until all the ſaline matter be diſſolved ; then filtering the ſolution through paper, and evaporating it in an iron veſſel, ſo that after refrigeration cryſtals may be formed. The Dubl. Ph. directs 10lbs. of powdered barilla to be boiled in two gallons of water, in a covered veſſel, for two hours, with occaſional ſtirring ; filtering the liquor ; then bruiſing the barilla that remains with an equal quantity of water, and again boiling it, which may be repeated a third time. The leys being filtered and mixed, evaporate them to dryneſs in a wide iron veſſel, taking care that the ſaline maſs which will remain be not again liquefied by too great a heat ; ſtir it with an iron ſpatula till it becomes white ; finally diſſolve it in boiling water, and, after due evaporation, ſet it apart, that as it cools, cryſtals may form. Theſe will be purer if the barilla before each boiling be expoſed for ſome time to the air. The cryſtallization ſhould be effected when the air is at the freezing temperature, and in a liquor the ſpecific gravity of which is, to that of water, as 1220 to 1000. If the ſalt be not very pure, repeat the ſolution and cryſtallization.

Barilla, beſides the ſubcarbonate of ſoda, contains ſulphate and muriate of ſoda, charcoal, lime, magneſia, argil, and ſilex, from which theſe proceſſes are intended to ſeparate it. One pound of barilla yields from ℥iij to ℥v of the cryſtallized ſubcarbonate.

A very pure ſubcarbonate of ſoda is now manufactured, on a great ſcale, by the decompoſition of ſulphate of ſoda and of muriate of ſoda, which will probably ſuperſede altogether the proceſſes ordered in the pharmacopeias.

Subcarbonate of ſoda has a mild alkaleſcent taſte, and changes the vegetable blue and red colours to green. Its cryſtals are large tranſparent octohedrons, truncated at the ſummits of the pyramids, which effloreſce when expoſed to a dry air, and crumble down into a white opaque powder. It undergoes the watery fuſion ; is ſoluble in two parts of water at 60°, and in conſiderably leſs than its weight of boiling water, its abundant water of cryſtallization aſſiſting the ſolution of the ſalt at that temperature. Its conſtituents, according to the late analyſis of D'Arcet, are, in 100 parts, 16.04 of acid, 20.85 of alkali, and 63.61 of water : which correſponds with the ſtatement of Bergman.

This ſalt is antacid and deobſtruent. It is leſs acrid than the ſubcarbonate of potaſs ; and hence is in more general uſe in dyſpepſia and acidities of the ſtomach, and in ſcrophulous affections. Its uſe has been lately ſtrenuouſly recommended in hooping-cough, the protraction of which it is ſaid to prevent. It is given, at firſt, after the ſtomach and bowels have been duly evacuated, in combination with ipecacuanha and opium, and afterwards, when the violence of the cough has abated, with myrrh. The doſe of this ſalt is from grs. x to ʒſs, given twice or thrice a day, in conjunction with bitters or rhubarb.

The officinal preparations are, "dried ſubcarbonate of ſoda" of the Lond. and "dried carbonate of ſoda" of the Dub. Ph.; "carbonate of ſoda" of the Lond. Ph. ; "water of the ſupercarbonate of ſoda" of the Ed. Ph.; "phoſphate of ſoda" of the Ed. and Dub. Ph.; "ſoda tartarizata" of the Lond. Ed. and Dub. Ph.; "carbonate of iron" of the Lond. Ed. and Dub. Ph.; "carbonate of ammonia," and "water of carbonate of ammonia," of the Dub. Ph.; "precipitated chalk" of the Dub. Ph.; and "benzoic acid" of the Ed. Ph.

The "dried ſubcarbonate of ſoda" of the Lond. Ph. is prepared by expoſing 1lb. of ſubcarbonate of ſoda to a moderate heat in a clean iron veſſel, until it becomes perfectly dry, and at the ſame time ſtirring it diligently with an iron ſpatula, and finally rubbing it into a powder. The Dubl. Ph. directs the "dried carbonate of ſoda" to be prepared by liquefying the cryſtals of carbonate of ſoda in a ſilver crucible over the fire; then, in an augmented heat, ſtirring the diſſolved ſalt, until by the evaporation of the water it becomes dry; reducing it to a fine powder, and preſerving it in ſtopped phials. The conſtituents of 100 parts, in this ſtate, according to the analyſis of Kirwan, are 40.14 of acid, and 59.86 of ſoda. Dr. Beddoes has extolled this ſalt in form of pills, as a remedy in calculous affections; and, as Thomſon ſays, it certainly affords decided relief from the painful ſymptoms attending calculus in the kidnies, and other urinary affections. Its effects, however, are only palliative, and depend on its deſtroying the prevalent acid in the ſtomach; and hence it cannot, in ſtrict language, be regarded as a lithontriptic. The doſe is from grs. x to grs. xv, given three times a day. Beddoes directed it to be combined with ſoap and aromatics.

The "water of ſupercarbonate of ſoda" of the Ed. Ph. is to be prepared from 10lbs. of water, and 2 oz. of ſubcarbonate of ſoda, in the ſame manner as the water of ſupercarbonate of potaſs. This preparation is milder and pleaſanter than the water prepared with ſubcarbonate of potaſs. It is manufactured in large quantities, on a great ſcale, of a much ſuperior quality to any which the apothecary can prepare: and is in very general uſe as a cooling beverage. Half a pint of it poured over two table-ſpoonfuls of lemon-juice, ſweetened with a little ſugar, forms an excellent and very agreeable efferveſcing draught.

The "phoſphate of ſoda" is prepared, according to the Ed. Ph., by mixing 10 lbs. of powdered bones, reduced to whiteneſs, with 6 lbs. of ſulphuric acid, in an earthen veſſel; then adding 9 lbs. of water, and again mixing; keeping the veſſel in a vapour-bath for three days; afterwards diluting the matter with 9 lbs. more of boiling water, and ſtraining through a ſtrong linen cloth, pouring boiling water gradually over it, until the whole of the acid be waſhed out. Set the ſtrained liquor apart, that the impurities may ſubſide, from which pour it off, and evaporate it to 9 lbs. To this liquor ſeparated from its impurities, and heated in an earthen veſſel, add a warm ſolution of carbonate of ſoda, until the efferveſcence ceaſe: then ſtrain, and ſet the liquor aſide that cryſtals may form. Theſe being removed, add to the liquor, if neceſſary, a little carbonate of ſoda, that the phoſphoric acid may be accurately ſaturated; and diſpoſe it, by evaporation again, to yield cryſtals, as long as theſe ſhall be produced. Finally, let the cryſtals be preſerved in a well-cloſed veſſel.

The Dub. Ph. directs to take of burnt bones, reduced to powder, 5 lbs.; ſulphuric acid, 3½ lbs. Mix the powder with the ſulphuric acid in an earthen veſſel; add, gradually, five pints of water, and agitate the mixture. Digeſt for three days, adding from time to time more water, leſt the materials ſhould become dry, and continue the agitation; then pour over them five pints of boiling water, and ſtrain through a linen rag, pouring on, at intervals, boiling water, until all the acid be waſhed out. Set the liquor apart, that the impurities may ſubſide, from which decant it, and evaporate it to one half; then add 3 lbs. 10 oz. of carbonate of ſoda, diſſolved in a ſufficient quantity of warm water; filter, and obtain cryſtals by repeated evaporation and cooling. The cryſtals are to be preſerved in well-cloſed veſſels.

If the ſalt be not ſufficiently pure, repeat the ſolution and cryſtallization.

A cheaper mode of preparing this ſalt has been given by M. Funcke, a German chemiſt. He adds to the matter of calcined bones diffuſed in water, juſt enough dilute ſulphuric acid to ſaturate the ſmall portion of carbonate of lime it always contains. When the efferveſcence ceaſes, the whole is diſſolved in nitric acid, and as much ſulphate of ſoda added to the ſolution as of bone-aſhes uſed. The whole is then diſtilled, to recover the nitric acid; and the phoſphate of ſoda is ſeparated from the reſidue, which is a mixture of ſulphate of lime and phoſphate of ſoda, by ſolution and cryſtallization.

This ſalt has a purely ſaline taſte, reſembling very much that of common ſalt. Its cryſtals are large, regular, tranſparent, rhomboidal priſms, terminated by three-ſided priſms, having a ſpecific gravity of 1.333, and effloreſcing on expoſure to the air. It is ſoluble in three parts of water at 60°, and in two parts of boiling water; and undergoes the watery fuſion when heated. Its conſtituents, according to Thenard, are, in 100 parts, 19 of ſoda, 15 of phoſphoric acid, and 66 of water. Muriate of barytes, lime, and magneſia, decompoſe this ſalt; and by the ſtrong acids it is converted into ſuperphoſphate of ſoda.

Phoſphate of ſoda is a mild cathartic, excellently adapted for children, and others who have a faſtidious taſte. It may be given diſſolved in gruel or broth, made without ſalt, by which its taſte is very effectually covered. The doſe is from ʒvj to ℥ij. It was introduced into practice by Dr. George Pearſon of London.

The "ſulphate of ſoda" is for the moſt part artificially prepared, and chiefly in the large way, during the manufacture of ſal ammoniac from ſulphate of ammonia and common ſalt. The directions given for preparing it, in the Lond. Ph., are as follow: Take of the ſalt which remains after the diſtillation of muriatic acid, 2 lbs.; boiling water, 2½ pints. Diſſolve the ſalt in the water; then add gradually as much ſubcarbonate of ſoda as will ſaturate the acid. Boil the ſolution until a pellicle appears; and after having filtered it, ſet it apart to cryſtallize. Pour the water from off the cryſtals, and dry them on bibulous paper. The "ſulphate of ſoda" of the Edinb. Ph., formerly "Glauber ſalts," (ſee GLAUBER *Salt*,) is formed by diſſolving in water the acidulous ſalt, which remains after the diſtillation of muriatic acid, and having mixed with it carbonate of lime (chalk) in powder, to remove the ſuperfluous acid, ſetting it apart until the impurities ſubſide; then, having poured off the liquor, filtering it through paper, and reducing it by evaporation, that it may cryſtallize. The Dub. Ph. directs to diſſolve the ſalt, which remains after the diſtillation of muriatic acid, in a ſufficient quantity of boiling water; then to evaporate the filtered ſolution to a proper point, and ſet it apart, that, as it ſlowly cools, cryſtals may be formed. The taſte of this ſalt is at firſt ſimply ſaline, but afterwards very diſagreeably bitter. Its cryſtals are tranſparent, ſix-ſided, irregular, channelled priſms, with dihedral ſummits; effloreſcent, and falling to a white powder, when expoſed to the air. It is ſoluble in 2.86 parts of water at 60°, and 0.8 of boiling water; undergoes the watery fuſion when heated, and in a ſtrong heat is partially decompoſed. According to Kirwan, 100 parts contain 23.52 of acid, 18.48 of alkali, and 58.00 of water; and in the dried ſtate, of 56 of acid, and 44 of water. This ſalt is a very common and uſeful purgative; but, on account of its nauſeous taſte, is not very generally preſcribed by the phyſician. The doſe is from ʒſs to ʒij; but in the effloreſcent ſtate, half of theſe quantities is ſufficient.

The "tartarized ſoda" (ſee CARBONAT *of Soda* and NATRON) is prepared, according to the Lond. Ph., by diſſolving 20 oz. of ſubcarbonate of ſoda in 10 pints of boiling water, and adding gradually 2 lbs. of ſupertartrate of potaſs in powder; filtering the ſolution through paper; then boiling till a pellicle is formed on the ſurface, and ſetting it aſide to cryſtallize; then pouring off the water from the cryſtals, and drying them on bibulous paper.

The "tartrite of potaſs and ſoda," formerly *Sal* RUPELLENSIS (which ſee), is prepared, according to the Edinb. Ph., from carbonate of ſoda and ſupertartrite of potaſs, in the ſame manner as TARTRITE *of Potaſs;* which ſee.

The "tartrate of ſoda and kali," of the Dub. Ph., is formed by diſſolving 20 oz. of carbonate of ſoda in 10 pints of boiling water, and gradually adding 2 lbs. of cryſtals of tartar, reduced to a very fine powder; filtering the ſolution through paper, evaporating it, and ſetting it aſide, that, as it ſlowly cools, cryſtals may be formed. Mr. T. Thomſon obſerves, that of the three appellations of this ſalt, that of the Dublin college is the leaſt exceptionable; the London name conveying an evidently erroneous notion of the preparation, and the Edinburgh college incorrectly denominating it a tartrite.

This ſalt has a bitter ſaline taſte. Its cryſtals are large, regular, tranſparent, hard, rhomboidal, ſix-ſided priſms; very ſlightly effloreſcent, and ſoluble in five parts of water at 60°. It is decompoſed by the ſtrong acids, muriate of barytes, lime, and by a red heat. The conſtituents of 100 parts of this ſalt, according to Schulze, are 41.3 of tartaric acid, 14.3 of potaſs, 13.3 of ſoda, and 31.1 of water.

Tartrate of potaſs and ſoda is a cooling and not very unpalatable cathartic. It was introduced into practice by M. Seignette, an apothecary of Rochelle, and the preparation kept a ſecret until it was diſcovered and publiſhed by Boulduc and Geoffrey in 1731. It operates moderately, and without exciting much irritation: hence it is well ſuited to nephritic and puerperal caſes. The doſe is from ʒj to ℥jſs, diſſolved in any convenient vehicle. Woodville. Thomſon's Lond. Diſp.

SODA, in *Medicine,* a word of Arabic origin, nearly ſynonimous with *cardialgia,* and *heart-burn,* ſignifying any ſenſe of burning heat in the ſtomach, ariſing from acidity or acrid humours. See CARDIALGIA and INDIGESTION.

The term *ſoda* has, however, been conſidered by ſome writers as alſo ſignifying heat and pain of the head.

SODA, in *Geography,* a town of Arabia, in the province of Nedsjed; 180 miles E. of Medina.

SODA, in *Natural Hiſtory.* See KALI.

SODA *Subethica,* a term uſed to expreſs a heavy and dull pain in the head.

SODADA, in *Botany,* from its Arabic name *Sodâd.* Forſk. Ægypt-Arab. 81. Juſſ. 243.—A genus of the natural order of *Capparides,* which is undoubtedly diſtinct, and may perhaps be tolerated under the above appellation, though of avowedly barbarous origin, like *Aucuba,* and one or two ſimilar names, of eaſy pronunciation. We do not, however, wiſh to ſanction any ſuch, but leave them to future opportunities of a thorough and authentic reform. In the preſent inſtance, at leaſt, we attempt no amendment, becauſe we have not materials to deſcribe the genus under conſideration. Colonel Hardwicke has brought, from the Eaſt Indies, either Forſkall's identical plant, or another ſpecies of the ſame genus. Forſkall deſcribes his as follows.

S. *decidua.* Calyx of four unequal leaves. Petals four, unequal. Stamens inclining. Capſule ſtalked.

A diffuſe *ſhrub,* with diſtant, alternate, ſpreading *branches,* about two inches long, with a pair of ſhort awl-ſhaped *ſpines* at each bud. *Leaves* ſeſſile, oblong, deciduous, rarely preſent. *Flower-ſtalks* between the ſpines, ſingle-flowered, three together. *Flowers* red. *Calyx* coloured, deciduous; its upper ſegment very large, gibbous, compreſſed, often ſplit at the ſide; the reſt equal, linear-lanceolate, fringed. Two upper *petals* ovate, pointed, flat, at firſt hidden under the upper leaf of the calyx; two lower narrower, alternate with its lower leaves, downy at the under ſide and edges. *Stamens* eight, unequal, thread-ſhaped, longer than the petals, browniſh-green. *Germen* globoſe, with four furrows on a ſtalk as long as the ſtamens. *Style* awl-ſhaped. *Stigma* acute. *Fruit* red, bigger than a hazel-nut, eatable when dreſſed before it is ripe. This ſhrub is common throughout the country of Yemen.

SODALES AUGUSTALES. See AUGUSTALES.

SODALITE, in *Mineralogy,* a ſtone which derives its name from the large portion of mineral alkali that enters into its compoſition. Its colour is a blueiſh-green. It occurs both cryſtallized and maſſive: the cryſtals are dodecahedrons, with rhomboidal faces. The ſtructure is lamellar, with joints in two directions. The fracture is conchoidal: it has a ſhining and reſinous luſtre, but the luſtre of the freſh fracture is vitreous; it is tranſlucent, and yields with difficulty to the knife. The ſpecific gravity is 2.37. It is infuſible by the blowpipe.

The conſtituent parts of ſodalite, as given by different chemiſts, vary.

Silex	36	to	38
Alumine	27	to	32
Soda	23	to	25
Oxyd of iron	¼	to	1
Lime	0	to	2
Muriatic acid	3	to	7

SODALITIUM, among the Anglo-Saxons, was the name of a voluntary aſſociation, the object of which was the perſonal ſecurity of thoſe who joined in it, and which the feebleneſs of government at the time rendered neceſſary. Among other regulations, which are contained in one of theſe ſtill extant, the following deſerves notice: If any aſſociate ſhall either eat or drink with a perſon who has killed any member of the ſodalitium, unleſs in the preſence of the king, the biſhop, or the count, and unleſs he can prove that he did not know the perſon, let him pay a great fine. Hicks Diſſ. Epiſt. apud Theſ. Ling. Septentr. vol. i. p. 21.

SODBURY, CHIPPING, anciently *Sopeberie,* in *Geography,* a ſmall pariſh, containing only 90 acres, and market-town, in the lower diviſion of the hundred of Grombald's-Aſh, in the county of Glouceſter, England, is ſituated 12 miles N. from Briſtol, 30 S. from Glouceſter, and 113 W. from London, at the foot of the Great Howby hill, a continuation of that chain which extends from north to ſouth through the county. This, and the two adjoining pariſhes of the ſame name, were ſo called from the *berie,* or camp, which is found on the ſummit of Old Sodbury. Chipping diſtinguiſhes it as a market-town, and was firſt uſed when the market was eſtabliſhed, in the reign of Henry III. The town conſiſts of one long ſtreet, and is the great thoroughfare between Briſtol and the eaſtern part of the county. The church conſiſts of a nave and two aiſles, with

with an embattled tower at the weſt end. A weekly market is held on Thurſdays, and two fairs yearly. By a charter of incorporation, granted by king Charles II. in 1681, the government of the borough was veſted in a mayor, ſix aldermen, and twelve burgeſſes, with a high ſteward, recorder, and town-clerk; and at the ſame time was granted the privilege of holding pleas of all manner of perſonal ſuits and debts under five pounds, ariſing within the borough. But in 1688, at the requeſt of the inhabitants, from what cauſe is not now remembered, the charter was annulled by proclamation; and from that period the ancient government by a bailiff was revived, who is annually choſen by the lord of the manor out of three perſons, returned to him at the court-leet. Two eſtates, called the Stub-Ridings and Meadow-Ridings, were anciently granted by two lords of the manor, in the reigns of Henry II. and John, to the bailiffs and bailiff-burgeſſes, for the following purpoſes. The former, conſiſting of about 100 acres, is granted for ſummer-paſture under certain regulations for ſixty-eight cow-beaſts, to as many perſons as have been inhabitants of the town for fourteen years. The latter is divided into eighty-one lots, beſides two others, called the Bailiff's and Hayward's piece. Each of theſe, containing rather more than a ſtatute acre, is held by a leſſee for his own life, and the life of his widow. Out of theſe eſtates the lord of the manor receives an annual payment of 5*l.*, and the vicar of Old Sodbury 1*l.* 13*s.* 4*d.* in lieu of tythes. The bailiff is entitled to fifty ſhillings yearly, for which, by ancient cuſtom, he provides an ox and two barrels of ale, on St. Stephen's day, for the inhabitants.

A guild was founded in this borough, dedicated to St. Mary, in the reign of Henry VI., of which John Glover was the laſt incumbent. The lands were granted, in 1558, to the burghers of Sodbury, part for a town-hall, and part for an alms-houſe. A free-ſchool is ſupported in this pariſh, by the profits of lands in different pariſhes. In the population returns to parliament in the year 1811, the inhabitants of this pariſh were ſtated to be 1235, occupying 236 houſes. In the ſanguinary reign of Mary, John Pigott was burnt here for his adherence to the Proteſtant religion.

The manor was granted by the Conqueror to Odo, earl of Champagne, whoſe grandſon, William, granted the privilege of paſture-common in the Riding before mentioned, the original of which is ſtill in exiſtence. About the ſame time, William Green of Sodbury gave Gaunt's Fields to the burgeſſes; and Jurdan Biſhop, who was lord of the manor of Little Sodbury, granted them common of paſture for cattle in Dymerſhed and Norwood. The manor, which by ſucceſſive marriages has been poſſeſſed by various families, is now held by that of Hartley.

In the high lands, eaſt of the town, are found a great variety of belemnites, nautilites, of the ribbed ſort; and weſt of the town, ſome veins of ſulphate of ſtrontian have been diſcovered.

Little Sodbury is a pariſh adjoining Chipping Sodbury, and conſiſts of about 900 acres of land, the greater part of which is appropriated to the dairy ſyſtem. On the edge of a hill, in this pariſh, is a large encampment of an oblong form, compriſing an area of about 200 yards from eaſt to weſt, and 300 from north to ſouth. This was probably formed by the Romans; and according to Leland, it was occupied by Edward IV.'s army, previous to the battle of Tewkeſbury.

Old Sodbury is another pariſh adjoining the former, on the north-eaſt, and conſiſts of 3000 acres of land, the greater part of which is paſture.

Dodington, three miles ſouth-eaſt of Sodbury, is the magnificent ſeat of Chriſtopher Codrington, eſq. who has long been engaged in building a ſpacious and ſplendid manſion here, from the deſigns of the late James Wyatt, eſq. architect. Rudge's Hiſtory of the County of Glouceſter, 2 vols. 8vo. 1803.

SODDER, or SODER. See SOLDER.

SODDERING. See SOLDERING.

SODDING *of Brick.* See BRICK.

SODDOMA, IL, in *Biography*, the cognomen of Giovanni Antonio Razzi, a native of Vercelli, in Piedmont, born about the year 1479. He was inſtructed in painting by Giacomo dalle Fonte; but his chief object of ſtudy was the ſtyle of L. da Vinci. He was employed by Julius II. to paint the chambers of the Vatican; but the charms of Raphael's firſt productions in that palace were the ſignal for the obliteration of all other works there: among them Il Soddoma's. Other pictures, which he painted for Agoſtino Ghigi in the Farneſina, were more fortunate, and yet remain. Their ſubjects are taken from the hiſtory of Alexander the Great, and though inferior to the works of Lionardo, yet they exhibit very conſiderable talent, many beauties of perſpective, and much playful imagery.

After he left Rome, he had conſiderable employment at Sienna, and there his beſt productions are to be found, in which he has combined the excellent qualities of the beſt artiſts of his day. He died in 1554.

SODENKYLA, in *Geography*, a town of Swediſh Lapland; 110 miles N.N.E. of Tornea. N. lat. 67° 25′. E. long. 26° 14′.

SODERALA, a town of Sweden, in Helſingland; 3 miles S.W. of Soderhamn.

SODERBY, a town of Sweden, in Jamptland; 60 miles N. of Froſon.—Alſo, a town of Sweden, in Upland; 40 miles N.N.E. of Stockholm.

SODERHAMN, a ſea-port town of Sweden, in the province of Helſingland, ſituated at the mouth of a river, near the gulf of Bothnia, firſt built by gunſmiths and copperſmiths, and erected into a town in the year 1620. The houſes are mean, but the church handſome. The trade of this place is conſiderable in arms, linen, butter, timber, flax, &c.; 20 miles N. of Geffle.

SODERKIOPING, a town of Sweden, in the province of Eaſt Gothland. This is a ſtaple town, ſituated on a navigable river, and one of the moſt ancient cities in Gothland. It had formerly its own municipal laws, and was in a much more flouriſhing condition than it is at preſent. Two kings were crowned, and in 1595 a diet was held in this town. It has at preſent but two churches; 10 miles S.S.E. of Nordkioping. N. lat. 61° 18′. E. long. 16° 54′.

SODERON, a ſmall iſland near the coaſt of Sweden, in the Alands Haf. N. lat. 60° 15′. E. long. 8° 14′.

SODERSKARBAK, a ſmall iſland in the gulf of Finland. N. lat. 60° 5′.

SODERTELGE, or *Soder Telge*, a town of Sweden, in the province of Sudermanland, ſituated between the ſea and the Maeler lake. About two miles and a half diſtant from this town, at a place called "Aegelſtowyk," is a good harbour. Sodertelge was formerly a ſtaple town, and in a flouriſhing condition; and there is ſtill a manufacture of worſted and ſilk ſtockings in this town. In the year 1719, Sodertelge was burnt by the Ruſſian army, but has ſince been rebuilt; 16 miles W.S.W. of Stockholm. N. lat. 59° 8′. E. long. 18° 28′.

SODE-SHOOTS, in *Botany*, a name given by ſome to the tree, whoſe inſpiſſated juice is the gum tacamahacca of the ſhops.

SODFORS, in *Geography*, a town of Sweden, in Weſt Bothnia; 18 miles N.W. of Umea.

SODIA, a town of Arabia, in the province of Hedsjas; 70 miles S.S.E. of Mecca.—Alſo, a mountain of Arabia, in the province of Hedsjas; 60 miles S. of Mecca.

SODINUS, in *Ancient Geography*, a navigable river of Aſia, which runs into the Cophes, according to Pliny.

SODIUM, in *Chemiſtry*, a ſimple body and a metal. This was diſcovered by ſir Humphrey Davy in the year 1807. He had a few days before found that potaſh was a compound of a peculiar metal combined with oxygen, and he now found that ſoda conſiſted of a metallic ſubſtance combined with oxygen. He firſt produced it by expoſing ſoda to the action of the Galvanic battery.

It is now obtained by fuſing ſoda or muriate of ſoda with potaſſium. The potaſſium combines with the oxygen in the ſoda, and with the chlorine in the ſalt, leaving pure ſodium.

This metal is white, reſembling ſilver; and having the ſame metallic luſtre.

Its ſpecific gravity is between 9 and 10, water being 1. In the common temperature it is malleable.

It aſſumes the liquid form at 200° of Fahrenheit, and is volatile at a red heat.

If expoſed to the air it would ſoon loſe its luſtre, by combining with oxygen, and in a little time would be converted into ſoda.

It is preſerved in naphtha, like potaſſium.

When heated in oxygen or chlorine, it burns with great brilliancy.

When thrown upon water, it does not ſink but runs along the ſurface, the motion being occaſioned by the rapid eſcape of hydrogen gas, from its decompoſing the water with great rapidity. The floating maſs is ſeen to diminiſh as it runs along, till it diſappears, when, as may be expected, the water is found to contain a ſolution of ſoda.

Sodium, like other metals, is a conductor of electricity.

Sodium combines with two doſes of oxygen. The one is that which conſtitutes ſoda; the other is of an orange colour, firſt obſerved by ſir Humphrey Davy; but for the particulars of its nature we are indebted to M. M. Gay Luſſac and Thenard.

Soda, in its pure ſtate, is a ſolid of a greyiſh-white colour, very hard, and breaks with a ſmooth fracture. In this ſtate it requires a ſtrong heat for its fuſion. When expoſed a little to the air, it abſorbs water, aſſumes a whiter colour, and becomes much more fuſible by heat. Its volatility is alſo increaſed at the ſame time. In this ſtate, as is the caſe with lime, potaſh, and many of the metallic oxyds, it is called an hydrate.

The peroxyd of ſodium is formed by burning ſodium in oxygen gas, an exceſs of the gas being preſent.

It is of a deep orange colour, and fuſes at a much leſs heat than ſoda.

If thrown into water, one atom of oxygen eſcapes in the form of gas, leaving pure ſoda, which diſſolves in the water. This proves how cloſely the exceſs of oxygen is held. This, however, is more conſpicuouſly ſhewn in its action upon combuſtible bodies, with which it deflagrates.

The atom of ſodium has been conſidered 22; hydrogen being 1, and oxygen 7.5; hence the protoxyd would be 29.5, and the peroxyd 37. But from the experiments of Gay Luſſac and Thenard, it appears that the oxygen in the ſoda is to that in the peroxyd as 1 to $1\frac{1}{2}$, or as 2 to 3; but as the exiſtence of half atoms would be abſurd, the atom of ſodium muſt be conſidered as equal to 44; the protoxyd will then be 51.5; the deutoxyd, which is ſoda, will be $44 + 2 \times 7.5 = 59$, and the peroxyd $44 + 3 \times 7.5 = 81.5$.

Soda combines with ſulphur, and is called ſulphuret of ſoda. It poſſeſſes properties differing but little from the ſulphuret of potaſh. It is formed by fuſing ſulphate of ſoda with common ſaw-duſt. Like ſulphuret of potaſh, when thrown into water, it firſt diſſolves, and decompoſing that fluid, the remaining ſulphuret combines with the hydrogen in its naſcent ſtate to form hydrogen with ſulphuret of ſoda. This forms a greeniſh-coloured fluid, having the ſmell of ſulphuretted hydrogen. The phoſphuret of ſoda is alſo ſimilar to the phoſphuret of potaſh. See POTASH.

Sodium alſo combines with ſulphur and phoſphorus. When ſodium and ſulphur are heated together in a veſſel filled with vapour of naphtha, they unite with all the ſigns of ſplendid combuſtion, the ſulphur ſupplying the place of oxygen. The compound is of a grey colour, producing ſulphate of potaſh by expoſure to the air. Their proportions ought to be 44 ſodium to 15 ſulphur for the firſt, and 44 to 30 for the ſecond ſulphuret.

Sodium has a ſimilar effect upon phoſphorus, by which the phoſphuret of ſodium is produced. It has no known action upon carbon, azote, or hydrogen.

Sodium combines with many of the metals, forming peculiar alloys. With potaſſium, in a ſmall proportion, it forms an alloy, which, agreeably to other alloys, is more fuſible than either of the metals. The alloy is of leſs ſpecific gravity than either of the metals, a circumſtance not common with other metallic alloys. The latter fact goes to prove that there is not a great affinity between the two metals.

One part of ſodium renders 40 of mercury ſolid, at the common temperature. When they combine, heat is diſengaged. It alſo combines with tin, without changing its colour. When theſe alloys are expoſed to the air, the ſodium is gradually ſeparated, by combining with the oxygen of the atmoſphere.

Salts of Soda, or its Compounds with the Acids.—Under this head we ſhall compriſe the muriate of ſoda, although, in ſtrict propriety, we might have been expected to have treated this compound under the action of ſodium upon *chlorine.*

Sulphate of Soda.—This ſalt is found native in moſt ſea-vegetables: it has been called Glauber ſalt. It may be eaſily formed by adding ſulphuric acid to the cryſtallized carbonate of ſoda, till the efferveſcence ceaſes, and the ſolution is neither acid nor alkaline.

On evaporation and cooling, it eaſily cryſtallizes into ſix-ſided priſms of a pearly appearance. Their taſte is cooling and rather bitter. At the temperature of 60° it diſſolves in leſs than three times its own weight of water, and in much leſs than its own weight of boiling water. When a ſolution of this ſalt is concentrated till it has ſomething leſs than half its own weight of water, and carefully ſet by to cool, it will not cryſtallize; but if a tremulous motion be given to the veſſel, or a cryſtal of the ſame ſalt dropped into it, the whole ſuddenly cryſtallizes, exhibiting a beautiful appearance. When the cryſtals are expoſed to the air, they loſe their water of cryſtallization, and aſſume the form of white powder. In this change they loſe about 60 *per cent.* of their weight, as will be ſeen in their analyſes.

According to Kirwan, it is compoſed of

Sulphuric acid - -	23.52
Soda - - - -	18.48
Water - - -	58.
	100

According to Bergman,

Acid	27
Soda	15
Water	58
	100

Wenzel's analyſis of the dry ſalt is,

Acid	55.7
Soda	44.3
	100

Kirwan's analyſis of ditto,

Acid	56
Soda	44
	100

It appears that this ſalt conſiſts of two atoms of acid to one of ſoda, and 20 atoms of water. This, if hydrogen be 1, will be 37.5 × 2 acid + 59 ſoda + 170 water = 304. Reduced to the hundred, it will be

Acid	19.4
Soda	24.6
Water	56.
	100

Nitrate of Soda.—This ſalt has been called *cubic nitre,* from having the general properties of nitrate of potaſh, but differing in the form of its cryſtals, which are of a cubical, or rather rhomboidal form.

It may be formed by ſaturating pure carbonate of ſoda with nitric acid.

On evaporation and cooling, it forms rhomboidal cryſtals, the ſpecific gravity of which is 2.0964, water being 1.

Theſe cryſtals diſſolve in three times their weight of water at 60°, and in leſs than their own weight of boiling water.

With inflammable bodies and heat, it exhibits phenomena ſimilar to thoſe of nitre: but it is inferior to that ſubſtance in forming gunpowder with charcoal and ſulphur.

Its proportions, according to Bergman, are

Nitric acid	43
Soda	32
Water	25
	100

According to Kirwan, in the dry ſtate,

Nitric acid	57.55
Soda	42.34
	99.89

This ſalt appears to be compoſed of one atom of acid and one of ſoda, in the dry ſtate, or 50.5 acid and 44 ſoda = 94.5. This will give

Nitric acid	53.5
Soda	46.5
	100

Muriate of Soda.—This ſalt, which is the common culinary ſalt in a ſtate of purity, is a component part of almoſt all animal matter; nor is there perhaps a vegetable that does not yield ſome portion of it.

It exiſts ready formed in the ſea, and forms entire mountains in the ſubſtance of the globe. It is from the native ſalt that all the muriatic acid is obtained. It is never formed by art, but the pure ſalt may be obtained by adding carbonate of ſoda to the ſalt in ſolution; then evaporate it to obtain cryſtals; theſe are of a cubic form, and pure muriate of ſoda.

According to the prevailing view now taken of this ſalt, it is a compound of ſodium and chlorine, or what was called oxymuriatic acid. Hence it is not conſidered as a ſalt, thoſe bodies being compounds of an acid and an oxyd. The ſubſtance in queſtion is believed to be a compound of ſodium, an inflammable body, combined with another body, having more the properties of oxygen than any other body. Muriate of ſoda is, therefore, conſidered as being more allied to an oxyd than a compound of two, the chlorine acting the part of oxygen. It is called by ſir Humphrey Davy *ſodane,* by Dr. Thomſon *chloride of ſodium,* and by the French chemiſts *chloruret of ſodium.* The taſte of this ſalt may be called the ſtandard of that ſenſation we call *ſalt.* Its ſpecific gravity is 2.12; it is ſoluble in about three times its weight of water at 60°, and nearly in the ſame quantity of boiling water.

It is unchanged by expoſure to the air. The moiſt ſtate in which it is frequently found in commerce, ariſes from the preſence of a little muriate of lime, which the pureſt native ſalt always contains; but it is more abundant in the ſalt obtained from ſea-water.

It is compoſed, according to Bergman, of

Muriatic acid	52
Soda	42
Water	6
	100

According to Kirwan, when dried at 80°,

Acid	38.88
Soda	53.
Water	8.12
	100

Sir Humphrey Davy conſiders it a compound of 2 atoms of chlorine and 1 of ſodium, or 2 × 33 chlorine + 44 ſodium = 110. This will be

Chlorine	60
Sodium	40
	100

See the article SALT.

Phoſphate of Soda.—This ſalt has been longer known than phoſphorus. It exiſts ready formed in urine, from which it was extracted, and called *ſal mirabile perlatum,* or wonderful perlated ſalt. It was ſo called from its cryſtals having a pearly appearance. This ſalt, with exceſs of acid, was conſidered by Prouſt as a peculiar acid, which he called the perlated acid. But it was ultimately found by Klaproth, and afterwards by Scheele, to be a compound of ſoda with the phoſphoric acid.

Dr. Pearſon firſt prepared it artificially, and introduced it into medicine as a purgative. He diſſolved 1400 grains of cryſtallized carbonate of ſoda in 2100 grains of water, and added gradually 500 grains of phoſphoric acid, of the ſpecific gravity 1.85. This ſolution he boiled for a few minutes, and filtered it while hot. The ſolution was ſet out in a cool place to cryſtallize.

This ſalt is often made by ſaturating ſoda with the ſuperphoſphate of lime obtained from bones by ſulphuric acid, and is never ſufficiently free from lime.

The acid ſhould be obtained by burning phoſphorus, and the ſoda uſed in the ſtate of well-formed cryſtals, when the pure ſalt is required.

It cryſtallizes in the form of rhomboidal priſms, terminating with three-ſided pyramids.

It effloreſces by expoſure to the air.

Its taſte is very like muriate of ſoda, but more mild and agreeable.

It is ſoluble in four parts of cold, and in about three parts of boiling water.

When expoſed to heat it firſt undergoes the watery fuſion. When heated to redneſs, it melts into a white enamel. From this property it has been propoſed as a ſubſtitute for borax, in the ſoldering of metals: it alſo reſembles the ſame ſubſtance in forming coloured glaſſes with metallic oxyds.

It is partially decompoſed by the ſulphuric, nitric, and muriatic acids, leaving it in a ſtate containing double its original quantity of acid. This is called the ſuperphoſphate of ſoda. It was this ſalt which Prouſt took for a peculiar acid. It is more ſoluble in water than the phoſphate, and does not eaſily cryſtallize.

Phoſphate of ſoda has not been analyſed: ſince, however, the weight of an atom of phoſphorus is 13, and phoſphoric acid $13 + 2 \times 7.5 = 28$, then phoſphate of ſoda will be $2 \times 28 + 59$, or

Soda - - - - -	51
Acid - - - - -	49
	100

Fluate of Soda.—This ſalt may be formed by adding fluoric acid to carbonate of ſoda, till the efferveſcence ceaſes.

On evaporation, it forms into cubic cryſtals. Theſe are ſparingly ſoluble in water, and have an aſtringent bitter taſte.

Borate of Soda.—This is a ſalt with half the quantity of acid which the borate contains; it is known in commerce and in the arts by the name of borax. The latter ſubſtance is extracted from a ſubſtance called tincal: the true borate is, therefore, not uſed, but the ſub-borate or borax.

Sub-borate of ſoda is cryſtallized in hexagonal priſms, with two ſides broader than the reſt. It is ſemitranſparent. Its ſpecific gravity is 1.74. It is ſoluble in twelve parts of cold water, and in ſix of boiling water. It has a ſweetiſh taſte, and rather alkaline. When expoſed to the air, it is ſoon reduced to a white powder, with much loſs of weight. This ariſes from the eſcape of the water of cryſtallization. Artiſts are apt to uſe it too plentifully in this ſtate, and fancy that its proper virtue is gone; but the white powder is equally valuable with the ſalt for all purpoſes. When the ſame change is brought about by heat, the borax is ſaid to be calcined. If a ſtrong heat be given to it in a crucible, it melts into a tranſparent glaſs. It is frequently uſed in forming choice ſpecimens of ſham cryſtals, by fuſion with flint, lead, and manganeſe. The compoſition of borax, according to Bergman, is,

Acid - - - - - - -	39
Soda - - - - -	17
Water - - - - -	44
	100

The acid is obtained from this ſalt by diſſolving it in hot water, and then adding ſulphuric acid. As the liquid cools, ſmall ſcaly cryſtals are precipitated, which are the pure boracic acid.

The baſe of this acid has been diſcovered ſince the commencement of this work, and even ſince this acid has been treated of: we, therefore, feel it our duty to give ſome account of it here.

When boracic acid, ſlightly moiſtened, is expoſed between two plates of platina, one being connected with the copper ſide of a Galvanic battery, and the other with the zinc ſide, the oxygen of the acid is attracted to the zinc or poſitive ſide, and the inflammable baſe to the copper or negative ſide. This is a dark coloured ſubſtance, which becomes detached from the reſt of the maſs, and is the baſe in queſtion. This experiment was firſt made by ſir Humphrey Davy, in March 1808, about the time that he diſcovered potaſſium and ſodium. In the November following it appears that he, as well as Meſſrs. Gay Luſſac and Thenard, obtained this baſe by heating boracic acid with potaſſium. The latter chemiſt alſo ſucceeded in recompoſing the acid. This ſubſtance has been called *boron* by ſir Humphrey Davy, which name it ſtill retains.

Boron is an opaque ſubſtance of a dark olive colour.

It is not fuſible or volatile at any known temperature. When heated in the open air, it burns by abſorbing oxygen, and is converted into dry boracic acid. In pure oxygen gas it undergoes more vivid combuſtion, giving out bright ſcintillations. The maſs becomes coated with boracic acid, and the remainder of the baſe is found unchanged in the cruſt.

It is a non-conductor of electricity, a proof that it is not of a metallic nature.

It is inſoluble in water.

The proportion of oxygen in boracic acid is not yet known. The cruſt of boracic acid, which forms on boron when it is burned, ſecures the remainder from the oxygen, ſo as to render the reſult ambiguous.

Sir Humphrey Davy judges, from the quantity of potaſſium required for the decompoſition of the acid, that it contains two-thirds its weight of oxygen. Gay Luſſac and Thenard, from treating boron with nitric acid, make it to contain one-third its weight of oxygen; but this reſult is not to be relied upon, ſince boracic acid is volatile both with water and the nitric acid.

Sir Humphrey Davy found that 90 parts of potaſh were required to neutralize 160 of boracic acid. This will give 80 for the weight of the atom of boracic acid, potaſh being 45, and hydrogen 1. If, according to ſir Humphrey, it contains two-thirds of oxygen, then the atom of boron will be 27.

Dr. Thomſon, from the experiments of Berzelius, which are in ſome meaſure corroborated by thoſe of ſir Humphrey Davy, makes the atom of boron 5.5, hydrogen being 1. This is the weight of the atom of carbon, to which boron ſeems in other reſpects allied. If, like carbon, it combines with two atoms of oxygen, then boracic acid will be

$5.5 + 7.5 \times 2 = 20.5$. Sir Humphrey's atom, which is 80, is nearly a multiple of this number.

Carbonate of Soda.—This is the ſalt known by the name of ſal ſoda. It exiſts ready formed in barilla and kelp, and is eaſily obtained by ſolution and evaporation, allowing it to cryſtallize ſlowly. It cryſtallizes in flat rhomboidal priſms. It is ſoluble in two parts of cold water, and in leſs than its own weight of boiling water. Like the ſulphate of ſoda, it effloreſces in the air, and aſſumes the form of white powder.

When heated, it melts in its own water of cryſtallization. This ſoon eſcapes; and if the heat be raiſed, one half of the carbonic acid probably eſcapes.

According to Bergman, its compoſition is,

Soda - - - -	20
Acid - - - -	16
Water - - - -	64
	100

According to Klaproth, it contains,

Soda - - - -	22
Acid - - - -	16
Water - - - -	62
	100

According to Kirwan, in cryſtals,

Soda - - -	21.58
Acid - - -	14.42
Water - - -	64
	100

In the dry ſtate,

Soda - - -	59.86
Acid - - -	40.14
	100

This ſalt is compoſed of 2 atoms of acid, 1 of ſoda, and 20 of water; or 41 acid, 59 ſoda, and 170 water. This, in 100, will be,

Soda - - -	21.8
Acid - - -	15.2
Water - - -	63
	100

This ſalt, although called a carbonate, is evidently a bicarbonate of ſoda; and the ſalt, which reſults from heating this, muſt be conſidered a carbonate.

There is another compound, with a ſtill greater proportion of carbonic acid, which is either a tricarbonate or a tetracarbonate of ſoda.

Arſeniate of Soda.—This is a ſalt little known, but believed to have the general properties of arſeniate of potaſh. See that ſalt under SALTS.

Acetate of Soda.—This ſalt may be formed by ſaturating carbonate of ſoda with acetic acid. It cryſtallizes in priſms reſembling ſulphate of ſoda. It is ſoluble in about three parts of water at 60°. It does not cryſtallize but with exceſs of alkali.

The other ſalts of ſoda are too little known to be important.

SODMERE POINT, in *Geography*, a cape on the S. coaſt of the Iſle of Wight. N. lat. 50° 38′. W. long. 1° 16′.

SODOM, in *Ancient Geography*, the chief city of the Pentapolis, which comprehended the five cities called Sodom, Gomorrah, Zeboim, Admah, and Zoar or Segor. The four former were deſtroyed on account of their wickedneſs by fire from heaven, A.M. 2107 or B.C. 1897; but the latter, though ſentenced to the ſame fate, was ſpared at the interceſſion of Lot. Sodom had been his dwelling-place, and the plain on which Sodom and the other cities ſtood was pleaſant and fruitful, like an earthly paradiſe, but after their deſtruction it was overflowed by the waters of the river Jordan, which thus formed the "Dead ſea," or "lake of Sodom," or the "ASPHALTITE *Lake*," which ſee. A French geographer, ſetting aſide the miraculous part of this event, aſcribes it to a volcanic eruption, and he conceives the lake to have been the crater of the volcano; but it is ſufficient to obſerve that this opinion contradicts the hiſtorical narration of this event.

In the time of Joſephus the ruins of theſe cities were ſtill in being. Strabo (Geog. l. xv.) alſo ſpeaks of the ruins of Sodom, which were 60 furlongs in compaſs, and were viſible on the ſhore of the Dead ſea. The "Notitia" expreſsly mentions Sodom as an epiſcopal city: and we find one Severus, a biſhop of Sodom, among the biſhops of Arabia who ſubſcribed to the firſt council of Nice. Reland, however, cannot allow that Sodom was ever rebuilt, and he thinks that the word Sodom, among the ſubſcriptions to the council of Nice, to have been an error of the copiers. Calmet is of a different opinion. The record, he ſays, is very circumſtantial: it puts the epiſcopal city of Sodom between Thamar and En-geddi. Stephanus, the geographer, places En-geddi near Sodom. Hence Calmet concludes, that the city of Sodom was rebuilt, either in or near its former ſituation; for though it appears probable that it was not covered by the waters of the Dead ſea, and that it ſtood on the ſhore of this ſea, yet, ſays Calmet, "I would not ſtrenuouſly oppoſe the contrary opinion."

SODOMY, the unnatural crime of buggery; thus called from the city of Sodom, which was deſtroyed by fire for the ſame. This is uſually, and very juſtly, denominated the "crime againſt nature," when committed with man or beaſt:—a crime, which ought to be ſtrictly and impartially proved, and then as ſtrictly and impartially puniſhed. The delicacy of our Engliſh law treats it, in its very indictments, as a crime not fit to be named; "peccatum illud horribile, inter Chriſtianos non nominandum." The edict of Conſtantius and Conſtantine obſerves a ſimilar taciturnity; "ubi ſcelus eſt id, quod non proficit ſcire, jubemus inſurgere leges, armari jura gladio ultore, ut exquiſitis pœnis ſubdentur infames, qui ſunt, vel qui futuri ſunt rei."

The Levitical laws adjudged thoſe guilty of this execrable evil to death, Lev. xviii. 22, 23. xx. 15, 16; and the civil law aſſigns the ſame puniſhment to it. Our ancient law commanded ſuch miſcreants to be burnt to death (Brit. c. 9.), though Fleta ſays (l. i. c. 37.) they ſhould be buried alive; either of which puniſhments was indifferently uſed for this crime among the ancient Goths. At preſent our laws make it felony. (25 Hen. VIII. c. 6. 5 Eliz. c. 17.) And the rule of the law is, that if both are arrived at years of diſcretion, "agentes et conſentientes pari pœna plectantur." 3 Inſt. 59.

SODRA BARKER, in *Geography*, a town of Sweden, in Dalecarlia; 40 miles S. of Fahlun.

SODRES, in *Ancient Geography*, a people of India, in the number of thoſe who were ſubdued by Alexander, according to Quintus Curtius, l. viii.

SODUCENA, a country of Aſia, in the Greater Armenia, S. of Colthene, according to Ptolemy.

SODUS, Great, in *Geography*, a large townſhip of America, in the N.E. corner of Ontario county, in the ſtate of New York, with a poſt-office called "Troupville," bounded N. by lake Ontario, E. by Seneca county, S. by Lyons, and W. by Williamſon and Palmyra; about 18 miles ſquare, and including a great part of Sodus bay. The ſurface is undulated with hillocks and vallies, in a N. and S. direction, and the ſoil is good and well watered. The timber is luxuriant, and conſiſts of the ſugar-maple, beech, oak, hickory, elm, aſh, linden or baſs-wood, cherry, tulip-tree or poplar, butternut, &c. Crops of wheat, rye, maize, hemp, flax, oats, and the common graſſes, ſucceed well, as do alſo the common fruits of the country. In the N.E. corner of Sodus is Great Sodus bay, reckoned the beſt harbour on the S. ſhore of the Ontario; and on an elevated point of land, projecting into the bay, the poſt-village of Troupville is very eligibly and handſomely ſituated, 212 miles from Albany, and about 30 N.E. of Canandaigna. Sodus has two griſt-mills, five ſaw-mills, one fulling-mill, and a conſiderable number of the common mechanical branches of manufacture for the convenience of the inhabitants. Here are two meeting-houſes, one for Preſbyterians and one for Baptiſts, and ſeveral ſchool-houſes. Iron ore has been found here. The firſt ſettlements in this town commenced in 1790, by two German families from the Mohawk river; and though the progreſs of population was ſlow, it amounted, by the cenſus of 1810, to 1957 perſons, and 343 families. N. lat. 43° 10′. W. long. 77° 5′.

Sodus, *Little*, a town of New York, in Albany, on the S. ſide of lake Ontario; 12 miles E. of Great Sodus.

SOEBORG, a town of Denmark, in the iſle of Zealand, ſeated on an iſland in a freſh-water lake. Near this town is a triangular pillar, with Latin, Daniſh, and German inſcriptions, erected in the year 1738, in honour of Frederick IV. and Chriſtian VI., for having ſtopped the progreſs of flying ſand, which overwhelmed one tract of land and village after another, and threatened the beſt part of Zealand with deſolation. In the reigns of theſe two monarchs this evil was reſtrained under the inſpection of the prefect Frederick Von Gram, by the addreſs of John Ubr. Rohl. This ſandy waſte is now covered with verdure, and appears like a fine meadow; 9 miles W.N.W. of Helſingoer.

SOELBO, a town of Norway, in the province of Drontheim; 20 miles E. of Drontheim.—Alſo, a lake, 18 miles S.E. of Drontheim.

SOELENGAT, a town of Norway, in the province of Bergen; 112 miles N. of Bergen.

SOEST, or Zoest, Gerard, in *Biography*, was a native of Weſtphalia, born about the year 1637. He acquired the art of painting in his own country, but practiſed principally in this, whither he came rather before the period of the reſtoration. His portraits have a conſiderable portion of truth and animation, wrought in a finiſhed manner, and with great warmth and glow of colour; ſo much ſo as to claſs him among the better rivals of ſir Peter Lely. He was moſt ſucceſsful in his portraits of men, among whom he had a very conſiderable ſhare of employment; but the more graceful and engaging pencil of ſir Peter ſecured the charms of the ſofter ſex to himſelf. Soeſt died at the early age of 44.

Soest, in *Geography*, a town of Germany, in the county of Mark, formerly one of the Hanſe towns, enjoying imperial privileges and the right of coining money. Its extent is large, and contains ſeveral churches. It was the place in which ſeveral of the ſucceſſors of Charlemagne reſided; 22 miles E. of Dortmund. N. lat. 51° 33′. E. long. 8° 11′.—Alſo, a river of Eaſt Frieſland, formed by the union of the Solte and Vehne, which, after a ſtraight courſe, runs into the Leer near Stikhuſen.

SOETA, in *Ancient Geography*, a town of Scythia, beyond the Imaus. Ptolemy.

SOETERWEER, in *Geography*, a town of Holland; 8 miles E. of the Hague.

SOFA, in the Eaſt, a kind of alcove raiſed half a foot above the floor of a chamber, or other apartment; and uſed as the place of ſtate, where viſitors of diſtinction are received.

Among the Turks, the whole floor of their ſtate-room is covered with a kind of tapeſtry, and on the window-ſide is raiſed a ſofa or ſopha, laid with a kind of matraſs, covered with a carpet much richer than the other. On this carpet the Turks are ſeated, both men and women, like the taylors in England, croſs-legged, leaning againſt the wall, which is bolſtered with velvet, ſattin, or other ſtuff, ſuitable to the ſeaſon. Here they eat their meals; only laying a ſkin over the carpet, to ſerve as a table-cloth, and a round wooden board over all, covered with plates, &c.

The ambaſſadors of France ſtood out a long while, and refuſed to viſit the grand vizir, unleſs he would receive them on the ſofa: at length he granted them the ſofa.

SOFALA, Zofala, or *Quiteve*, in *Geography*, a kingdom of Africa, bounded on the N. and W. by the ſtates of Mocaranga, on the E. by the Mozambique channel, and on the S. by Sabia, about 350 miles from E. to W. and 120 from N. to S., extending about 50 leagues along the coaſt and about 80 into the interior of the country. This country is ſaid to be ſubject to a Mahometan prince, tributary to the king of Portugal. Its capital, of the ſame name, was, at the arrival of the Portugueſe, an inconſiderable town, without walls, and fenced only with a thorny hedge; but it has ſince been fortified, and much improved, as well as the fort, which they conſtructed for its defence. It was then called "Cuama;" but geographers and pilots retain its ancient name of Sofala. It is conveniently ſituated on a ſmall iſland, at the mouth of the river Cuama. On the coaſt are alſo two other towns, *viz.* Haulema and Dardema, with ſeveral obſcure villages. The natives of Sofala are generally black, with ſhort curled hair; in ſhape taller and more genteel than the negroes of Mozambique, Quiloa, &c. Their common dreſs is a piece of ſilk or cotton, wrapped round the middle, covering them to the knees; the reſt of the body being naked, except the head, as perſons of the ſuperior claſs wear a kind of turban. All perſons adorn their necks, arms, wriſts, legs, and ancles, with rings of gold, ſilver, amber, or coloured beads, according to their condition. The ſtuffs and trinkets uſed in their dreſs are chiefly imported from Bombay by the Portugueſe; and thoſe of the better ſort affect to wear ſwords with handles of ivory. The inhabitants of the country and town of Sofala are a mixture of Mahometan Arabs, idolatrous Caffres, and Portugueſe Chriſtians. Thoſe who inhabit the coaſt ſpeak the Arabic tongue, which is their native language; as they are not the original natives but the deſcendants of the Arabs, who, leaving their native country, ſettled more or leſs on this coaſt. They cultivate rice and millet for bread, and eat the fleſh of elephants, large and ſmall cattle, and alſo fiſh, with great variety of which the ſea and rivers abound. They likewiſe make beer both of rice and millet, and ſome other liquors from honey, palm, and other fruits. Honey is abundant, and bees-wax ſerves them to exchange for painted cotton or ſilk, and other cloths. Their principal commerce is carried on with the inhabitants of Mozambique, Quiloa, Mombaça, and Melinda, who come hither in their "zambucks," or ſmall barges, which are freighted with a variety of the fore-mentioned cloths of all colours, exchanging them for gold, ivory, wax, or ambergris, and alſo with the Portugueſe. The Arabians exchange goods from the Eaſt Indies and the Red ſea, to the amount of 140,000*l.* ſterling annually for ivory and gold. Beſides the gold which is brought from Mocaranga, Sofala has ſome very conſiderable mines of that metal, which, according to the reports of the Portugueſe inhabitants, have yielded to the value of above two millions of merigals yearly, each merigal being valued at about fourteen French livres, amounting, according to Mr. Savary's ſtatement, to 1,166,666*l.* ſterling. The ſands alſo of the river Sofala contain a very conſiderable mixture of gold-duſt. Some perſons have even affirmed that Solomon obtained his gold, which is ſo highly commended by the ſacred hiſtorians, from this country, and that Sofala is the celebrated Ophir; the gold being allowed to be the pureſt and fineſt in all Africa. (See Ophir.) The Mahometan religion is ſaid by many writers to be that of the king and court, and of a great part of the people; but others think it more probable, that the original natives are wholly deſtitute of any religion; and that the Arabians, who have ſettled on this coaſt, are the only Mahometans, except ſome few proſelytes, from the Negroes, who became ſuch for the ſake of commerce; as they obſerve, that all the merchants who came hither from Quiloa, Mombaça, and Melinda, are of that religion. S. lat. 19° to 22°. E. long. 33° to 36°.

Sofala, a town of Africa, in the country of the ſame name. S. lat. 19° 22′. E. long. 36°. See the preceding article.—Alſo, a river of Africa, which riſes in the county of Mocaranga, and purſuing an eaſterly courſe, runs into the ſea, S. lat. 19° 22′.

SOFEE. See Sophi.

SOFFIETTA, in *Ichthyology*, the bellows-fiſh, a name by which ſome have called the ſcolopax, a ſmall ſea-fiſh, common in the markets of Rome and Venice.

SOFFINGERBA, in *Geography*, a town of Italy, in Friuli; 4 miles N.N.W. of Friuli.

SOFFITA, **Soffit**, or *Sofit*, in *Architecture*, any timber ceiling, formed of croſs-beams, or flying corniches; the ſquare compartiments or pannels of which are enriched with ſculpture, painting, or gilding.

The word is Italian, and ſignifies the ſame with the Latin *lacunar* and *laquear;* with this difference, that *lacunar* is uſed for any ceiling with ſquare, hollow pannels, called *lacus;* and *laquear* for compartiments interlaced with plat-bands, after the manner of knots or *laquei.*

Such are thoſe we ſee in the baſilics and palaces of Italy, in the apartments of Luxembourg, at Paris, &c.

Soffita, or *Soffit*, is alſo uſed for the under ſide or face of an architrave; and more particularly for that of the corona or larmier, which the ancients called *lacunar*, the French *plafond*, and we uſually the *drip*.

It is enriched with compartiments of roſes; and in the Doric order has eighteen drops, diſpoſed in three ranks, ſix in each, placed to the right of the guttæ, at the bottom of the triglyphs.

SOFI, or **Sophi.** See Sophi.

SOFIA, in *Geography.* See Sophia.

SOFIANA, a town of Perſia, in Adirbeitzan; 25 miles S.W. of Tabris.

SOFIT, or **Soffit**, the internal ſuperficies of an arch: ſometimes it ſignifies the opening itſelf.

SOFR, in *Geography*, a town of Arabia, in the province of Hedsjas; 70 miles S.E. of Mecca.

SOFRA, a town of Arabia, in the province of Nedsjed; 50 miles N.E. of Kariatain.

SOFREGAM, a town of the iſland of Ceylon; 54 miles S. of Candi.

SOFROI, a town of Fez, in the province of Chaus, trading principally in oil; 12 miles E. of Fez.

SOFT Chalk, in *Agriculture*, a ſort of foſſile marle, which readily moulders down and becomes blended with the mould of the ſoil, on which account it forms an excellent manure, free from the objection made to that of the hard kind, which moſtly requires to be reduced into lime. This ſort of ſubſtance is often met with at ſome depth at the bottoms of chalk hills, where ſearch ſhould be conſtantly made for it, as it may become of great value as manure. All ſoft mouldering chalks are not only excellent ſubſtances for applying on lands that are of the ſtiffiſh kinds, but they commonly form good ſoils, where they are the principal material.

Soft *Graſs*, a troubleſome ſort of graſs among moiſt arable lands in ſome places. See Holcus.

Soft *Meadow-Graſs*, the common name of a common graſs in moſt meadows, but which is of no great value for the purpoſes of the farmer. There is alſo a creeping ſoft graſs often met with, which is ſaid to be uſeful on dry ſandy ſoils in producing a turf or ſward. See Holcus.

Soft *Pulſe*, *Roe*, and *Soap*. See the ſubſtantives.

SOFTENING, in *Painting*, the mixing and diluting of colours with the bruſh or pencil.

To ſoften deſigns in black and white, made with the pen, &c. ſignifies to weaken the teint.

To ſoften a portrait, according to Felibien, is to change ſome of the ſtrokes, and give a greater degree of ſweetneſs and ſoftneſs to the air of it, which before had ſomething rough and harſh in it.

SOGANA, in *Ancient Geography*, a town of Judea, in the half tribe of Manaſſeh, on the other ſide of Jordan. It was fortified by Joſephus, when he was governor of Galilee.

SOGANLIK, in *Geography*, a town of European Turkey, in Bulgaria, on the Black ſea; 8 miles E. of Varna.

SOGD, the moſt celebrated and fertile diſtrict of Great Bucharia, being the ancient *Sogdiana*, which ſee. See Bucharia.—Alſo, a river which pervades this diſtrict, and which, at the diſtance of 100 miles from Samarcand, ſituated on its ſouthern bank, after waſhing the walls of Bokhara, paſſes through a conſiderable lake, and is ſuppoſed to join the Oxus or Amu.

SOGDI, in *Ancient Geography*, a people of India, on this ſide of the Ganges, according to Quintus Curtius, who places them on the left bank of the river Indus. The ſame hiſtorian informs us that Alexander built a city in the country of theſe people, and called it Alexandria. He alſo relates, that when ſome of theſe people, who reſided not far from the country of Odin's Goths, were condemned to death by Alexander on account of a revolt, they rejoiced greatly, and teſtified their joy by ſinging verſes and dancing. When the king inquired the reaſon of their joy, they anſwered, that "being ſoon to be reſtored to their anceſtors by ſo great a conqueror, they could not help celebrating ſo honourable a death, which was the wiſh of all brave men, in their own accuſtomed ſongs." This correſpondence of manners and principles between the Scandinavians and the Sogdians furniſhes a ſtriking proof of Odin's migration from the E. to the N.; firſt, in the ſpontaneous exerciſe of the poetical talent; and, ſecondly, in the opinion, that a glorious or warlike death, which admitted them to the company of their friends other, though there is conſiderable difference in this reſpect among different earthy matters, ſome being liable to ſuſtain a great number of different plants in a vigorous ſtate of growth, almoſt immediately after they become mixed with the ſoil, while others require to be applied and united for a length of time before they afford ſuſtenance to any kind of vegetable whatever, and even then only yield a ſcanty ſupply of nouriſhment, and that for the ſupport of a few particular ſorts of plants. Where the former ſorts of materials are abundant, the ſoils are generally fertile and productive; but where the latter prevail, they are moſtly ſterile and unfriendly to vegetation. Alſo that ſoils, beſides poſſeſſing the proper earthy matters, muſt be embued with other principles, ſuch as the aqueous and carbonaceous, and have ſuch a conſiſtence and texture as will properly ſupport the plants, as well as ſuch proportions of the ſeveral materials as will admit of their being retained, and applied in ſuch quantities as are ſuitable for the purpoſes of vegetation, according to the differences of climate in reſpect to moiſture, and the varieties of ſituation in regard to the lands, in order to be rich, fruitful, and productive, in the different kinds of vegetable crops. It has been ſtated likewiſe, that the bodies or materials, ſo far as they are yet known, that have a tendency to leſſen the fertility of ſoils, are the oxyds or calces of particular metals, ſome coaly and pyritical matters, acids, and certain heathy vegetable ſubſtances. But that ſome of theſe ſubſtances, though unfriendly to the growth of vegetables, when in theſe circumſtances, on being blended and united with other materials that enter into the compoſition of ſoils, operate upon them in ſuch a manner as to render them more fertile than they would have been without them. Mixtures and impregnations of this nature are conſtantly taking place in ſoils, which cannot be eaſily comprehended or aſcertained, but which produce great and important effects and changes in them. From this cauſe, ſoils which are apparently ſimilar in every reſpect, on being brought into cultivation, frequently turn out to be eſſentially different. And it is well known to moſt perſons converſant with practical agriculture, that ſoils in which calcareous matter is predominant, even when they are grown ſo poor and exhauſted as to be almoſt incapable of producing any of the other crops commonly cultivated on them, will bear large and repeated crops of one ſort of vegetable, that of ſaintfoin; and that other ſoils which are capable of affording the common crops in an abundant manner, cannot be made to produce this. In the ſame way, ſuch calcareous ſoils as have been cultivated for a great length of time, and are conſequently much impregnated with manure, afford plentiful crops of barley; while oat-crops, if attempted to be raiſed upon them in ſuch a ſituation, are weak, puny, and relatively extremely ſmall. And, on the contrary, ſome primitive ſoils, not originally containing any calcareous materials, and which, not having been cultivated, cannot be impregnated with manures on firſt being broken up, often yield aſtoniſhing crops of oats, while barley can ſcarcely be raiſed at all upon them. Theſe and many other ſimilar facts, noticed by cultivators of the ſoil, ſufficiently ſhew the effects which even trifling mixtures of certain matters have in altering their qualities, and rendering them more or leſs fertile, as well as more or leſs proper for the growth of particular ſorts of crops without there being any external appearance of ſuch alteration. Further, ſoils are alſo found to differ greatly from their depths, and the nature of the ſub-ſoils on which they reſt. It is ſtated as a fact well known by practical farmers, and which the experience of every day confirms, that even the ſoils that are conſtituted of the moſt ſuitable ſubſtances for the purpoſes of vegetation, when only a few inches in depth, and depoſited upon beds of cold wet clay, rock, or chalk, are by no means ſo fruitful and productive as thoſe which are thicker, though of inferior quality, but reſting on a bottom which is more dry and gravelly. The difference of weight and tenacity in the under ſtrata of ſoils, likewiſe introduces great variety in regard to their powers and capabilities of raiſing and rearing vegetable productions in the way of crops upon them.

The variations in the weights of ſoils are very material, as they ſhew in ſome meaſure the quantities of animal and vegetable matters with which they are impregnated in different caſes, the lighter ſorts being in moſt inſtances the moſt abundant in ſuch ſubſtances. The variations in their powers and properties of diſſipating or holding the moiſture which they contain are alſo very material and important, as they denote, in ſome degree, the nature of their compoſitions, and their utility for the growth of different ſorts of plants as crops.

The nature and variations of ſoils, in ſo far as they are more or leſs capable of imbibing and retaining the principles of heat, or more *cold* and raw, or *warm* in their qualities, which are by no means abſurdities or prejudices, as ſome have ſuppoſed, are highly deſerving of the attention of the philoſophical farmer, as ſome ſoils are evidently much more heated by the effects of the ſun than others, all other circumſtances being the ſame, while ſoils brought to the ſame ſtate of heat cool in different lengths of time, or ſome much faſter than others. This property, which has hitherto been but little attended to, is thought to be probably of conſiderable importance by the above writer on chemiſtry. It is conceived, that in general ſoils that conſiſt principally of a ſtiff white clay are difficultly heated; and that, being commonly very moiſt, they retain their heat only for a very ſhort time. Chalky ſoils are ſimilar in one particular, which is that of their being heated with difficulty; but being drier they retain their heat longer, leſs being ſuppoſed to be conſumed in producing the evaporation of their moiſture.

It has been found that a black ſoil, which contained much ſoft vegetable matter, was moſt heated by the ſun and air; and that the coloured ſoils, and thoſe containing a large proportion of carbonaceous or ferruginous matter, when expoſed under equal circumſtances to the ſun, acquire a much higher temperature than pale-coloured ſoils.

In all caſes, when ſoils are perfectly dry, thoſe that are the moſt readily heated by the power of the ſun, cool likewiſe in the moſt ready manner; but ſir Humphrey Davy has experimentally aſcertained, that the darkeſt coloured dry ſoil, or that which contains abundance of animal and vegetable matter; ſubſtances which moſt facilitate the diminution of temperature, when heated to the ſame extent, provided it be within the common limits of the effects of the ſun's heat, will cool more ſlowly than a wet pale ſoil, wholly compoſed of earthy matter. He found that a rich black mould, which contained nearly a fourth part of vegetable matter, had its temperature increaſed in the courſe of an hour from 65° to 88°, by expoſure to the ſun-ſhine; while a chalk ſoil was heated only to 69° under the ſame circumſtances and length of time. But the mould removed into the ſhade where the temperature was 62°, loſt, in half an hour, 15°; while the chalk, under the ſame circumſtances, had loſt only 4°. Farther, a brown fertile ſoil and a cold barren clay were each artificially heated to 88°, having been previouſly dried: they were then expoſed in a temperature of 57°; in half an hour the dark ſoil was found to have loſt 9° of heat; the clay had loſt only 6°. An equal portion of the clay containing moiſture, after being heated to 88°, was expoſed in a temperature of 55°; in leſs than a quarter of an hour it was found to have gained the temperature of the room. In all theſe trials the ſoils were put upon ſmall trays made of tin-plate two inches ſquare and half an inch in depth, the temperature being aſcertained by a thermometer of a very delicate kind.

It is upon the whole ſuppoſed, that nothing can be more evident, than that the genial heat of the ſoil, particularly in the ſpring ſeaſon, muſt be of the greateſt and moſt material uſe and importance to the raiſing plants as crops. And that when the leaves are fully and completely developed or ſpread out, the ground or land is conſiderably ſhaded; and any injurious influence or conſequence, which in the ſummer ſeaſon might have been apprehended from too great a heat, wholly prevented: ſo that the temperature of the ſurface, when bare and expoſed to the effects of the ſun, affords at leaſt, it is ſuppoſed, one indication of the ſtate of its fertility; and that the thermometer may therefore be, it is believed, ſometimes an uſeful inſtrument to the purchaſer as well as improver of lands.

The moiſture preſent in ſoils has likewiſe an effect and influence on their temperatures; and the particular manner or method in which it is diſtributed through, or combined with, the earthy, or perhaps other materials, is of great conſequence and importance, in ſo far as it relates to the nouriſhment of the plants which grow upon them. The above chemico-agricultural writer thinks, that where the water is too ſtrongly attracted by the earths, it will not be abſorbed by the roots of the plants; and that where it is in too great quantity, or too looſely united to them, it will tend to injure or deſtroy the fibrous parts of the roots. In his opinion there are two ſtates in which water ſeems to exiſt in the earths, and in animal and vegetable ſubſtances: in the firſt ſtate, it is conceived to be united by chemical, in the other by coheſive attraction. The former of theſe is illuſtrated by the pouring of pure ſolutions of ammonia or potaſſa into thoſe of alum, when the alumine or alumina falls down combined with water; and the dry powder affording, by diſtillation, more than half its weight of water. Alſo, by the moiſture which wood, muſcular fibre, and gum, that have been heated to 212°, afford in the ſame way at a red heat, which is likewiſe water held in the ſame manner.

The latter is ſhewn, it is ſuppoſed, when dried pipe-clay, at the temperature of the atmoſphere, is brought into contact with water, as the laſt is rapidly abſorbed. In general too, ſoils, as well as vegetable and animal ſubſtances that have been dried at a heat below that of boiling water, increaſe in weight by expoſure to the air, in conſequence of their abſorbing water from it, which is in the ſtate of vapour, on account of this ſort of attraction.

The water which is *chemically* combined among the principal component parts of ſoils, unleſs in the caſe of the decompoſition of animal or vegetable ſubſtances, cannot, it is ſuppoſed, be abſorbed by the roots of plants; but that which *adheres* to the parts of the ſoil is in conſtant uſe in vegetation. Indeed, it is believed that there are few earthy mixtures met with in ſoils that contain any chemically combined water; water is expelled from the earths by moſt ſubſtances that combine with them. As for inſtance, when a combination of lime and water is expoſed to carbonic acid, that fluid ſubſtance takes the place of the water; and compounds of alumina and ſilica, or others of the earths, do not chemically unite with water; and ſoils, as has been ſeen, are formed either by earthy carbonates, or compounds of pure earths and metallic oxyds.

However, when ſaline ſubſtances exiſt in ſoils, they may, it is ſaid, be united to water, both chemically and mechanically; but they are always, it is ſuppoſed, in too ſmall a proportion to materially influence the relations of the ſoils to water.

The power or capability of the ſoil to abſorb and receive water, in conſequence of this ſort of attraction, depends greatly upon the ſtate of diviſion of its parts; as the finer and more minute this is, the greater and more powerful is the capacity for abſorption. The different conſtituent parts of ſoils ſeem likewiſe to operate, even by this kind of attraction, with different degrees of force and energy. In this way vegetable ſubſtances ſeem, it is ſaid, to be more abſorbent than animal ſubſtances; animal ſubſtances more ſo than compounds of alumina and ſilica; and compounds of alumina and ſilica more abſorbent than carbonates of lime and magneſia. Theſe differences may, however, it is ſuggeſted, poſſibly depend upon the differences in their ſtates of diviſion, and on the ſurface which is expoſed.

This power or capability of ſoils to abſorb water from the air is, it is ſuppoſed, much connected with fertility. The ſoils which are the moſt efficient in ſupplying plants with water, by means of atmoſpheric abſorption, are, it is ſaid, thoſe in which there is a due and proper mixture of ſand, finely divided clay, and carbonate of lime, with ſome animal and vegetable matter; and which are ſo looſe and light as to be freely and readily permeable to the atmoſphere. In ſo far as regards this quality, carbonate of lime, and animal and vegetable matter, are, it is ſaid, of great uſe in ſoils. They give abſorbent power to them, without at the ſame time giving tenacity: ſand, too, conſtantly deſtroys tenacity, but, on the contrary, affords little power of abſorption. The above writer has compared the abſorbent powers of many ſoils, in ſo far as it relates to atmoſpheric moiſture, and has conſtantly found it to be the greateſt in the moſt fertile of them; ſo that it is ſuppoſed to afford one mode of judging of the productiveneſs of land.

Thus, the water, and the decompoſing animal and vegetable matter exiſting in the ſoil, conſtitute, it is ſuppoſed, the true nouriſhment of plants; and that as the earthy parts of the ſoil are uſeful in retaining water, ſo as to ſupply it in the proper proportions to the roots of the vegetables, ſo they are likewiſe efficacious in producing the proper diſtribution of the animal or vegetable matter. When equally blended and intermixed with it, they alſo prevent it from decompoſing in too rapid a manner; and by their means the ſoluble parts are ſupplied in proper proportions or quantities. But beſides this agency, which may be conſidered as mechanical, the writer conceives that there is another, between ſoils and organizable matters, which may be regarded as chemical in its nature. The earths, and even the earthy carbonates, have, it is ſaid, a certain degree of chemical attraction for many of the principles of vegetable and animal ſubſtances, as is readily exemplified in the caſe of alumina and oil: for when an acid ſolution of alumina is mixed with a ſolution of ſoap, which conſiſts of oily matter and potaſſa, the oil and the alumina will unite and form a white powder, which will ſink to the bottom of the fluid which holds it. The extract, too, from decompoſing vegetable matter, when boiled with pipe-clay or chalk, forms, it is ſaid, a combination by which the vegetable matter is rendered more difficult of decompoſition and ſolution. Pure ſilica and ſiliceous ſands have, it is remarked, little action of this kind; and the ſoils which contain the moſt alumina and carbonate of lime, are thoſe which act with the greateſt chemical energy in preſerving manures. Such ſoils are ſuppoſed to deſerve the appellation which is commonly given to them, of rich ſoils; as the vegetable nouriſhment is long preſerved in them, unleſs when taken up by the organs of plants. Siliceous ſands, on the contrary, are thought to merit the term hungry, which is commonly applied to them; as the vegetable and animal matter they contain, not being attracted by the earthy conſtituent parts of the ſoil, are more liable to be decompoſed by the action of the atmoſphere, or carried off or away from them by water in different ways. In moſt of the black and brown rich vegetable moulds, the earths ſeem, it is ſuppoſed, to be in combination with a peculiar extractive matter, afforded during the decompoſition of vegetables. This is ſlowly taken up, or attracted, it is believed, from the earths by water, and appears to conſtitute a prime cauſe of the fertility of the ſoil. The ſtandard of fertility of ſoils for different plants muſt vary, it is ſuppoſed, with the climate, and muſt be particularly influenced by the quantity of rain. The power of ſoils to abſorb moiſture ought, it is ſaid, to be much greater in warm or dry counties than in cold and moiſt ones, and the quantity of clay or vegetable or animal matter they contain greater. Such ſoils as are on declivities, alſo, ſhould be more abſorbent than thoſe on plains, or in the bottoms of vallies. Their productiveneſs is likewiſe influenced by the nature of the ſub-ſoil, or the ſtratum on which they reſt. When ſoils are immediately ſituated upon a bed of rock or ſtone, they are much ſooner, it is ſaid, rendered dry by evaporation, than when the ſub-ſoil is of clay or marle; and a principal cauſe of the great fertility of the land in the moiſt climate of Ireland is, it is imagined, the proximity of the rocky ſtrata to the ſoil. A clayey ſub-ſoil will ſometimes, it is thought, be of material advantage to a ſandy ſoil; and in this caſe it will retain moiſture, in ſuch a manner as to be capable of ſupplying that loſt by the earth above, in conſequence of evaporation, or the conſumption of it by plants as crops. A ſandy or gravelly ſub-ſoil often corrects the imperfections of too great a degree of abſorbent power in the true ſoil. In calcareous countries, where the ſurface is a kind of marle, the ſoil is often found, it is obſerved, only a few inches above the limeſtone, yet its fertility continues unimpaired by the proximity of the rock; though in a leſs abſorbent ſoil, this ſituation would occaſion barrenneſs; and thus the ſandſtone and limeſtone hilly ſoils, in ſome weſtern diſtricts, may be readily diſtinguiſhed at a diſtance, in the ſummer ſeaſon, by the different tints or caſts of colour in the vegetation. On the ſandſtone kind it will commonly appear brown and burnt up; while on the limeſtone ſort, it will be green and flouriſhing in a conſiderable degree.

It not unfrequently happens that ſoils are met with in a quite unaltered ſtate, upon the rocks from which they were produced. The manner in which they were formed may eaſily be conceived, it is ſuppoſed by ſir Humphrey Davy, by referring to the caſe of *ſoft* or *porcelain granite*, which conſiſts of three ingredients, quartz, felſpar, and mica. The quartz he conſiders as almoſt pure ſiliceous earth, in a cryſtalline form. The felſpar and mica are very compounded ſubſtances: both contain ſilica, alumina, and oxyd of iron; in the former there is commonly lime and potaſſa; in the latter, lime and magneſia. Therefore, when a granite rock of this ſort has been long expoſed to the influence of air and water, he ſuppoſes the lime and potaſſa, contained in its conſtituent parts, are acted upon by water or carbonic acid; and the oxyd of iron, which is moſtly in the leaſt oxyded ſtate, tends to combine with more oxygen; in conſequence of which the felſpar decompoſes, as well as the mica, but the firſt in the moſt rapid manner. The felſpar, which is as it were the cement of the ſtone, forms a fine clay; the partially decompoſed mica blends and intermixes with it as ſand; and the undecompoſed quartz appears as gravel, or ſand of different degrees of fineneſs. On the ſmalleſt layer of earth being formed on the ſurface of the rock, the ſeeds of moſſes, and other imperfect plants, which are moſtly floating in the ſurrounding atmoſphere, and which have made it their reſting place, begin, it is ſaid, to vegetate; and their decay, death, and decompoſition afterwards, afford a certain quantity of organizable matter, which mixes with the earthy materials of the rock. In this improved ſoil, more perfect plants are capable of ſubſiſting: theſe, in their turn, abſorb nouriſhment from the water of the atmoſphere; and, after periſhing, afford new materials to thoſe already provided. The decompoſition of the rock ſtill continues; and at length, by ſuch ſlow and gradual proceſſes, a ſoil is formed, in which even foreſt trees can, it is ſuppoſed, fix their roots, and which is fitted to reward the labours of thoſe undertaking its cultivation.

It is likewiſe noticed, that where ſucceſſive generations of vegetables have grown upon a ſoil, unleſs part of their produce has been carried away by man, or conſumed by animals, the vegetable matter increaſes in ſuch proportion, that the ſoil approaches to a peat in its nature; and if it be ſo placed as that it becomes impregnated with water from a higher ſituation, it gets ſpongy, and is gradually rendered incapable of ſupporting better plants. A great number of peat moſſes appear, however, it is ſaid, to have been formed by the deſtruction of foreſts, by the imprudent uſe of the hatchet, at ſome early former period. It is ſuppoſed, that when the trees in the outer parts of the woods were cut down, thoſe in the interior were expoſed to the influence of the winds; and, having been accuſtomed to ſhelter, became unhealthy, and died in their new ſituations; the leaves and branches of which, gradually decompoſing, produced a ſtratum of vegetable matter. In ſeveral of the great peat bogs in the north of this and the neighbouring country, the larger trees met with on the outer parts of them, it is ſaid, bear the marks of having been felled; while in the interior, few entire trees are found: and the cauſe is, probably, it is ſuppoſed, that they fell by gradual decay; and that the fermentation and decompoſition of the vegetable matter were moſt rapid, where it was in the greateſt quantity or proportion.

Other leſs healthy ſorts of ſpurious peat bogs are formed in watery ſituations, by the accumulation of the remains of aquatic plants. There is here a fermentation of an apparently different kind, and a much greater evolution of gaſeous matter.

It is found that the earthy matter of peats is invariably analogous to that of the ſtratum on which they repoſe: the plants which have formed them muſt have derived the earths that they contained from this ſtratum. Thus, the above writer obſerves, that in the counties of Wilts and Berks, where the ſtratum below the peat is chalk, calcareous earth abounds in the aſhes, and very little alumina and ſilica. They likewiſe contain much oxyd of iron and gypſum, both of which may be derived from the decompoſition of pyrites, which is ſo abundant in chalk. The different ſpecimens of peat that have been burnt by this experimenter, from the granitic and ſchiſtoſe ſoils of different parts of theſe iſlands, have conſtantly given him aſhes principally of a ſiliceous and aluminous nature; but one from the county of Antrim, in Ireland, yielded aſhes, which afforded very nearly the ſame conſtituent parts as the great baſaltic ſtratum of the county.

It is ſuggeſted that poor and hungry ſoils, ſuch as are produced from the decompoſition of granitic and ſandſtone rocks, remain very often for ages with only a thin covering of vegetation; but that ſoils from the decompoſition of limeſtone, chalk, and baſaltes, are not unfrequently clothed by nature with the perennial graſſes, and afford, when ploughed up, a rich bed of vegetation for every ſort of cultivated plants.

From what has been ſaid on the formation of rocky ſoils, it muſt be obvious that they are as various as the rocky matters from which they are produced, and probably much more ſo, in conſequence of the alterations which have taken place in them, from the continued operation of water, and different other cauſes.

In ſo far as the cropping of land is concerned, it muſt be evident that no general principle can be laid down for it, unleſs the whole of the circumſtances connected with the nature, compoſition, and ſituation of the ſoils, as well as ſubſoils, be fully underſtood.

In like manner, in the above writer's opinion, the modes of cultivation in different ſoils muſt be different; as the ſame practice that may be excellent in one caſe may be deſtructive in others. Thus, for inſtance, deep ploughing may be very advantageous and profitable in rich thick ſoils; but in fertile ſhallow ones, upon cold clay or ſandy ſub-ſoils, very injurious and hurtful. Siliceous ſandy ſoils are much more productive in moiſt wet climates, where the fall of rain is great, ſuch as thoſe in the ſouth-weſt and north-weſt of this country, and in ſome places in Ireland, than in dry diſtricts; and in ſuch ſituations, wheat and beans will require leſs coherent and abſorbent ſoils than in thoſe which are drier; and bulbous-rooted plants will, it is ſaid, thrive well in ſoils that have as many as fourteen parts out of fifteen of ſand. The exhauſting powers of crops, too, it is aſſerted, will be influenced by the ſame circumſtances; as where ſufficient moiſture cannot be abſorbed by plants, they muſt neceſſarily take up more manure. In the ſouth-weſtern and north-weſtern parts of this iſland, as well as in Ireland, corn will, it is ſaid, exhauſt leſs than in dry inland diſtricts; and oats are much more deteriorating, eſpecially in dry climates, than in ſuch as are moiſt. In many other inſtances, the ſame is likewiſe the caſe.

In regard to the conſtitution or compoſition of fertile ſoils, the firſt eſſential requiſite, according to Mr. Kirwan, is, that it contain a ſufficient quantity of the three or four ſimple earths above mentioned, and of the ſoluble carbonaceous principle; and that the other requiſites are, that the proportion of each, and the general texture of the ſoil, be ſuch as to enable it to admit and retain as much water as is neceſſary to vegetation, and no more. Alſo, further, that as it has been ſeen that the retentive powers of moiſture are very different in the ſimple earths, the proportions in which the fertility of a ſoil requires them to be mixed muſt be different in climates and countries that differ conſiderably in moiſture; in the *drier*, they muſt be ſuch as are moſt retentive; in the *moiſter*, ſuch as ſuffer it to paſs or evaporate more eaſily. The ſame remark alſo extends to ſituation. Lands on a plain ſhould be ſo conſtituted, as to be leſs retentive of water than thoſe ſituated on a declivity; as has been ſeen, and is very evident: conſequently, lands that have a retentive or impermeable ſub-ſoil, ſhould be differently conſtituted from thoſe that have one leſs retentive, or more permeable. And the time of the year in which rain moſt abundantly falls may alſo be worthy of notice, in adjuſting this buſineſs.

From a variety of facts and obſervations, which we cannot minutely detail, it is inferred that in the drier countries, where the fall of rain is but 20 inches, the ſoil, to be fertile, muſt be cloſer, and the quantity of calcareous earth much increaſed, and that of the ſiliceous earth much diminiſhed. Thus, in the climate of Turin, where the fall of rain exceeds 40 inches, the proportion of ſiliceous earth is from 77 to 80 *per* cwt., and that of calcareous from 9 to 14, to ſuffer this exceſs of rain more eaſily to evaporate. In the climate of Upſal, where the fall of rain is 24 inches, the proportion of ſilex is only 56 *per* cwt., but that of calx is 30; and in the climate of Paris, which is ſtill drier, the proportion of ſilex is only from 46 to 51, and that of calx 37.5 *per* cwt. And hence we may perceive the neceſſity of attending to the average quantity of rain, to judge of the proper conſtitution of fertile lands upon fixed principles. The quantity of rain differs much, in different parts of the ſame kingdom; but in general, in Ireland, Mr. Kirwan believes it to be between 24 and 28 inches, on an average. In the two laſt mixtures, the proportions vary conſiderably: the firſt may ſerve, it is ſaid, as a model for the heavier ſoils; and the ſecond for the lighter. In the following experiments, the carbonic principle ſeems to have been extracted from the ſurrounding garden-mould, with which the pots communicated, by means of their perforation at the bottom.

The author of a late work on "Agricultural Chemiſtry" ſtates, that as plants have no locomotive powers, they can only grow in places where they are ſupplied with food; and that the ſoil is neceſſary to their exiſtence, both as affording them properly the means of nouriſhment, and enabling them to fix themſelves in ſuch a manner as to obey thoſe mechanical laws, by which their radicles are kept below the ſurface, and their leaves expoſed to the free atmoſphere. That as the ſyſtems of roots, branches, and leaves, are very different in different vegetables, ſo they flouriſh moſt perfectly in different ſoils ſuited to them: the plants that have bulbous roots require a looſer and a lighter ſoil than ſuch as have fibrous roots; and the plants having only ſhort fibrous radicles ſtand in need of a firmer ſoil than ſuch as have tap-roots, or extenſive roots of the lateral kind.

He found a good turnip ſoil from Holkham, in the county of Norfolk, to afford eight out of nine parts ſiliceous ſand; and the finely divided matter to conſiſt of

Carbonate of lime - - - - -	63
Silica - - - - - - -	15
Alumina - - - - - - -	11
Oxyd of iron - - - - - -	3
Vegetable and ſaline matter - -	5
Moiſture - - - - - - -	3

A ſoil particularly fitted for raiſing flouriſhing oaks, to be conſtituted nearly as noticed afterwards, below.

An excellent wheat-ſoil from near Weſt Drayton, in the county of Middleſex, gave three parts in five of ſiliceous ſand; and the finely divided matter conſiſted of

Carbonate of lime - - - - -	28
Silica - - - - - - -	32
Alumina - - - - - - -	29
Animal or vegetable matter and moiſture	11

It is noticed, that of theſe ſoils, the firſt was the leaſt coherent in texture, and the laſt by far the moſt ſo. In all caſes, the conſtituent parts of the ſoil which give tenacity and coherence are, it is ſaid, the finely divided matters; and that they poſſeſs the power of giving thoſe qualities in the higheſt degree, when they contain much alumina. A ſmall quantity of finely divided matter is ſufficient, it is ſaid, to fit a ſoil for the production of turnips and barley; and the writer has ſeen a tolerable crop of turnips on a ſoil containing eleven parts out of twelve ſand. Any much greater proportion of ſand, however, it is ſtated, always produces abſolute ſterility. The ſoil of Bagſhot-Heath, which is wholly devoid of vegetable covering, contains, it is ſaid, leſs than one-twentieth of finely divided matter; 400 parts of it, which had been heated red, afforded the above writer 380 parts of coarſe ſiliceous ſand, 9 parts of fine ſand of the ſame kind, and 11 parts of impalpable matter, which was a mixture of ferruginous clay, with carbonate of lime. Vegetable or animal matters, when finely divided, not only give, it is ſaid, coherence, but likewiſe ſoftneſs and penetrability; but neither they, nor any other part of the ſoil, muſt be in too great proportion; and a ſoil is unproductive, if it conſiſts entirely of impalpable matter. Pure alumina or ſilica, pure carbonate of magneſia, are incapable of ſupporting healthy vegetation. And no ſoil is fertile, it is ſtated, that contains ſo much as nineteen parts out of twenty of any of the conſtituent materials that have been mentioned above.

In anſwer to the important queſtion, whether the pure earths in the ſoil only act in a mere mechanical manner, or as indirect chemical agents, or actually furniſh the food of the plants? it is ſtated, that as their baſes have not yet been decompoſed, there is no reaſon to ſuppoſe that they are capable of being converted into the elements of organized compounds, as into carbon, hydrogen, and azote. Plants have been made to grow, it is ſaid, in given quantities of earth, but they conſume very ſmall portions only; and what is loſt may be accounted for, by the quantities found in their aſhes, that is to ſay, it has not been converted into any new products. The carbonic acid united to lime or magneſia, if any ſtronger acid happens to be formed in the ſoil during the fermentation of vegetable matter, which will diſengage it from the earths, may, it is ſaid, be decompoſed; but the earths themſelves cannot be ſuppoſed convertible into other ſubſtances, by any proceſs taking place in the ſoil or land. In all caſes, the aſhes of plants, it is obſerved, contain ſome of the earths of the ſoil in which they grow; but theſe never equal more than one-fiftieth of the weight of the plant which is conſumed. On the whole, it is concluded, that if they be conſidered as neceſſary to the vegetable, it is as giving hardneſs and firmneſs to its organization. Thus wheat, oats, and many of the hollow graſſes, have, it is ſaid, an epidermis principally of ſiliceous earth; the uſe of which ſeems to be to ſtrengthen them, and defend them from the attacks of inſects and paraſitical plants.

It is ſtated that, for the moſt part, the ſoils, the conſtituent materials of which are the moſt various and contrary to each other, are thoſe of the alluvial kind, or which have been formed in a gradual manner from the depoſitions of rivers, or other waters: they are, in many caſes, extremely fertile. The writer juſt mentioned has examined ſome productive ſoils of this ſort, which have been very different in their compoſition. A very productive ſoil from the banks of the river Parrot, in the county of Somerſet, afforded eight parts of finely divided earthy matter, and one part of ſiliceous ſand: the analyſis of the former gave theſe reſults:

360 parts of carbonate of lime,
25 parts of alumina,
20 parts of ſilica,
8 parts of oxyd of iron,
19 parts of vegetable, animal, and ſaline matter.

A rich ſoil of this nature from near the Avon river, in the valley of Eveſham, in the county of Worceſter, gave three-fifths of fine ſand, and two-fifths of impalpable matter: the latter conſiſted of

35 Alumina,
41 Silica,
14 Carbonate of lime,
3 Oxyd of iron,
7 Vegetable, animal, and ſaline matter.

From a ſpecimen of good ſoil of Tiviotdale, five-ſixths of fine ſiliceous ſand, and one-ſixth of impalpable matter, were afforded: the latter conſiſted of

41 Alumina,
42 Silica,
4 Carbonate of lime,
5 Oxyd of iron,
8 Vegetable, animal, and ſaline matter.

And a ſoil affording excellent paſture from the valley of the Avon, near the town of Saliſbury, gave one-eleventh of coarſe ſiliceous ſand; the finely divided matter of which conſiſted of

7 Alumina,
14 Silica,
63 Carbonate of lime,
2 Oxyd of iron,
14 Vegetable, animal, and ſaline matter.

It is ſtated that, in all theſe caſes, the fertility ſeemed to depend upon the ſtate of diviſion and mixture of the earthy materials and the vegetable and animal matters; which may be readily explained from what has been already advanced.

And profeſſor Davy, in ſpeaking of the improvement of ſoils, as connected with the principle of their compoſition, remarks in the paper noticed above, that when a barren ſoil is examined with a view to its improvement, it ought, in all caſes, if poſſible, to be compared with an extremely fertile ſoil in the ſame neighbourhood, and in a ſimilar ſituation: the difference given by their analyſes would indicate the methods of cultivation; and thus the plan of improvement would be founded upon accurate ſcientific principles. And that, if the fertile ſoil contained a large quantity of ſand, in proportion to the barren ſoil, the proceſs of amelioration would depend ſimply upon a ſupply of this ſubſtance; and the method would be equally ſimple with regard to ſoils deficient in clay or calcareous matter. But that in the application of clay, ſand, loam, marle, or chalk to lands, there are no particular chemical principles to be obſerved; but when quicklime is uſed, great care muſt be taken that it is not obtained from the magneſian limeſtone; for in this caſe, as has been ſhewn by Mr. Tennant, it is exceedingly injurious to land. The magneſian limeſtone may be diſtinguiſhed from the common limeſtone by its greater hardneſs, and by the length of time that it requires for its ſolution in acids, and it may be analyſed by the proceſs for carbonate of lime and magneſia. When the analytical compariſon indicates an exceſs of vegetable matter as the cauſe of ſterility, it may be deſtroyed by much pulverization, and expoſure to air, by paring and burning, or the agency of lately made quicklime. And the defect of animal and vegetable matter muſt be ſupplied by animal or vegetable manure.

And it is further ſtated, that ſterile ſoils in different climates and ſituations muſt differ in compoſition. The general indications of fertility and barrenneſs, as found by chemical experiments, muſt neceſſarily differ in different climates, and under different circumſtances. The power of ſoils to abſorb moiſture, a principle eſſential to their productiveneſs,

ductiveneſs, ought, as has been ſeen, to be much greater in warm and dry countries, than in cold and moiſt ones; and the quantity of fine aluminous earth they contain larger. Soils, likewiſe, as already ſeen, that are ſituated on declivities, ought to be more abſorbent than thoſe in the ſame climate, on plains or in vallies. The productiveneſs of ſoils muſt likewiſe be influenced by the nature of the ſub-ſoil, or the earthy or ſtony ſtrata on which they reſt; and this circumſtance ought to be particularly attended to in conſidering their chemical nature, and the ſyſtem of improvement. Thus, a ſandy ſoil may ſometimes owe its fertility to the power of the ſub-ſoil to retain water; and an abſorbent clayey ſoil may occaſionally be prevented from being barren, in a moiſt climate, by the influence of a ſub-ſtratum of ſand or gravel. In regard to the chemical compoſition of fertile corn-ſoils in this climate, thoſe ſoils that are moſt productive of corn, contain always certain proportions of aluminous and calcareous earth, in a finely divided ſtate, and a certain quantity of vegetable or animal matter. The quantity of calcareous earth is however very various, and in ſome caſes exceedingly ſmall. A very fertile corn-ſoil from Ormiſton, in Eaſt Lothian, afforded the writer, in an hundred parts, only eleven parts of mild calcareous earth; it contained twenty-five parts of ſiliceous ſand; the finely divided clay amounted to forty-five parts. It loſt nine in decompoſed animal and vegetable matter, and four in water; and afforded indications of a ſmall quantity of phoſphate of lime. This ſoil was of a very fine texture, and contained very few ſtones or vegetable fibres. It is not unlikely that its fertility was in ſome meaſure connected with the phoſphate; for this ſubſtance is found in wheat, oats, and barley, and may be a part of their food. A ſoil from the low lands of Somerſetſhire, celebrated for producing excellent crops of wheat and beans without manure, he found to conſiſt of one-ninth of ſand, chiefly ſiliceous, and eight-ninths of calcareous marle tinged with iron, and containing about five parts in the hundred of vegetable matter. He could not detect in it any phoſphate or ſulphate of lime, ſo that its fertility muſt have depended principally upon its power of attracting principles of vegetable nouriſhment from water and the atmoſphere. And Mr. Tillet found that a ſoil compoſed of three-eighths of clay, two-eighths of river-ſand, and three-eighths of the parings of limeſtone, was very proper for wheat.

With reſpect to the compoſition of ſoils proper for bulbous roots and for trees, it is obſerved that, in general, bulbous roots require a ſoil much more ſandy, and leſs abſorbent, than the graſſes. A very good potatoe ſoil, from Varſel, in Cornwall, afforded him ſeven-eighths of ſiliceous ſand; and its abſorbent power was ſo ſmall, that one hundred parts loſt only two by drying at 400° Fahrenheit. Plants and trees, the roots of which are fibrous and hard, and capable of penetrating deep into the earth, will vegetate to advantage in almoſt all common ſoils which are moderately dry, and which do not contain a very great exceſs of vegetable matter. He found the ſoil taken from a field at Sheffield-Place, in Suſſex, remarkable for producing flouriſhing oats, to conſiſt of ſix parts of ſand, and one part of clay and finely divided matter. And one hundred parts of the entire ſoil ſubmitted to analyſis, produced

Subſtances.	Parts.
Water	3
Silex	54
Alumine	28
Carbonate of lime	3
Oxyd of iron	5
Decompoſing vegetable matter	4
Loſs	3

And on the advantages of improvements made by changing the compoſition of the earthy parts of ſoils, it is obſerved that, from the great difference of the cauſes that influence the productiveneſs of lands, it is obvious that, in the preſent ſtate of ſcience, no certain ſyſtem can be deviſed for their improvement, independent of experiment: but there are few caſes in which the labour of analytic trials will not be amply repaid by the certainty with which they denote the beſt methods of amelioration; and this will particularly happen, when the defect of compoſition is found in the proportions of the primitive earths. In ſupplying animal or vegetable manure, a temporary food only is provided for plants, which is in all caſes exhauſted by means of a certain number of crops; but when a ſoil is rendered of the beſt poſſible conſtitution and texture, with regard to its earthy parts, its fertility may be conſidered as permanently eſtabliſhed. It becomes capable of attracting a very large proportion of vegetable nouriſhment from the atmoſphere, and of producing its crops with comparatively little labour and expence.

There are different other caſes in which improvements may be directed in this way; as where the ſalts of iron or ſome acid material is found to prevail in ſoils, they may be altered and corrected by the uſe of lime in its moſt active ſtate. In this manner very ſterile ſoils, not deficient in texture, have been effectually improved. When the quantity of calcareous matter is too great, ſand or clay is the obvious remedy. If there be a deficiency of vegetable materials in light ſandy or gravelly ſoils, they may be permanently improved by the uſe of peat earth upon them. The peat-boggy and marſhy ſorts of ſoils, after proper draining, are moſtly made productive, by laying upon them ſandy, or ſtiff earthy matters in due proportion, eſpecially when the former are of the black ſoft peaty quality. In caſes where peaty ſoils are acid, or much impregnated with ferruginous ſaline matters, the uſe of calcareous ſubſtances is eſſentially neceſſary for bringing them into proper order.

It is conceived that the beſt natural ſoils are thoſe, the materials of which have been produced from ſtrata of different kinds, which have been the moſt perfectly divided in their parts by the operation of air and water, and are the moſt intimately blended and incorporated together. In improving ſoils artificially, it is in ſhort ſuppoſed, that the farmer cannot do better than imitate the proceſſes of nature. The materials ſuitable for the purpoſe are, it is ſaid, ſeldom far diſtant: coarſe ſand is often found immediately upon chalk; and beds of ſand and gravel are commonly below clay.

The labour of amending and improving the texture and conſtitution of ſoils, is repaid, it is ſaid, by many great permanent benefits; a ſmaller quantity of manure is required, and their fertility rendered ſecure, &c.

In order to aſcertain the properties and qualities of land, the method of chemical analyſis has been adopted. In this caſe the following rules and directions, laid down by profeſſor Davy in the paper befor alluded to, may be found uſeful in guiding the inquirer. All the varieties of ſoils may be analyſed in this way.

1. *Inſtruments required for the Analyſis of Soils.*—The really important inſtruments required for the analyſis of ſoils are, in his opinion, few, and but little expenſive. They are, a balance capable of containing a quarter of a pound of common ſoil, and capable of turning, when loaded, with a grain; a ſeries or ſet of weights, from a quarter of a pound troy to a grain; a wire ſieve, ſufficiently coarſe to admit a pepper-corn through its apertures; an Argand lamp and

ſtand ; ſome glaſs-bottles ; Heſſian crucibles ; porcelain or queen's ware evaporating baſons ; a Wedgewood peſtle and mortar ; ſome filters made of half a ſheet of blotting-paper, folded ſo as to contain a pint of liquid, and greaſed at the edges ; a bone-knife, and an apparatus for collecting and meaſuring aeriform fluids. And the chemical ſubſtances or re-agents required for ſeparating the conſtituent parts of the ſoil are, muriatic acid (ſpirit of ſalt), ſulphuric acid, pure volatile alkali diſſolved in water, ſolution of pruſſiat of potaſh and iron, ſuccinate of ammonia, ſoap-ley, ſolutions of carbonate of ammonia, of muriate of ammonia, ſolution of neutral carbonate of potaſh, and nitrate of ammonia. An account of the nature of theſe bodies and their effects may be found in Dr. Thomſon's Syſtem of Chemiſtry, and Henry's Epitome ; and the re-agents are ſold together with the inſtruments mentioned above, by Mr. Knight, Foſter-lane, Cheapſide, arranged in an appropriate cheſt.

2. *Mode of collecting Soils for Analyſis.*—In caſes where the general nature of the ſoil of a field is to be aſcertained, ſpecimens of it ſhould be taken from different places, two or three inches below the ſurface, and examined as to the ſimilarity of their properties. It ſometimes happens, that upon plains, the whole of the upper ſtratum of the land is of the ſame kind, and in this caſe one analyſis will be ſufficient ; but in vallies, and near the beds of rivers, there are very great differences, and it now and then occurs that one part of a field is calcareous, and another part ſiliceous ; and in this caſe, and in analogous caſes, the portions different from each other ſhould be ſeparately ſubmitted to experiment. Soils, when collected, if they cannot be immediately examined, ſhould be preſerved in phials quite filled with them, and cloſed with ground-glaſs ſtoppers. The quantity of ſoil moſt convenient for a perfect analyſis, is from two to four hundred grains. It ſhould be collected in dry weather, and expoſed to the atmoſphere till it becomes dry to the touch. The ſpecific gravity of a ſoil, or the relation of its weight to that of water, may be aſcertained by introducing into a phial, which will contain a known quantity of water, equal volumes of water and of ſoil, and this may be eaſily done by pouring in water till it is half full, and then adding the ſoil till the fluid riſes to the mouth ; the difference between the weight of the ſoil and that of the water will give the reſult. Thus, if the bottle contains 400 grains of water, and gains 200 grains when half filled with water and half with ſoil, the ſpecific gravity of the ſoil will be 2 ; that is, it will be twice as heavy as water : and if it gained 165 grains, its ſpecific gravity would be 1825, water being 1000. It is of importance that the ſpecific gravity of a ſoil ſhould be known, as it affords an indication of the quantity of animal and vegetable matter it contains ; theſe ſubſtances being always moſt abundant in the lighter ſoils. The other phyſical properties of ſoils ſhould likewiſe be examined before the analyſis is made, as they denote, to a certain extent, their compoſition, and ſerve as guides in directing the experiments. Thus, ſiliceous ſoils are generally rough to the touch, and ſcratch glaſs when rubbed upon it ; ferruginous ſoils are of a red or yellow colour ; aluminous ſoils adhere ſtrongly to the tongue, and emit a ſtrong earthy ſmell when breathed on ; and calcareous ſoils are ſoft, and much leſs adheſive than aluminous ſoils.

3. *Mode of aſcertaining the Quantity of Water of Abſorption in Soils.*—Soils, though as dry as they can be made by continued expoſure to air, in all caſes ſtill contain a conſiderable quantity of water, which adheres with great obſtinacy to the earths and animal and vegetable matter, and can only be driven off from them by a conſiderable degree of heat. The firſt proceſs of analyſis is, to free the given weight of ſoil from as much of this water as poſſible, without, in other reſpects, affecting its compoſition ; and this may be done by heating it for ten or twelve minutes over an Argand's lamp, in a baſon of porcelain, to a temperature equal to 300° Fahrenheit. In ſeveral experiments, in which this proceſs has been carried on by diſtillation, he has found the water that came over pure, and no ſenſible quantity of other volatile matter was produced. And in caſe a thermometer is not uſed, the proper degree may be eaſily aſcertained, by keeping a piece of wood in contact with the bottom of the diſh ; as long as the colour of the wood remains unaltered, the heat is not too high ; but when the wood begins to be charred, the proceſs muſt be ſtopped. A ſmall quantity of water will perhaps remain in the ſoil, even after this operation, but it always affords uſeful comparative reſults ; and if a higher temperature were employed, the vegetable or animal matter would undergo decompoſition, and in conſequence the experiment be wholly unſatisfactory. The loſs of weight in the proceſs ſhould be carefully noted, and when in four hundred grains of ſoil it reaches as high as fifty, the ſoil may be conſidered as in the greateſt degree abſorbent, and retentive of water, and will generally be found to contain a large proportion of aluminous earth. When the loſs is only from twenty to ten, the land may be conſidered as only ſlightly abſorbent and retentive, and the ſiliceous earth as probably moſt abundant.

4. *The Separation of Stones, Gravel, and vegetable Fibres from Soils.*—None of the looſe ſtones, gravel, or large vegetable fibres, ſhould be divided from the pure ſoil, till after the water is drawn off ; for theſe bodies are themſelves often highly abſorbent and retentive, and in conſequence influence the fertility of the land. The next proceſs, however, after that of heating, ſhould be their ſeparation, which may be eaſily accompliſhed by the ſieve, after the ſoil has been gently bruiſed in a mortar. The weights of the vegetable fibres of wood, and of the gravel and ſtones, ſhould be ſeparately noted down, and the nature of the laſt aſcertained ; if calcareous, they will efferveſce with acids ; if ſiliceous, they will be ſufficiently hard to ſcratch glaſs ; and if of the common aluminous claſs of ſtones, they will be ſoft, eaſily ſcratched with a knife, and incapable of efferveſcing with acids.

5. *Separation of the Sand and Clay, or Loam, from each other.*—The greater number of ſoils, beſides gravel and ſtones, contain larger or ſmaller proportions of ſand of different degrees of fineneſs ; and it is a neceſſary operation, the next in the proceſs of analyſis, to detach them from the parts in a ſtate of more minute diviſion, ſuch as clay, loam, marle, and vegetable and animal matter, and the matter ſoluble in water. This may be effected in a way ſufficiently accurate, by boiling the ſoil in three or four times its weight of water, and, when broken down and cool, by agitating the parts of the ſoil in the water, and then letting them reſt. In this caſe, the coarſe ſand will generally ſeparate in a minute, and the finer in two or three minutes, whilſt the minutely divided earthy, animal, or vegetable matter will remain in a ſtate of mechanical ſuſpenſion for a much longer time ; ſo that by pouring the water from the bottom of the veſſel, after one, two, or three minutes, the ſand will be principally ſeparated from the other ſubſtances, which, with the water containing them, muſt be poured into a filter, and after the water has paſſed through, collected, dried, and weighed. The ſand muſt likewiſe be weighed, and their reſpective quantities noted down. The water of lixiviation muſt be preſerved, as it will be

found to contain ſaline matter, and the ſoluble animal and vegetable matters, if any exiſt in the ſoil.

6. *Examination of the Sand.*—By the proceſs of waſhing and filtration, the ſoil is ſeparated into two portions, the moſt important of which is generally the finely divided matter. A minute analyſis of the ſand is ſeldom or never neceſſary, and its nature may be detected in the ſame manner as that of the ſtones or gravel. It is always either ſiliceous ſand, or calcareous ſand, or a mixture of both. If it conſiſts wholly of carbonate of lime, it will be rapidly ſoluble in muriatic acid, with efferveſcence; but if it conſiſt partly of this ſubſtance, and partly of ſiliceous matter, the reſpective quantities may be aſcertained by weighing the reſiduum after the action of the acid, which muſt be applied till the mixture has acquired a ſour taſte, and has ceaſed to effervеſce. This reſiduum is the ſiliceous part: it muſt be waſhed, dried, and heated ſtrongly in a crucible; the difference between the weight of it and the weight of the whole, indicates the proportion of calcareous ſand.

7. *Examination of the finely divided Matter of Soils, and Mode of detecting mild Lime and Magneſia.*—The finely divided matter of the ſoil is uſually very compound in its nature; it ſometimes contains all the four primitive earths of ſoils, as well as animal and vegetable matter; and to aſcertain the proportions of theſe with tolerable accuracy is the moſt difficult part of the ſubject. The firſt proceſs to be performed, in this part of the analyſis, is the expoſure of the fine matter of the ſoil to the action of the muriatic acid. This ſubſtance ſhould be poured upon the earthy matter in an evaporating baſon, in a quantity equal to twice the weight of the earthy matter; but diluted with double its volume of water. The mixture ſhould be often ſtirred, and ſuffered to remain for an hour, or an hour and a half, before it is examined. If any carbonate of lime or magneſia exiſt in the ſoil, they will have been diſſolved in this time by the acid, which ſometimes takes up likewiſe a little oxyd of iron; but very ſeldom any alumine.

The fluid ſhould be paſſed through a filter; the ſolid matter collected, waſhed with rain-water, dried at a moderate heat, and weighed. Its loſs will denote the quantity of ſolid matter taken up. The waſhings muſt be added to the ſolution, which, if not ſour to the taſte, muſt be made ſo by the addition of freſh acid, when a little ſolution of common pruſſiat of potaſh and iron muſt be mixed with the whole. If a blue precipitate occurs, it denotes the preſence of oxyd of iron, and the ſolution of the pruſſiat muſt be dropped in till no farther effect is produced. To aſcertain the quantity, it muſt be collected in the ſame manner as other ſolid precipitates, and heated red; the reſult is oxyd of iron, which may be mixed with a little oxyd of manganeſum. Into the fluid freed from oxyd of iron, a ſolution of neutralized carbonate of potaſh muſt be poured till all the effervеſcence ceaſes in it, and till its taſte and ſmell indicate a conſiderable exceſs of alkaline ſalt. The precipitate that falls down is carbonate of lime; it muſt be collected on the filter, and dried at a heat below that of redneſs. The remaining fluid muſt be boiled for a quarter of an hour, when the magneſia, if any exiſt, will be precipitated from it, combined with carbonic acid, and its quantity is to be aſcertained in the ſame manner as that of the carbonate of lime. If any minute proportion of alumine ſhould, from peculiar circumſtances, be diſſolved by the acid, it will be found in the precipitate with the carbonate of lime, and it may be ſeparated from it by boiling it for a few minutes with ſoap-ley, ſufficient to cover the ſolid matter. This ſubſtance diſſolves alumine, without acting upon carbonate of lime. Should the finely divided ſoil be ſufficiently calcareous to effervеſce very ſtrongly with acids, a very ſimple method may be adopted for aſcertaining the quantity of carbonate of lime, and one ſufficiently accurate in all common caſes. Carbonate of lime, in all its ſtates, contains a determinate proportion of carbonic acid, *i. e.* about 45 *per cent.*, ſo that when the quantity of this elaſtic fluid, given out by any ſoil during the ſolution of its calcareous matter in an acid, is known, either in weight or meaſure, the quantity of carbonate of lime may be eaſily diſcovered. When the proceſs by diminution of weight is employed, two parts of the acid and one part of the matter of the ſoil muſt be weighed in two ſeparate bottles, and very ſlowly mixed together, till the effervеſcence ceaſes; the difference between their weight, before and after the experiment, denotes the quantity of carbonic acid loſt; for every four grains and a half of which, ten grains of carbonate of lime muſt be eſtimated. The beſt method of collecting the carbonic acid, ſo as to diſcover its volume, is by the pneumatic apparatus, the conſtruction and application of which are deſcribed below. The eſtimation is, for every ounce meaſure of carbonic acid, two grains of carbonate of lime. The bulk may be meaſured by the quantity of water which is diſplaced.

8. *Mode of aſcertaining the Quantity of inſoluble finely divided animal and vegetable Matter.*—After the fine calcareous matter of the ſoil has been acted upon by muriatic acid, the next proceſs is to aſcertain the quantity of finely divided inſoluble animal and vegetable matter that it contains. This may be done with ſufficient preciſion, by heating it to ſtrong ignition in a crucible over a common fire, till no blackneſs remains in the maſs. It ſhould be often ſtirred with a metallic wire, ſo as to expoſe new ſurfaces continually to the air: the loſs of weight that it undergoes denotes the quantity of the ſubſtance that it contains deſtructible by fire and air. It is not poſſible, without nice and difficult trials, to aſcertain whether this ſubſtance is wholly animal or vegetable matter, or a mixture of both. When the ſmell emitted during the incineration is ſimilar to that of burnt feathers, it is a certain indication of ſome animal matter, or that which is analogous to it; and a copious blue flame at the time of ignition, almoſt always denotes a conſiderable proportion of vegetable matter. In caſes when the experiment is needed to be very quickly performed, the deſtruction of the decompoſible ſubſtances may be aſſiſted by the agency of nitrate of ammonia, which at the time of ignition may be thrown gradually upon the heated maſs in a quantity of twenty grains for every hundred of reſidual ſoil. It promotes the diſſipation, or affords the principle neceſſary to the combuſtion of the animal and vegetable matter, which it cauſes to be converted into elaſtic fluids; and it is itſelf at the ſame time decompoſed and loſt.

9. *Mode of ſeparating aluminous and ſiliceous Matter and Oxyd of Iron.*—The ſubſtances remaining after the decompoſition and deſtruction of the vegetable and animal matter, are generally minute particles of earthy matter, containing uſually alumine and ſilex, with combined oxyd of iron, or of manganeſe. To ſeparate theſe from each other, the ſolid matter ſhould be boiled for two or three hours with ſulphuric acid, diluted with four times its weight of water; the quantity of the acid ſhould be regulated by the quantity of ſolid reſiduum to be acted upon, allowing for every hundred grains two drachms, or one hundred and twenty grains of acid. The ſubſtance remaining after the action of the acid may be conſidered as ſiliceous; and it muſt be ſeparated, and its weight aſcertained, after waſhing and drying in the uſual manner.

The alumine and the oxyd of iron and mangane$\int$e, if they exiſt, are all diſſolved by the ſulphuric acid; they may be ſeparated by carbonate of ammonia, which, added to exceſs, throws down the alumine, and leaves the oxyd of iron in ſolution, and this ſubſtance may be ſeparated from the liquor by boiling, by ſuccinate of ammonia uſed to exceſs, which precipitates the oxyd of iron, and by ſoap-ley, which diſſolves the alumina, but not the oxyd of manganeſum: the weights of the oxyds aſcertained after they have been heated to redneſs, will denote their quantities. Should any magneſia and lime have eſcaped ſolution in the muriatic acid, they will be found in the ſulphuric acid; this, however, is ſcarcely ever the caſe; but the proceſs for detecting them, and aſcertaining their quantities, is the ſame in both inſtances. The method of analyſis by ſulphuric acid, is ſufficiently preciſe for all uſual experiments; but if very great accuracy be an object, dry carbonate of potaſh muſt be employed as the agent, and the reſiduum of the incineration muſt be heated red for half an hour, with four times its weight of this ſubſtance, in a crucible of ſilver, or of well-baked porcelain. The maſs obtained muſt be diſſolved in muriatic acid, and the ſolution evaporated till it is nearly ſolid; diſtilled water muſt then be added, by which the oxyd of iron and all the earths, except ſilex, will be diſſolved in combination as muriates. The ſilex, after the uſual proceſs of lixiviation, muſt be heated red; the other ſubſtances may be ſeparated in the ſame manner as from the muriatic and ſulphuric ſolutions. This proceſs is the one uſually employed by chemical philoſophers for the analyſis of ſtones.

10. *Mode of diſcovering ſoluble, animal, and vegetable Matter, and ſaline Matter.*—If any ſaline matter, or ſoluble, vegetable, or animal matter, is ſuſpected in the ſoil, it will be found in the water of lixiviation uſed for ſeparating the ſand. This water muſt be evaporated to dryneſs in an appropriate diſh, at a heat below its boiling point. If the ſolid matter obtained is of a brown colour, and inflammable, it may be conſidered as partly vegetable extract. If its ſmell, when expoſed to heat, be ſtrong and fetid, like burnt feathers, it contains animal, mucilaginous, or gelatinous ſubſtance; if it be white and tranſparent, and not deſtructible by heat, it may be conſidered as principally ſaline matter, the nature of which may be known by the proper teſts. Nitrate of potaſh (nitre) or nitrate of lime, is indicated in this ſaline matter, by its ſcintillating with burning coal. Sulphate of magneſia may be detected by its bitter taſte; and ſulphate of potaſh produces no alteration in ſolution of carbonate of ammonia, but precipitates ſolution of muriate of barytes.

11. *Mode of detecting Sulphate of Lime (Gypſum) and Phoſphate of Lime in Soils.*—Should ſulphate or phoſphate of lime be ſuſpected in the entire ſoil, the detection of them requires a particular proceſs upon it. A given weight of it, 400 grains for inſtance, muſt be heated red for half an hour in a crucible, mixed with one-third of powdered charcoal. The mixture muſt be boiled for a quarter of an hour, in half a pint of water, and the fluid collected through the filter, and expoſed for ſome days to the atmoſphere in an open veſſel. If any ſoluble quantity of ſulphate of lime (gypſum) exiſted in the ſoil, a white precipitate will gradually form in the fluid, and the weight of it will indicate the proportion. Phoſphate of lime, if any exiſt, may be ſeparated from the ſoil after the proceſs for gypſum. Muriatic acid muſt be digeſted upon the ſoil, in quantity more than ſufficient to ſaturate the ſoluble earths, the ſolution muſt be evaporated, and water poured upon the ſolid matter. This fluid will diſſolve the compounds of earths with the muriatic acid, and leave the phoſphate of lime untouched. It would not, the writer ſays, fall within his limits to detail any proceſſes for the detection of ſubſtances which may be accidentally mixed with the matters of ſoils. Metallic oxyds and earths of other kinds are, now and then, found in them, but theſe in too minute quantities to bear any relation to fertility or barrenneſs, and the ſearch for them would make the analyſis much more complicated without rendering it more uſeful.

12. *Statement of Reſults and Products.*—When the examination of a ſoil is completed, the products ſhould be claſſed, and their quantities added together; and if they nearly equal the original quantity of ſoil, the analyſis may be conſidered as accurate. It muſt, however, be noticed, that when phoſphate or ſulphate of lime are diſcovered by the independent proceſs juſt ſtated, a correction muſt be made for the general proceſs, by ſubtracting a ſum equal to their weight from the quantity of carbonate of lime obtained by precipitation from the muriatic acid. In arranging the products, the form ſhould be in the order of the experiments by which they were obtained. Thus, 400 grains of a good ſiliceous ſandy ſoil may be ſuppoſed to contain, and have been actually found to contain as follows:

	Grains.	
Of water of abſorption - -	18 to	19
Of looſe ſtones and gravel, principally ſiliceous,	42	53
Of undecompounded vegetable fibres -	10	14
Of fine ſiliceous ſand - - -	200	212
	270	298

Of minutely divided matter ſeparated by filtration, and conſiſting of

	Grains.	
Carbonate of lime - - -	19 to	25
Carbonate of magneſia - - -	3	4
Matter deſtructible by heat, principally vegetable,	15	10
Silex - - - - -	21	40
Alumine - - - -	13	32
Oxyd of iron - - - - -	5	4
Soluble matter, principally ſulphate of potaſh, common ſalt, and vegetable extract, -	3	5
Gypſum - - - -	2	3
Phoſphate of lime - - -	0	2
	81	125
	298	270
Amount of all the products in the different caſes	379	395
Loſs - - - - -	21	5

In one of theſe inſtances the loſs is ſuppoſed ſmall; but in general, in actual experiments, it will be found much greater, as ſeen in the other, in conſequence of the difficulty of collecting the whole quantities of the different precipitates, and the preſence of more moiſture than is accounted for in the water of abſorption, and the loſs of it in the different proceſſes. But when it is within thirty for four hundred grains, there is no reaſon to ſuſpect any want of due preciſion in the proceſſes.

13. *This general Method of Analyſis may in many Caſes be much ſimplified.*—When the experimenter is become acquainted with the uſe of the different inſtruments, the properties of the re-agents, and the relation between the external and chemical qualities of ſoils, he will ſeldom find it neceſſary to perform, in any one caſe, all the proceſſes that have been deſcribed. When his ſoil, for inſtance, contains no notable

proportion of calcareous matter, the action of the muriatic acid, 7, may be omitted. In examining peat ſoils, he will principally have to attend to the operation by fire and air, 8; and in the analyſis of chalks and loams, he will often be able to admit the experiment by ſulphuric acid, 9. In the firſt trials that are made by perſons unacquainted with chemiſtry, they muſt not expect much preciſion of reſult. Many difficulties will be met with: but in overcoming them, the moſt uſeful kind of practical knowledge will be obtained, and nothing is ſo inſtructive in experimental ſcience as the detection of miſtakes. The correct analyſt ought to be well grounded in chemical information; but perhaps there is no better mode of gaining it than that of attempting original inveſtigations. In purſuing his experiments, he will be continually obliged to learn from books the hiſtory of the ſubſtances he is employing or acting upon; and his theoretical ideas will be more valuable, in being connected with practical operations, and acquired for the purpoſe of diſcovery.

Apparatus for the Analyſis of Soils.—The neceſſary apparatus and other conveniences for effecting the above purpoſes are different: the firſt conſiſts of a retort in connection with other veſſels, ſo as to form a peculiar pneumatic apparatus, by which the quantity of elaſtic fluid that is given out during the action of an acid on calcareous ſoils may be collected and meaſured, the bulk of it being aſcertained by the amount of the water that is diſplaced. The different parts of the apparatus are theſe. A bottle or retort for receiving and containing the ſoil; another containing the acid, furniſhed with a ſtop-cock; a tube connected with a flaccid bladder; a bottle for containing the bladder; and a graduated meaſure. When this contrivance is uſed, a given quantity of ſoil is introduced into the firſt bottle; the ſecond is filled with muriatic acid, diluted with an equal quantity of water, and the ſtop-cock being cloſed, is connected with the upper orifice of the firſt bottle, which is ground to receive it. The tube connected with the flaccid bladder is introduced into the lower orifice of the ſame bottle, and the bladder, in its flaccid ſtate, placed into the bottle for containing it, which is filled with water. The graduated meaſure is put under the tube of the bottle for containing the bladder. When the ſtop-cock of the ſecond bottle is turned, the acid flows into the firſt, and acts upon the ſoil; the elaſtic fluid which is generated paſſes through the tube connected with the flaccid bladder into the bladder, and diſplaces a quantity of water in the bottle for containing the bladder equal to it in bulk; and this water flows through the tube of the laſt bottle into the graduated meaſure; and gives by its volume the indication of the proportion of carbonic acid diſengaged from the ſoil; for every ounce meaſure of which two grains of carbonate of lime may be eſtimated or allowed, as already ſuggeſted.

The other things are, an Argand's lamp and ſtand; funnels for the purpoſe of filtering; and bottles for containing the different re-agents, as previouſly noticed.

Another method of deciding in regard to the nature, properties, and qualities of ſoils, but which is far inferior to that of chemical analyſis, though moſt frequently had recourſe to in purchaſing of land, is that of attending to the growth and colour of the vegetables which grow upon or cover it; but it requires a ſound judgment, much experience, and a correct eye in the execution.

It is cuſtomary, alſo, for farmers to have recourſe to other marks in forming their judgments of ſoils, ſuch as their appearances or colours, and their adheſion, tenacity, or looſeneſs and friability. Thus, the hazel-brown ſhews a valuable ſort of loamy ſoil, and the reddiſh ſandy mould a good one of the lighter kind. The wetneſs of lands ſhould likewiſe be well conſidered, ſo far as it is connected with the nature of the ſoil. From the full conſideration of all theſe different circumſtances, with a competent experience, a tolerably correct deciſion may in general be formed in reſpect to the nature of land. See FARM.

Sir Humphrey Davy, in his "Elements of Agricultural Chemiſtry," conſiders it as a vain labour to attempt to claſs ſoils with ſcientific accuracy. He thinks, too, that the diſtinctions at preſent adopted by farmers are quite ſufficient for the purpoſes of agriculture; eſpecially if ſome degree of preciſion be had recourſe to in the application of the terms. The term ſandy, he thus conceives, ſhould never be applied to any ſoil that does not contain at leaſt ſeven-eighths of ſand; ſandy ſoils that effervеſce with acids, ſhould be diſtinguiſhed by the name of calcareous ſandy ſoil, to diſtinguiſh them from thoſe that are ſiliceous. The term clayey ſoil ſhould not be made uſe of to any land which contains leſs than one-ſixth of impalpable earthy matter, not conſiderably effervеſcing with acids: the word loam ſhould be limited to ſoils containing at leaſt one-third of impalpable earthy matter, copiouſly effervеſcing with acids. A ſoil to be conſidered as peaty, ſhould contain at leaſt one-half of vegetable earthy matter. And that, in caſes when the earthy part of a ſoil obviouſly conſiſts of the decompoſed matter of one particular ſort of rock, a name derived from the rock may with propriety, it is ſuppoſed, be given to it. In this way it is imagined, that if a fine red earth be found immediately above decompoſing baſalt, it may be denominated baſaltic ſoil. If fragments of quartz and mica be found abundant in the materials of the ſoil, as is often the caſe, it may be called granitic ſoil; and the ſame thing may be done in a great number of other ſimilar caſes.

It is evident, that the greater preciſion and correctneſs there are in this buſineſs, the greater will be the advantages of the cultivators of the land or ſoil.

Diviſion of Soils.

Kinds.

1. Clayey,
2. Loamy,
3. Chalky,
4. Gravelly,
5. Sandy,
6. Peaty or moſſy,
7. Boggy and heathy, or
8. Moory,

However, theſe ſeveral diviſions muſt evidently be capable of being ſubdivided under various other heads, according to the differences in the conſtituent ingredients.

Clayey Soils.—It may be remarked, that as clay is ſeldom found in any thing near a ſtate of purity in ſoils, it is plain that there muſt be much difference in the ſoils in which it is the chief conſtituent principle, according to the proportion and nature of the admixture that has taken place. Theſe ſoils are moſtly found to contain an intermixture of different earthy materials, with various animal, vegetable, and mineral ſubſtances, and often blended with conſiderable quantities of ſiliceous and ſandy matters. It has been obſerved, in a late practical work, on the authority of Dr. Anderſon, that it is upon this account that the clayey ſoils of ſome diſtricts are ſo abundantly fruitful and productive, while thoſe of others are inſuperably ſterile and refractory. Farmers, or thoſe engaged in cultivating land, for the moſt part being only acquainted or converſant with earth or mould, as it offers itſelf to their attention in the groſs or whole, have not, he thinks, been led to remark the aſtoniſhing diverſity that takes place in reſpect to the properties of clays and other bodies that are united with them as primitive and conſtituent parts of ſoils, in their original and native ſtates; but having found that they all agreed in poſſeſſing the property of imbibing and retaining moiſture, and thereby of becoming ſoft and ductile, have, probably too haſtily, concluded them to have in ſome meaſure a ſimilarity in their other qualities. In this way erroneous notions have frequently, he ſuppoſes, been engendered reſpecting ſoils in which theſe ſubſtances abound. For it is well aſcertained, from the uſe of clays in ſtates of greater purity, that there are eſſential differences in their qualities. There are ſome ſorts, as that which is denominated fuller's-earth, and ſeveral of the ſoft boles that have the coheſive property in but a very ſlight degree; while others, ſuch as thoſe which are termed *tills*, are ſo extremely tenacious and viſcid, as to be capable of being drawn out into threads: and there are ſtill others, which, from their ſoftneſs, and property of imbibing water readily, are capable of being cut with great facility by any ſharp inſtrument; while ſome other ſorts are ſo firm, hard, and compact, as ſcarcely to admit of being ſoftened by means of water. The clays which are employed for making the fineſt porcelain, and thoſe uſed in the compoſition of the more coarſe wares, are only to be met with in particular ſituations and diſtricts. This fully ſhews that much diverſity muſt exiſt in the nature of ſoils of this deſcription, and which are perhaps far from being yet fully underſtood or aſcertained. But, beſides ſoils of this ſort differing in theſe reſpects, they have an equal diverſity in their appearances or colours, and their textures; being found in the ſtate of nature of very different colours, as red, white, blue, and yellow, and of very different degrees of compactneſs or denſity; in ſome caſes readily admitting the intermixture of other matters to improve them; while in others they are highly refractory in this reſpect, being with very great difficulty made to unite with them. It is plain, therefore, that in the firſt of theſe varieties of clayey ſoils, the proportion of ſiliceous or ſandy material muſt be conſiderably larger than in the latter, in relation to that of the clayey part. But notwithſtanding the above, all theſe deſcriptions of ſoils are found to poſſeſs ſome degree or other of the ſtiff or heavy quality, according to which, with proper attention to their other circumſtances, their cultivation and improvement muſt be conducted and carried on.

The chemical analyſis of different ſorts of clays, executed by the late ingenious Mr. Somerville, and detailed in his valuable Survey of Eaſt Lothian, ſerves to place the nature of ſuch ſoils in a clear point of view.

The intelligent writer concludes, that the experiments which he has deſcribed ſeem to prove, that the principal conſtituent parts of fertile clays are alkaline ſalts, calcareous earth, and oil, together with a very ſmall proportion of iron. In the ſtrongeſt and moſt retentive clays, the proportion of oil is greater, and that of alkaline ſalt and calcareous earth leſs, than in ſuch as approach nearer to the nature of loam; except in the experiments, when the clay was taken from the top of a lime-rock, in which it was found to contain leſs oil than any of the others, and more calcareous earth than either loam or any of the other clays: it differs further in containing no iron. And it is ſuppoſed that *tills* (*i. e.* a name given in Eaſt Lothian to ſuch of the thin clays as are blue, yellow, and red coloured, and, at the ſame time, barren) contain the ſame principles as other clays, with the exception of calcareous earth, of which they appear to be entirely deſtitute; in place of which, they contain a very great proportion of iron, which ſeems to be the principal cauſe of their barrenneſs; and, according as they contain more or leſs of it, they are more or leſs ſterile.

But in whatever manner theſe ſoils may be conſtituted, they invariably require greater power, labour, and attention, to bring them into a condition proper for the purpoſes of the farmer, than thoſe of moſt other ſorts. They are, in fact, naturally ſterile, from their adhering together in maſſes; unleſs where the ſummer is ſo divided between rain and ſun-ſhine, that they are kept in a medium between drought and wetneſs, a circumſtance that rarely happens in this uncertain climate. Where the ſeaſons are wet, the plants growing on ſuch ſoils are inundated; the cloſeneſs of the clay not admitting the water to ſoak into the ground: and in a dry ſeaſon the ground becomes ſo ſolid, that the roots of plants cannot penetrate or ſpread themſelves in it. A tolerably accurate idea of the fertility or barrenneſs of clayey ſoils may be obtained, by regarding the appearance of the different plants, as they vegetate: if they appear lively and vigorous, a favourable opinion may be drawn; the reverſe, of courſe, follows, if they appear languid, unhealthy, and ſtinted in their growth.

However, the clayey ſoils are thought to contain more of the food of plants than almoſt any other; as, without much alteration, ſuch lands will produce good crops of graſs, provided care be taken not to feed them too cloſely, nor to admit cattle into them in the ſpring. In order, however, to bring them into tillage, it is neceſſary that ſuch ſoils ſhould be altered by the admixture of ſuch ſubſtances as tend to open the ſoil, and to break the coheſion of its particles, and which ſupply vegetable matter in many caſes. When once theſe objects are accompliſhed, the land will become highly valuable, retaining manure excellently, and never returning to its former ſtate of barrenneſs. Theſe ſorts of ſoils are conſequently capable of much improvement, by the judicious application of ſubſtances and manures of ſuitable kinds, and a proper courſe of tillage huſbandry. And in regard to the former, pounded limeſtone, gravel, ſand, and calcareous marle, are the moſt uſeful articles in the view of altering the texture; and the beſt ſeaſon for laying them on is in the beginning of the year, as it is only during winter, while the ſurface is frozen, that teams can ſtir upon them. Where thoſe foſſile ſubſtances cannot be procured, and the vegetable principle is deficient, a mixture of dung and ſand, eſpecially that from the ſea-ſhores, will contribute greatly to fertilize the ground. But the application of lime alone has, in many inſtances, been attended with great advantage; though ſome farmers diſapprove of it, on account of its being apt to cake, and not mixing intimately with the ſoil. However, a variety of other ſubſtances may likewiſe be employed, in caſes where a deficiency of thoſe foſſils exiſt, ſuch as compoſts of chalk and dung, tanners' bark, ſea-mud, and other materials that promote a ſtrong fermentation: and it has been found by experience, that chalk and theſe together not only enrich the ſoil, but alſo make it produce earlier crops than it did before. The chalk, indeed, thus laid upon the land at length ſubſides, ſettles as deep as the plough goes, and is then of no further value in opening the land; but it may be recovered and brought up again to the ſurface, by ploughing ſomewhat deeper than ordinary, after which it will produce its former good effects. Gravel from neighbouring ſoils may alſo be carted upon clayey ſoils, to which may be added ſea or pit-coal aſhes, duſt from ſaw-pits, chips, and rubbiſh from the back yards of houſes, ſtraw, and ſtubble, rotten wood, burnt clay, peat aſhes, and perhaps *gypſum*, or plaſter of Paris in ſome caſes. This laſt ſubſtance, as well as thoſe of lime and other calcareous matters, may alſo be found uſeful in ſuch ſoils of this ſort as have a ſour tendency, by neutralizing and correcting ſuch acidity, by which they may be rendered more proper for the growth of crops of both the grain and graſs kind.

And it has been obſerved in the third volume of the Farmer's Magazine, that the thinner kinds of theſe lands are almoſt univerſally poor: the colder and more unkindly bottoms ſuch ſoils are found upon muſt naturally render them ſo. And that ſuch land is badly adapted to bear much fatigue of the plough, either in winter or ſummer: that being the caſe, neither autumn nor late ſpring ploughing can be depended on by the farmers; the land being ſo delicate of itſelf, it cannot reſiſt the alternate froſt and rain in winter; and if it happen to be a wet ſeaſon before ſeedtime, the proſpect of a crop muſt be very unpromiſing; and by the latter, if drought come on, it cannot fail of penetrating to the bottom of the furrow; in which caſe, the grain caſt upon it muſt remain deſtitute of nouriſhment: therefore, the moſt proper ſeaſon for ploughing ſuch land is February, and the beginning of March, when the weather is dry. And further, that the ſtronger ſorts baffle the operation of the plough more than any other it encounters. The only friend that co-operates with it, in ſubduing ſuch ſoils, is ſtrong liming: without doubt, winter froſt is alſo of much benefit; on which account, the farmer is often induced to plough ſuch land early. But it ought to be remembered, that although ſalutary effects may be produced by early ploughing, when there happens to be much froſt; yet very pernicious effects muſt follow, when the winter turns out to be very wet: for it is generally underſtood that clayey ſoils, for the moſt part, lie upon a retentive bottom of the ſame nature; therefore, all the water that falls upon them muſt eaſily penetrate to the bottom, through the ſeams between the furrows: and as the ſubſoil, or bottom of the furrow, will be left with a ſmall bank on the land-ſide of the coulter cut together, with the under araſe of the back part of the furrow reſting upon it, the water muſt be prevented from running to the drain-furrow, which will prove very pernicious and hurtful to the ſoil, being too cold at the bottom, in its beſt ſtate. It may perhaps be ſaid, that the ſame danger will be incurred, at whatever period the ploughing is performed; but there is a material difference between water ſtagnating in the bottom of the furrows for four or five months, and when it only does ſo for as many weeks: therefore, wherever autumn or early winter ploughing is practiſed on ſuch ſoils, that of ſummer fallow will alſo, he thinks, be often neceſſary.

It may be noticed, that the moſt proper ſorts of crops, in the firſt ſort, are peaſe and oats; and where compoſts can be had, and applied to the ſward, ſummer fallow will be beneficial; followed by wheat and artificial graſſes: and in the latter, cabbages, wheat, beans, peaſe, and graſs-ſeeds for both hay and paſture. See CLAYEY *Land.*

Almoſt every one of the above modes of improving and bettering the qualities of clayey ſoils are practiſed with much advantage and ſucceſs, in one or other of the different places throughout the country where they are met with. In the northern parts, however, where the uſe of lime on theſe ſorts of ſoils, eſpecially the better cultivated kinds of them, is more had recourſe to than in the ſouthern, they not uncommonly apply farm-yard manure the ſame ſeaſon in which the land is limed, though not, by any means, in combination with it; as by this practice the lime is believed to act more powerfully, as well as more effectually, and with far greater expedition, than when it is employed in the manner of compoſt, or mixture with earthy matters. It has been fully ſhewn that lime, in its active ſtate, has great power in promoting the ſolution and decay of all vegetable matters in ſoils, and, of courſe, of greatly increaſing the proportion of that ſort of material in them. In this way its readineſs in producing this ſort of matter in a large quantity, when applied to ſoils which contain a conſiderable portion of vegetable materials, is eaſily explained. And the powers of improving different kinds of clayey ſoils, in theſe methods, may be very much aided and aſſiſted by well directed modes of ſtirring and tilling ſuch lands; as where the ploughings, harrowings, and other proceſſes on them, eſpecially in the more ſtiff and retentive kinds, are frequent, and made at ſeaſons of the year in which they are neither too dry and cloddy, nor too wet and poachy, ſo that they may be well broken down and reduced in their parts, and fully expoſed to the influence of the atmoſphere. In theſe ways they are enabled to acquire a high degree of pulverization and fineneſs in their particles, by which the growth of plants upon them is greatly forwarded, and rendered more perfect. The ſeed is here to be covered in, for the moſt part, in a complete manner; the previous ploughings having been made to ſuitable depths, as the circumſtances of the lands may direct. On the thinner ſorts, where ſprings are apt to riſe, they ſhould have leſs depth than in other caſes. The tools and teams employed in working them ſhould be ſtrong, and ſo attached as to do as little injury by poaching as poſſible; ſuch ſeaſons as are neither too moiſt nor too dry being, in all caſes, choſen for the purpoſe.

Soils of this nature prevail very greatly in many diſtricts of the kingdom; and though they are improved, and brought into proper order for cultivation, with great difficulty, labour, and expence, they commonly anſwer very well in the end, by affording a long continued and very abundant produce.

2. *Loamy Soils.*—It is evident that loam, in its natural ſtate, is a ſort of earthy material, more compact than chalk, but leſs coheſive than clay. In theſe ſoils there is likewiſe much variety; ſome being ſtiff and compact; while others are more open, looſe, and porous: hence we have heavy, ſtiff, and light loams. The materials of which theſe ſoils are chiefly compoſed are thoſe of the clayey, chalky, ſandy, and gravelly kinds; on which account writers on huſbandry have denominated them clayey loams, chalky loams, ſandy loams, and gravelly loams; and ſometimes, where a ſmall portion of the oxyd or calx of iron is found mixed with the loamy material, they are termed *tilly* loams. The firſt, according to Kirwan, denotes a compound ſoil, moderately coheſive, in which the argillaceous ingredient predominates. Its coheſion is, then, greater than that of any other loam, but leſs than that of pure clay. The other ingredient is a coarſe ſand, with or without a ſmall mixture of the calcareous ingredient. It is this which farmers generally call ſtrong, ſtiff, cold, and heavy loam, in proportion as the clay abounds with it. And the ſecond indicates a loam formed of clay, coarſe ſand, and chalk; in which, however, the calcareous ingredient or chalk much predominates. It is leſs coheſive than clayey loams.

The third ſort denotes a loam in which ſand predominates: it is leſs coherent than either of the above-mentioned. Sand, partly coarſe and partly fine, forms from 80 to 90 *per cent.* of this compound. The fourth differs from the above only in containing a larger mixture of coarſe ſand, or pebbles. This and the two laſt are generally called by farmers light or hungry ſoils; particularly when they have but little depth. The fifth is generally of a dark brown or reddiſh colour, and much harder than any of the preceding: it conſiſts of clay and the calces of iron, more or leſs intimately mixed. It may be diſtinguiſhed not only by its colour, but alſo by its ſuperior weight; it ſometimes efferveſces with acids, and ſometimes not; when it does, much of the irony part may be ſeparated, by pouring it, when well dried, into ſpirit of ſalt; from which the iron may afterwards be ſeparated by alkalies or chalk. And akin to this are certain vitriolic ſoils, which, when ſteeped in water, impart to it the power of reddening ſyrup of violets. Theſe are generally of a blue colour, but redden when heated.

Further, it has been remarked by a late writer, that in proportion as the clayey principle diſappears, they recede from ſoils of that kind, and that of courſe the nearer the quality of the clayey matter comes to that of the others, the ſtronger and heavier the loamy ſoils muſt be. And that the differences in the lightneſs and friability of the ſoils of this claſs, in a great meaſure, depend on the relative proportions of the other ingredients. Where the calcareous ingredient greatly exceeds thoſe of the ſandy or gravelly kinds, they are neither ſo light nor ſo pulverizable as where they are nearly equal, or where the ſandy or gravelly matters conſiderably predominate over it. In the latter caſe, indeed, ſuch ſoils are formed as have been denominated by practical farmers light and hungry, eſpecially where the earthy bed or ſtratum thus produced is but of little depth, and reſts on a gravelly or flinty bottom or ſub-ſoil. It is alſo added, that the variety in the colours of ſoils of the loamy kind, ſeems, in ſome inſtances, to be produced by the union or mixture of metallic ſubſtances in greater or leſs proportions, and in more cloſe or more lax ſtates of combination with them; in others, by the prevalence of acid impregnations. The colour in the firſt caſe is for the moſt part reddiſh, approaching to brown; in the latter it is commonly blueiſh, changing by heat to a ſlight red. But theſe are not, he ſuppoſes, the only cauſes that influence the colour of theſe ſoils; they are much altered in their appearances, as well as other qualities, by the different proportions of vegetable or animal matter which they contain, and the different ſtates of decompoſition and decay to which they have been carried by length of time, cultivation, and other means. In ſituations, it is ſaid, where this ſort of ſoil has been but little diſturbed, and conſequently little changed by the artificial additions of either animal or vegetable ſubſtances, and thoſe which it naturally contained not having advanced to the ſtage of perfect ſolution and decay, it is generally found of a light brown or hazel colour; but where much culture has been employed for a length of time, and large applications of animal and vegetable matters frequently made, the natural and artificial materials of theſe kinds, having proceeded more nearly to the ſtate of perfect diſſolution and deſtruction, it has an appearance that approaches to that of black. And it is added, that from theſe various circumſtances, the properties of the ſoils are likewiſe conſiderably altered and affected. Such ſoils of this kind as are met with in extenſive tracts on the borders of the ſea, and of large rivers communicating with it, are generally rich and fertile, being moſtly compoſed of a fine ſort of ſand, calcareous matter in a high ſtate of tenuity from the attrition or rubbing down of different kinds of ſhells and other marine productions, and a rich matter proceeding from the diſſolution of various luxuriant ſea plants, and innumerable ſorts of animal exuviæ. Theſe alluvial materials being all gradually depoſited and incorporated with the natural loamy earth of the ſituations in which they are found.

There are ſoils of this ſort, in particular ſituations near the ſea-coaſts, which are extremely rich, being a great deal conſtituted or compoſed of layers of oyſter and cockle-ſhells, in combination with their earthy matters, and much impregnated with marine ſalt from the overflowings of the ſea, which ſeems to have been highly beneficial to them, when acted upon, for ſome length of time, by the air of the atmoſphere, in the production of grain as well as other crops. In theſe caſes, this ſaline quality would appear to be entangled in a peculiar ſort of loamy ſubſtance, very different from any which are met with in upland ſituations. The richeſt loamy ſoils in ſuch places are moſtly compoſed, in a great meaſure, of ſand in mixture with a portion of clay, and are, from this quantity of ſand, very friable in their nature. But with the ſoils in theſe particular caſes, it is very different; as whatever degree of friability they may poſſeſs, ſeems to ariſe from the fermentative power, which is cauſed by the action of the atmoſphere on ſubſtances that abound with mucilaginous matters. They fall, it is ſaid, when expoſed to the changes of the weather, into dies, and are more like the cryſtallized forms of mud drying in the ſun, than the crumbling looſeneſs of common loams. There is very little appearance of any ſand in them; the particles of which they are compoſed are ſo very fine, that it would be readily imagined, they would eaſily become an impalpable powder; but, on the contrary, they are capable of ſuch adheſion, that a clod will often become very hard. Conſequently they appear to be compoſed of clay, very fine ſand, a mucilaginous principle which ferments with rain and warmth, and the ſaline quality which is derived from their origin and peculiarity of ſituation. When crumbled in the hand, they yield a ſtrong ſcent, ſo that the volatile alkali would probably be diſcovered by chemical trials, it is thought, in them. Soils of this loamy kind are met with in Foulneſs iſland, in Eſſex, and ſome other ſimilar ſituations. Their natural fertility is often ſo very great, that the farmers are but little attentive to manure; nor is it commonly ventured for any ſort of grain, as it throws up too much ſtraw, without increaſing the quantity of corn. It might, however, probably be applied for beans, or cabbages, where they were the previous crops, with much advantage.

This ſort of excellent loam is ſuppoſed utterly incapable of being formed or attained by any kind of artificial means: the great elaboratory of nature in this, as in ſo many other caſes, leaves, it is thought, the utmoſt ſkill of the chemical farmer at a vaſt diſtance.

The chemical analyſis of this ſort of ſoil, as given in the work already mentioned, by Mr. Somerville, may ſhew ſtill more fully the properties which are poſſeſſed by this kind of land.

From the experiments of this ingenious writer it would appear, that the principal conſtituent parts of the different kinds of loam, upon which they were tried, are vegetable and calcareous earths, oil, alkaline ſalts, and an inconſiderable quantity of iron. The deep black loams ſeem to contain conſiderably more oil than any of the other two, but leſs alkali and calcareous earth; which, in ſome meaſure, accounts for the inactive nature of ſome ſoils of that deſcription, which, by no means, yield crops equal to what might be expected from their appearance. The hazel-coloured loam contains leſs oil than the black, but a greater proportion of alkaline ſalts and calcareous earth; owing to which, all the loams of that deſcription in Eaſt Lothian are more active, and produce better crops than the former. The light loams, from the circumſtance of their containing leſs oily and more alkaline and calcareous matter, are the moſt active, and are commonly termed *ſharp* lands, by the farmers in that diſtrict.

Further, theſe ſoils being, in general, leſs tenacious or more friable and mellow than clays, are capable of being more eaſily improved with leſs expence and labour of team, and alſo at any ſeaſon of the year. The manure proper for ſuch ſoils varies according to their relative degree of fertility,

tility, and the greater or leſs proportion of acidity and of argillaceous and calcareous matter they contain. Thoſe loams which are contiguous to the banks of rivers, or the ſea-coaſt, are generally admitted, as has been ſeen, to be ſo fertile, as to require little additional aid from manure; but for the more heavy and adheſive kinds, a compoſt of effete lime and dung, or lime in combination with pulverized or ground bones and blood, or other animal recrements, and ſuch terrene ſubſtances as contain large quantities of ſand, may be beneficially applied in ſuch quantities as the tenacity or poverty of the land may require. Where the argillaceous principle abounds, lime alone may be ſpread on the ſoil, in order to counteract the acidity prevalent in ſuch ſoils; in the contrary caſe, or where there is an abundance of ſand, gravelly, or chalky particles duly mixed with the loams, well rotted dung, vegetable manures of different kinds, and the mud or depoſition procured from ſtagnant waters, may be ſpread to the greateſt advantage; and in caſe the loam be too friable or light, a quantity of clayey loam may be carried on the land, ſufficient to impart a proper degree of coheſion or tenacity.

In the county of Oxford they find lime uſeful on the yellow loams which are wet and ſtand in need of draining. They are rarely ſoils of much natural fertility; but lime makes them very productive in oats, and prepares them for future wheat crops; when employed in the quantity of from twenty to thirty quarters *per* acre. It anſwers greatly, likewiſe, on the red loamy ſand lands in the proportion of from fifteen to twenty-five quarters on the acre.

In Suſſex, wherever the land or ſoil tends to a reddiſh loam, or inclines to be ſandy, they have recourſe to marle, which is of a ſoapy nature, with great ſucceſs. They employ it in the quantity of from ten to twenty waggon-loads on the acre, which is from eight hundred to ſixteen hundred buſhels; applying it in the autumnal or winter ſeaſons.

Where a ſoil deficient in calcareous matter contains much *ſoluble* vegetable manure, as is the caſe in ſome ſoils of this kind, the application of quicklime to them ſhould always, according to the writer of the work on Agricultural Chemiſtry, be avoided, as it either tends to decompoſe the ſoluble matters by uniting to their carbon and oxygen, ſo as to become mild lime, or it combines with the ſoluble matters themſelves, and forms compounds having leſs attraction for water than the pure vegetable ſubſtance. And the caſe is the ſame in regard to moſt animal manures, when in ſuch ſoils; but the operation of the lime is different in different caſes, and depends upon the nature of the animal matter. With oily matters lime forms a kind of inſoluble ſoap, and then gradually decompoſes them by ſeparating from them oxygen and carbon. It combines likewiſe with the animal acids, and probably, it is ſaid, aſſiſts their decompoſition by abſtracting carbonaceous matter from them combined with oxygen; and conſequently it muſt render them leſs nutritive. It tends alſo to diminiſh the nutritive powers of albumen from the ſame cauſes; and always deſtroys, to a certain extent, the efficacy of animal manures, either by combining with certain of their elements, or by giving them new arrangements. Lime ſhould, of courſe, never be applied with animal manures to ſoils, unleſs they are too rich, or for the purpoſe of preventing noxious effluvia. It is injurious when applied in mixture with any common dung to ſoils, and tends to render the extractive matter of the dung inſoluble. But lime is conſtantly efficacious in all thoſe caſes in which fermentation is uſeful to produce nutriment from vegetable ſubſtances in ſoils.

All the ſoils of this nature are capable of affording almoſt all ſorts of crops, both thoſe of the grain and root kind, as well as thoſe of the pulſe, hemp, and flax ſort, as may be ſeen under theſe different kinds of crops.

The modes of cropping in ſome diſtricts follow, in ſome meaſure, the qualities of the loams, whether they be ſtrong, fertile, impalpable, ſandy, or of any other kinds or deſcriptions. The medium fertile loams are probably, however, on the whole, the moſt ſuited to every ſort of farming purpoſe.

3. *Chalky Soils.*—All theſe are ſoils, which are found to occupy very extenſive tracts in many of the ſouthern diſtricts of the kingdom, as well as in ſome of the more northern; and, like thoſe which have been already noticed, differ very materially both from the diverſity of the calcareous material which they contain, its proportion, and the other matters that are intermixed and blended with it, as well as the thickneſs of the earthy bed on which it reſts, and the nature of the inferior ſtratum on which the whole is depoſited. It has been ſtated by an uſeful practical writer, that matter of the calcareous kind is contained in many different ſtony ſubſtances, beſides that of chalk, as marble, limeſtone, coral, and ſhells of different kinds; and in ſtates of union with other materials, ſuch as ſand, the different ſimple earthy bodies, in different proportions, and in ſome inſtances with iron and magneſia. Its capability or power of imbibing and retaining moiſture is conſiderable, though not ſo great as that of clay. It burns to lime by proper degrees of heat, and abſorbs carbonic acid gas or fixed air in different proportions from the atmoſphere, and returns again to the ſtate of chalk or effete calcareous matter. It is found of very different degrees of hardneſs and friability, as well as of different ſtates of fineneſs or pulverization, in different ſoils of the claſs to which it belongs. It varies alſo greatly in its effects in reſpect to vegetation; from the different matters that may happen to be combined with it in its primitive or original ſtate. And it is further ſtated, that it has long been known to the practical farmer, that ſome ſorts of lime or calcareous matter may be employed in large proportions; while others cannot be uſed, except in very ſmall quantities, without doing very conſiderable injury to the ſoil with which they are incorporated. But that the long unexplored cauſe of this diverſity of effect in different limes, or calcareous matters, ſeems lately to have been placed in a more clear and ſatisfactory point of view, by the experimental attempts of an ingenious philoſopher, Mr. Tennant, who has found by repeated experiments, that that ſort of lime which is the moſt friendly to vegetation, conſiſts entirely of calcareous earth, and quickly abſorbs a large portion of carbonic acid gas or fixed air from the atmoſphere; while that which is injurious and unfriendly to the growth of plants, contains only three parts of pure calcareous earth, the other two conſiſting of magneſia; and that it abſorbs comparatively but an extremely ſmall portion of carbonic acid gas or fixed air from the ſurrounding atmoſphere. It was alſo found, that this kind of mixture of calcareous matter was very ſlow in acquiring the power of ſupporting vegetation, even after it had been converted into lime, and remained for a conſiderable length of time in the ſtate of mortar. And that the limeſtone in which there is a mixture of magneſia, is much harder, and diſſolves conſiderably more ſlowly in acids, than that which is purely calcareous. It is likewiſe ſuppoſed, that the cryſtallized ſtructure commonly obſerved in the magneſian limeſtone indicates, that it has not been formed by the accidental conjunction of the two earths, but conſtituted by their chemical union. The difficulty with which it is diſſolved by

means of acids, may alſo, it is conceived, in ſome meaſure, depend on the attraction of its different component particles to each other. It is a ſort of limeſtone, which is found to extend itſelf over very large diſtricts in the midland parts of the iſland, as well as in the more northern counties, as is obvious from the practical diſtinctions of *mild* and *hot* limes, which are in common uſe, as noticed by doctor Fenwick, in his excellent Eſſay on Calcareous Manures.

It has indeed been ſuggeſted, that theſe intereſting facts not only ſhew, that whatever ſameneſs there may be in the nature of calcareous matter, when in its pure and unadulterated ſtate, but that, as met with in ſoils, and different ſubſtances of the calcareous kinds, it has conſiderable diverſity, and when in union with magneſia, it is in a high degree prejudicial to the growth of vegetables. Later trials have, however, rendered this laſt ſuppoſition ſomewhat doubtful; therefore, until further experiments have more completely cleared up the matter, the farmer ſhould proceed with caution in the uſe of ſuch materials. But though magneſian lime or earth in its cauſtic ſtate may be injurious to vegetation, ſuch lime, in ordinary circumſtances, is not unfrequently made uſe of in moderate quantities upon ſoils of the fertile kind, in the counties of Leiceſter, Derby, and York, with good effect, and is capable of being employed in larger portions on ſoils containing more full ſupplies of vegetable matter. Magneſia, when combined with carbonic acid gas, ſeems not, it is ſaid, to be hurtful to the growth of plants, and in ſoils rich in manure, it is ſoon ſupplied with this principle, from the decompoſition of that ſubſtance.

In explanation of the above, ſir H. Davy has ſtated, that magneſia has a much weaker attraction for carbonic acid than lime, and will remain in the ſtate of cauſtic or calcined magneſia for many months, though expoſed to the air; and that as long as any cauſtic lime remains, the magneſia cannot be combined with carbonic acid, for lime inſtantly attracts carbonic acid from it. When a magneſian limeſtone is burnt, the magneſia is deprived of carbonic acid much ſooner than the lime; and if there be not much vegetable or animal matter in the ſoil to ſupply by its decompoſition carbonic acid, the magneſia will remain for a long while in the cauſtic ſtate; and in ſuch, acts as a poiſon to certain vegetables. And that more magneſian lime may be uſed upon rich ſoils, than thoſe of other kinds, ſeems to be owing to the circumſtance, that the decompoſition of the manure in them ſupplies carbonic acid. And magneſia, when mild or fully combined with carbonic acid, ſeems to be conſtantly an uſeful conſtituent part of ſoils. Carbonate of magneſia, produced by boiling the ſolution of magneſia in ſupercarbonate of potaſſa, has been thrown over graſs, and upon growing wheat and barley, ſo as to render the ſurface white, without injuring the vegetation in the ſmalleſt degree, by the ſame experimenter. Some moſt fertile diſtricts are alſo ſaid to contain mild magneſian earth, as the Lizard, in Cornwall.

This explanation has been ſomewhat confirmed by mixing and uſing four portions of the ſame ſort of ſoil in this manner: with one-twentieth of its weight of cauſtic magneſia, with another the ſame quantity of magneſia and a proportion of fat decompoſing peat, one-fourth of the weight of the ſoil; one portion was left in its natural ſtate, and one mixed with peat without magneſia. They were made towards the end of the year, and ſown in the early ſpring the next, all of them with barley; which grew very well, it is ſaid, in the pure ſoil; but better in the ſoil containing the peat and magneſia; and nearly as well in the ſoil with the peat alone; but in the ſoil mixed with magneſia alone, it roſe very feebly, and looked yellow and ſickly. The repetition of this trial was attended with ſimilar reſults; and it was found, that the magneſia in the ſoil mixed with peat became ſtrongly effervescent, while the portion in the unmixed ſoil gave carbonic acid in much ſmaller quantities. In the one caſe, it is ſuppoſed, the magneſia had aſſiſted in the formation of manure, and had become mild; in the other caſe it had acted as a poiſon on the plants.

It has alſo been found, that matter of the calcareous kind, whether effete or in the ſtate of carbonate, or in the more active one of cauſticity, as quicklime, ſeems ultimately to promote the reſolution and deſtruction of all vegetable and animal ſubſtances; but that in the latter ſtate, it acts with much greater violence on theſe materials, deſtroying their organization, and diſſipating their principles more quickly, as well as robbing them more completely of the carbonic acid gas or fixed air, which is ſo eſſential; while in the former it operates with great mildneſs, and only aids the reſolution of thoſe ſubſtances, by gently promoting the proceſs of putrefaction or decay.

It muſt be obvious, that in them the proportions of clayey, loamy, and gravelly ingredients, in combination with the calcareous matters of theſe ſoils, are materially different in different diſtricts: where the clayey and loamy are comparatively in large quantities, the heavier kinds of chalky ſoils are met with; but where the ſandy or gravelly are prevalent, the lighter ones. Material differences alſo ariſe from the earthy matter with which the calcareous ſubſtance is blended in the ſtate of ſoil, as where the quantity of this is ſmall, and not reduced into any perfect ſtate of mould, the ſoil is poor and thin; but where the thickneſs of this ſuperficial bed or layer is conſiderable, and the animal, vegetable, or other ſubſtances of which it is conſtituted, have proceeded to a more complete ſtage of decompoſition, the ſoils are more rich and heavy. Where the ſtate of the ſub-ſoil is of a compact nature, and much blended with ſiliceous or flinty matter, or has a mortary hardneſs, it is leſs favourable than where it is of a more open, brittle, or mellow powdery nature. From the calcareous material being abundant in theſe caſes, the principal intention is the changing of their textures, and the ſupplying of vegetable matter to them.

And it is found, that in the thinner or lighter calcareous ſoils, clay, or clayey marle, and the vegetable recrements depoſited and obtained in wet or ſwampy ſituations, may be beneficially applied. In thoſe of a contrary or heavier nature, the ſpreading of ſandy or clayey loams, as circumſtances may require, on them, will be attended with advantage, as altering their texture; and to theſe may be added compoſts of various vegetable and animal ſubſtances, farm-yard manure and aſhes; beſides which great attention is requiſite in breaking up theſe ſoils at the proper ſeaſon, as, if this operation be deferred till a dry ſeaſon, they become ſo bound or hard, that it will be impoſſible to work them, until they are ſoftened by rain, without very great expence both of teams and of labour in other ways. Near London, the uſe of ſoot and malt-duſt has alſo been found highly beneficial in many caſes of theſe kinds of ſoils.

Soils of this nature work, and are capable of being improved very differently, according as they are more or leſs heavy. The light and mouldering chalky lands readily admit of theſe means of amelioration, while thoſe which are of a more heavy and ſolid quality, allow of them with conſiderable difficulty and trouble. Some ſorts of crops are in a great meaſure peculiar to theſe ſorts of ſoils, as thoſe of ſaintfoin, and ſome others, but they are capable of bearing moſt kinds in their different qualities and ſtates. See Stonebrash *Land*.

Soils of this kind, though they have a barren and unpromiſing appearance, are ſometimes very productive.

4. *Gravelly Soils.*—It may be noticed, that in the gravelly materials, which conſtitute ſoils of this deſcription, there is much difference in the ſize of the ſtony particles, from that of the ſmalleſt pea, to that of the egg of a pullet. But when they become of ſtill larger dimenſions, they are denominated ſtony or rocky ſoils, according as they are in detached or connected maſſes. But the gravelly beds, of whatever kind, conſiſt in general of ſiliceous or flinty, or thoſe of the calcareous or chalky kinds, while the rocky and ſtony ſubſtances are of ſeveral different qualities. Various other matters are mixed with theſe, ſo as to conſtitute ſoils of this kind, which have much diverſity in different reſpects. Theſe are principally matters of the loamy or earthy kind, ariſing from the putrefaction and decay of different animal and vegetable materials. It is alſo remarked, that the gravelly mixture is ſometimes found to approach nearly to the ſurface, while at others it recedes conſiderably from it. In Middleſex, Mr. Middleton found, that when the ſtratum was very near the top, a full crop of yellow bloſſomed broom covered the ground; if in a ſtate of graſs, and when ploughed, an equally full crop of ſorrel. This was ſeen in the old incloſures. In ſome inſtances ſprings ariſe immediately underneath; in others they are at a great depth. The bottom or ſub-ſoil is likewiſe various; in ſome caſes it is ſtony and rocky, in others it is clayey, or a rocky gravel, and ſometimes ſand, &c. And it is added, that the open porous nature of gravelly ſoils diſpoſes them to admit moiſture very readily, as well as to part with it with equal facility; from the latter of which circumſtances they are ſubject to burn, as it is termed, in dry ſeaſons, which is not the caſe in the heavier or more retentive ſort of ſoils.

It is evident that the differences of theſe ſoils muſt be remedied according to their nature, by the uſe of different ſorts of matters of the marle kind. In caſes where the gravel is of the calcareous kind, clay, or clayey loam, may be properly employed; and a mixture of the carbonate of lime, or lime in its effete ſtate, and clay, may be found beneficial; alſo chalk, as being of the ſame nature, may be made uſe of in the ſame way. For theſe kinds of gravel, which, from their contiguity to ſprings, are apt to lie wet in the winter, there is no manure more properly adapted than chalk; which, although it does not abound with vegetable matters in any large proportion, like yard-dung, and ſome other dreſſings, is, however, an excellent preparation for them, and will, in ſome meaſure, ſupply the place of ſuch ſubſtances. It is found, from its abſorbent nature, to have a good effect, not only in counteracting the ſuperabundant moiſture of ſuch ſoils, but in leſſening their heat; by which means the diſpoſition to burn in the ſummer, ſo inimical to the growth of various crops, and to which all gravels are in ſome degree liable, is prevented: and in this laſt view, chalk, though particularly adapted to thoſe of the wet and ſpringy kind, may be applied with ſucceſs on gravels of almoſt every denomination, with the proſpect of advantage. Where there exiſts any deficiency in the vegetable and animal earthy materials, it may be properly ſupplied by dung of the farm-yard kind in its more reduced ſtate, and various other animal excrementitious matters, which may probably be employed with the greateſt benefit in the form of compoſts, with good loamy mould, aſhes, the mucilaginous and clayey depoſitions of rivers and ponds, and other ſubſtances of a ſimilar kind. Several of theſe materials, and ſome others of the animal claſs, are, however, often uſed ſeparately to the ſurface of ſoils of this ſort, with the moſt evident advantage.

Alſo much benefit may be derived to ſuch lands by a proper alteration of green vegetables, and other crops that are uſually grown upon them; as by ſuch means the moiſture is more preſerved, and the ſoils more guarded againſt injury. In the Agricultural Survey of Hertfordſhire, Mr. Young ſpeaks of a poor ſort of gravelly ſoil, the characteriſtics of which are wetneſs, or ſpewineſs, as the farmer terms it, from many ſprings; moſt of which are ſulphury, and extremely unfriendly to vegetation, abounding more or leſs with ſmooth blue pebbles, which, at various depths, are conglomerated by ſulphury clay into plum-pudding ſtones; in ſome places ſo near the ſurface as to impede the plough, if ſet but for an inch or two at a greater depth than the old ſcratchings of bad ploughmen: it is ſtiff, without a matrix for the roots of plants; and ſharp and burning even in the immediate vicinity of ſprings: it has much ſticky clay in the compoſition, but of a moſt ſterile nature. He hollow-drained many acres; but as he was obliged to employ the pick-axe, the expence was too great; and he found that the ploughing it into high ridges was conſiderably the beſt way of draining it. When it has been drained, manures have then a great effect for a time; but ſuch was the voracity of the ſoil, that the benefit of manuring was ſoon loſt, even when it had been laid down for paſture ſome years, as a preparation for corn; the beſt improvement that can, he ſuppoſes, be made on it, when cultivated for ſuch a purpoſe. But it is ſuggeſted by Mr. Walker, that this ſoil is beſt adapted to wood; for he was ſurpriſed to ſee the hedges thriving with great luxuriance on land not worth cultivation.

Lime, in mixture with good mould, has been found uſeful in Oxfordſhire, on hot gravelly land. It does very well alone, but not equal to where it is employed in combination with ſome ſort of earthy material. In the lighter kinds of gravels, the clayey marles are alſo frequently of very great utility; and in thoſe of the heavier deſcription, the calcareous ſort may often be employed with equal benefit. When well mixed up, and blended with different earthy materials, they may both be laid upon gravelly ſoils with the beſt effects, in many caſes.

By theſe different means of improving the textures and qualities of theſe kinds of ſoils, they have been ſo much altered and amended in the nature and arrangement of their parts, as to be capable of affording good crops of many different ſorts, as well as of enduring the ſummer heats, without being ſubject to become too dry or burnt up by them.

5. *Sandy Soils.*—It is ſtated that theſe are a deſcription of ſoils, which ſeem to have been formed gradually by the reduction of different ſorts of hard bodies in nature, particularly thoſe of the calcareous, ſiliceous, and ſtony ſorts, the particles being brought into different ſtates of fineneſs, being in ſome caſes extremely minute. They vary equally in their colours in different inſtances, being ſometimes perfectly white, browniſh, yellow, and red. The differences in the quantities in which other ſorts of matter enter into their compoſitions, afford conſiderable variety in their weights, tenacity, and different other properties. In ſome diſtricts, ſoils of this ſort exiſt of different kinds, from the lighteſt ſpecies of loam to the naked ſand compoſed entirely of ſmall flints, and in all of them there is a mixture of earth; according to the proportion of which, they are more or leſs favourable to vegetation.

And it has been remarked by the late Mr. Somerville, that, in Eaſt Lothian, the whole of the ſandy ſoil is evidently ſuperinduced, or placed upon the land; the bottom upon which it is laid being uniformly of the ſame quality with the circumjacent grounds. The origin of this ſand, which is accumulated upon ſeveral parts of the coaſt, is owing, it is ſuppoſed, to two cauſes: the firſt, and that which no doubt has produced the greateſt part of it, has been the waſhing away of many points of land by the ſea, by which the coaſt, formerly very much indented, is now rendered pretty uniform, and brought nearer to a regular figure: the ſecond cauſe of its formation has ariſen from the waſting of the ſoil in the interior, during heavy falls of rain, by which great quantities have been brought from the higher grounds, and either depoſited in places where the current has been leſs rapid, or carried along with the ſtream to the ſea. The laſt, however, is a rare occurrence, unleſs in ſituations where the land declines very rapidly towards the ſhore. In that county, however, it is evident that the whole of the land upon the coaſt has ariſen from the waſting and waſhing away of different points of land, while that in the interior has been produced by the waſhing of the rivers. It is remarked by a writer mentioned above, that in caſes where the proportions of clayey, loamy, or other earthy ſubſtances with which they are mixed, approach nearly to that of the ſand, the heavier ſorts of ſandy ſoils are formed; but that where theſe enter only in very ſmall quantities, the light ſandy ſoils are formed; and where they are hardly met with at all, the ſoil is a looſe blowing ſand, moſt commonly of a white or browniſh appearance. And it is added, that the portions of vegetable matters, that are intermixed with different ſoils of the ſandy kind, are not leſs various than thoſe of the clayey and loamy, from which conſiderable differences of quality are produced. Theſe differences in their textures and compoſitions alſo introduce others, which reſpect their powers of admitting and retaining heat and moiſture. The openneſs and want of adherence in ſuch ſoils, while they allow of the admiſſion of heat and water more readily, permit them to be carried off with greater eaſe and expedition: they are, therefore, leſs permanently benefited by their influence than many of the cloſer and more adheſive ſoils.

But as theſe ſorts of ſoils are chiefly deficient in the calcareous, clayey, loamy, and vegetable materials, the aim of the farmer muſt be the augmentation of their coheſive property, and the ſupplying the calcareous and decayed animal and vegetable materials. They cannot, of courſe, be cultivated with advantage, without the aid of other foſſile manures to counteract their poverty, and prevent the continual evaporation of moiſture. For this purpoſe, clay and loam may be beneficially ſpread on ſandy ſoils, which may likewiſe be improved by the uſe of compoſts of animal and vegetable manure: though, where theſe cannot be obtained, good mould or earth may be employed with advantage, as alſo may peaty earth, either alone, or in combination with other matters. It has been obſerved by Dr. Fordyce, that a leſs quantity of clay is required in the improvement of light ſandy ſoils, than of ſand in the clayey ones; but whether this be a practical rule or not, the thinner and poorer ſorts of ſandy ſoils moſtly ſtand in need of a large quantity of clayey matter. And when the calcareous property prevails, clayey marles and clayey loams are moſt proper; but in caſes of its being deficient, calcareous marle and loams may be uſed with more advantage. This has been ſufficiently proved by their application in different diſtricts. A degree of tenacity or firmneſs may alſo be imparted to ſandy ſoils, by the treading of ſheep, folded upon them; while they receive much benefit from the dung and urine depoſited by thoſe animals.

And it may be noticed, that theſe different materials are proper for being laid on either alone, or in the ſtate of compoſts; but marles and clayey ſubſtances are moſtly applied in the ſtates in which they are found in nature; but the farm-yard dung, and peaty ſubſtances, in mixture with other matters.

Further, it has alſo been ſtated by the author of "Practical Agriculture," that the light, open, and porous texture of ſandy ſoils renders them much more eaſily cultivated, and kept in order, than thoſe of the ſtrong and cloſe kinds; and, conſequently, the farms where they prevail are generally large: but that, when properly prepared, they are better adapted for the growth of many ſorts of crops, ſuch as thoſe of the bulbous and tap-rooted ſorts. And they have alſo another advantage, which is that of puſhing forward the crops with more expedition. Whatever inconveniencies attend them are moſtly ſuch as proceed from the want of a ſufficient degree of coheſion among their conſtituent particles, and ſolidity of texture. On theſe accounts, they often counteract the beſt and moſt judicious management. The roots of the crops are liable to become naked and expoſed, from ſtorms and various other cauſes; and if grain, to fall down and be lodged ſo early in the ſeaſon as to render them of little value.

It has likewiſe been remarked by the writer of the Eaſt Lothian Agricultural Report, that there, within theſe few years, conſiderable tracts of this kind of ſoil, formerly of little value, have been brought under the plough, and made to produce excellent crops of turnips, clover, barley, rye, &c. as may be ſeen in different parts of the Survey; but the moſt valuable improvement upon this deſcription of ſoil has been made by laying it into graſs, and treating it with top-dreſſings of different kinds of ſoils, which, when liberally applied, have, in not a few inſtances, changed the appearance, and ſo much altered its nature, as to render it capable of bearing a ſucceſſion of valuable crops of grain.

Some think lime the beſt of all dreſſings for ſandy lands. This is the caſe, in particular inſtances, in the county of Oxford. On the fine red ſandy ſoils there, ſome lay from ten to twenty quarters on the acre; the former quantity very common in mixture with earth and ſome dung. The benefit thus produced is generally great, laſting many years.

Beſides theſe, vaſt improvements have been made in a variety of other caſes on theſe ſoils, by the uſe of the above methods. Their textures, compoſitions, and properties, have been ſo amended and improved, as to make them capable of producing crops of moſt ſorts with advantage.

6. *Peaty or Moſſy Soils.*—Theſe kinds of ſoils are more common in the northern diſtricts and in Ireland, than in the ſouthern parts of the kingdom, though in theſe latter they occur in a ſmall extent. And they, like other ſorts of ſoils, vary from the nature and proportions of the ingredients of which they are compoſed. It has been obſerved, that where the vegetable or peaty material predominates but little over the other ſubſtances with which it is mixed and incorporated, the lighter ſorts of peaty or moſſy ſoils are formed; but where the other matters bear only a ſlight proportion to it, the deep and heavy peaty or moſſy ſoils preſent themſelves. In different diſtricts the peaty matter is found of different depths, and of various degrees of denſity or cloſeneſs of texture, probably proceeding from ſome original differences in the vegetable ſubſtances from which it was formed, or the greater advances which it has made to the ſtate of perfect decompoſition. The ſub-ſoil

in moſt of the deep moſſy diſtricts is of the clayey kind, more or leſs ſtiff and heavy, over which the peaty or moſſy material is depoſited generally in a ſort of ſtratified order; the firſt layer of which, being commonly not more than ten or twelve inches in thickneſs, exhibits the appearance of a richiſh brown earth, ariſing, in all probability, from the incorporation of the loamy or clayey matters with the peat or vegetable earth lying immediately upon them, and conſtituting originally, perhaps, the ſurface of the ground. The layer that ſucceeds to this is moſtly of a dark colour, and of conſiderable thickneſs, apparently formed of a great variety of vegetable and other materials in the more perfect ſtages of reſolution or decay, united together by time and other circumſtances, with more or leſs degrees of compactneſs and ſolidity. The uppermoſt ſtratum, or that which is placed upon this denſe peaty matter, is, in general, of a very pale colour, and very light ſpongy texture, ariſing poſſibly from the graſſes, leaves, and other vegetable ſubſtances of which it is formed, not having attained that ſtate of decay which conſtitutes the darker ſorts of peaty earth. However, in the more ſuperficial peaty ſoils, little or nothing of this ſtratified appearance is met with. A coat of peaty earth, differing greatly in thickneſs, according to the peculiarity of the ſituations, and other circumſtances, is formed by a great length of time from the deſtruction and decay of ſucceſſive crops of graſſes, leaves, and other ſubſtances of different kinds, and depoſited upon, and intermixed with, the various harder materials of the ſoils which happened to be underneath them. It is obſerved, that by theſe means much variety is produced in the ſoils. Where the under ſtrata of earthy matter are tolerably good, and the crops of vegetables large and luxuriant, the better ſorts of light peaty ſoils ſeem to be predominant; but where the quality of the under ſtrata is indifferent, and the vegetable products ſcanty, as well as feeble in their growth, the poorer ſorts of theſe ſoils are formed. And in many diſtricts, this, as well as the ſandy ſoil, being depoſited or ſuperinduced, the bottom being uniformly the ſame as that of the adjoining grounds, in the low flat parts, owes its origin evidently to the ſtagnation of water; in theſe places the moſs conſiſts of the roots and decayed leaves of aquatic plants, which are found in diſtinct ſtrata, and of different kinds, according to their depth. But in ſituations more elevated, and upon the tops of the higheſt hills, the moſs has been formed in ſome caſes merely by the decay of the plants, which, falling down yearly without being entirely rotted, have, in proceſs of time, accumulated and formed the moſs there met with; but in the hollows, its formation is owing to the ſame depoſition, with the addition of a great proportion of earth, waſhed from the ſides of the hills during the floods. In ſome parts of the county of Eaſt Lothian, this ſoil has made conſiderable progreſs towards decay, and nearly reſembles black rich loam; but in by far the greateſt part, the roots and leaves of the different plants concerned in its formation are in a tolerably perfect ſtate, and when freed from moiſture, preſent little elſe than a collection of theſe.

Mr. Somerville concludes, from his experiments made upon moſs in all the different ſtages of decay, that the predominant principle in the whole is an acid; and, according as the moſs is more or leſs decayed, the prevalence of this principle is more or leſs obſervable. In the experiments upon moſs not much decayed, the quantity of acid was greater, and that of the oil and the alkali leſs, than in any of the other trials; on the contrary, where it was moſt decayed, it was found to contain the leaſt acid and the greateſt proportion of oil and alkaline ſalts. A knowledge of theſe circumſtances is of conſiderable importance in agriculture, for, by obſerving the progreſs that moſs has made towards decay, a tolerable idea can be formed of the trouble and expence that will be neceſſary either to bring it into cultivation, or render it uſeful as a manure.

And it is ſuggeſted, that from the ſame experiments it would appear, that the conſtituent parts of moſs are, 1, an acid; 2, an alkali; 3, oil; 4, vegetable earth; 5, iron. The iron was met with in one inſtance only, and in that the quantity of acid was greater than in any of the other trials; the nature of the acid was alſo different, being evidently vitriolic, a thing ſeldom met with, unleſs in caſes where the moſs contains iron, which is certainly the worſt of all its principles, and the moſt difficult to correct. And it is added, that upon comparing the conſtituent parts of moſs with thoſe of the beſt ſoils, they are found nearly the ſame, with the exception of the acid, but in ſome different proportions. The alkaline principle in ſome kinds of moſs is ſcarcely equal to what is met with in good loam or clay, while the oil and vegetable earth are much greater; a great proportion of other ſoils conſiſts of ſand, gravel, earth, &c.; but the earthy part of moſs conſiſts entirely of a mould formed by the earthy part of decayed vegetables, together with the ſediment of water.

From their compoſition, theſe ſoils muſt of courſe be extremely retentive of moiſture. It has, indeed, been remarked by the earl of Dundonald, that from the rays of the ſun and drying winds being exerted during the ſummer ſeaſon in carrying off, by means of evaporation, the ſuperabundant moiſture in ſuch caſes; and heat being known to be abſtracted from bodies, and cold generated thereby, effects muſt be produced highly injurious not only to climate but to vegetation in general, and more particularly to ſuch plants as ſtand in need of a higher degree of heat, and more nouriſhment than ſuch ſoils are capable of ſupplying. And further, that there can be very little doubt but that theſe prejudicial effects on the growth of vegetables extend themſelves to the more dry lands adjoining ſuch fens or deep moſſes. It has alſo been found, that the ſurface-ſtratum of peaty ſoils, from its being more expoſed to the influence and action of the pure air of the atmoſphere, is much leſs ſoluble than the under ſtrata, conſequently in its ſimple or unmixed ſtate leſs proper for the purpoſes of agriculture. From the ſame cauſe, too, it becomes leſs capable of ſupporting flame, and is therefore improper for the purpoſes of fuel, in the way of turf or peat.

The different manners in which moſſy or peaty ſoils are formed, have been ſeen and explained, in ſome meaſure, above, and in ſpeaking of the nature and means of cultivating moſſy lands. See Mossy *Land.*

Very extenſive improvements, in ſoils of this kind, have lately been made in Lancaſhire and different counties in the northern parts of the kingdom, as well as in ſeveral diſtricts in Ireland. See Turfy *Land.*

It may be remarked, that theſe ſorts of ſoils ſtand in need of different methods of management in bringing them to the condition of producing crops. In thoſe of the deeper kinds, the firſt thing to be done is to draw off, as much as poſſible, the ſuperabundant moiſture, by the cutting of proper drains, and ſuch other means as the nature of the ſituation, and other circumſtances, will admit of. It has been noticed, that in places where water in ſufficient quantity can be conveniently made to paſs through ſuch moſſes, and where the ſoil underneath is good, much may be effected by floating away the principal part of the moſſy ſubſtance; but where the moſſes are not deep, or the ſoils under them of a good quality, after the making of proper drains, the beſt way is, probably, to ridge them in ſuch directions and modes as are the moſt effectual in promoting the exit or paſſage of the ſtagnant water which they contain. Different materials may then be applied with the intention of improving their textures, and promoting the diſſolution of the undecayed parts of the vegetable matters that are contained in them. The firſt may be accompliſhed by the application of various gravelly ſubſtances, ſand and coarſe earth; and the latter, eſpecially where there is a large growth of coarſe plants, by the uſe of lime in its cauſtic ſtate; but where ſuch plants do not ſo much abound, alkaline ſubſtances, chalk, calcareous marle, the ſhelly kinds of ſea-ſand, and the carbonate of lime, may be more advantageouſly made uſe of. And as ſhell-marle, chalky ſubſtances, rich clays, and limeſtone gravels, are frequently met with under deep peat moſſes, they ſhould be tried for by boring in various parts. Paring and burning is alſo uſeful where the quantity of vegetable matters on the ſurface is conſiderable, and of the coarſe kind; but the method of applying good earthy matter is to be preferred where it can be procured in an eaſy and cheap manner. And advantages may be gained in promoting the fertility of theſe ſoils by cropping with particular ſorts of vegetables, as ſuch as have large branching ſtems, and cover the ſurface of the ground very much, ſo as to exclude the action of the air in a great meaſure upon it.

It is probable, too, that the hot limes, as they are called by farmers, may be laid upon theſe ſoils in full proportions with very great advantage in ſome caſes; and that where lands of any kind have been hurt by the too great uſe and abundance of them, peat will prove a good means of reſtoring them.

In theſe different ways very great improvements have been made in peaty and moſſy ſoils, eſpecially where the drains have been formed ſufficiently near to each other, and to proper depths for taking away the water in an effectual manner. Great advantage has alſo been derived by laying the ſurfaces of ſuch lands over with any ſort of heavy earthy matters to the thickneſs of three or four inches, ſuch, for inſtance, as the heavy ſorts of marle, the ſcrapings of roads, the heavy mud of rivers and ponds, &c. By theſe means, where they are intended for graſs, a finer kind of herbage is brought up, and where for the purpoſes of tillage, the ſurface is well conſolidated, and rendered more ſuitable to the growth of crops of that ſort.

7. *Boggy Soils.*—Theſe are alſo ſoils that have much of the nature of the preceding, but which differ in ſome reſpects from them, being chiefly in low confined ſituations, and of leſs depth than the heavier moſſy ſoils, and of more than thoſe of the lighter deſcription of that ſort of ſoil. There are ſoils of this deſcription frequently met with in Ireland, and occaſionally in low meadows and near large ponds or lakes in this country. Theſe ſoils are gradually formed by the depoſition and decay of the different vegetables that grow in ſuch ſituations as thoſe of the luxuriant aquatic kinds; and the ſtagnation of much moiſture upon them, by which the roots alſo become deſtroyed and reduced to the ſtate of earth. They have of courſe different appearances or colours, according to the ſtate of putrefaction and decay to which the different parts have advanced, and the nature of the other earthy materials with which they are blended; in ſome caſes being of a lightiſh brown aſpect, as where the fibrous and ligneous matters have only undergone a ſlight change; but where this has been carried to a conſiderable extent, they are of a dark colour, approaching to black, or of a deep duſky hue. See PEATY and MOSSY *Land.*

As the great defects in ſoils of this nature are chiefly thoſe of their being too much charged with moiſture, and of too open and porous a texture, the means of bringing them into a proper condition are obvious. In deep boggy ſoils, the buſineſs of draining ſhould firſt, when practicable, be reſorted to, in order to draw off the exceſſive moiſture. After which, various hard dry earths will be found of great uſe in improving bogs, ſuch as gravel, chalk, ſtony matters, ſand, ſhell-marle, &c. as theſe ſubſtances contribute to bind, ameliorate, and warm the ſoil, while they prevent ſprings from oozing out and overflowing the ſurface. Where they are over-run with ruſhes and ſimilar coarſe vegetables, quicklime may be beneficially applied, and paring and burning may be employed, ſometimes with advantage. And another uſeful mode of reclaiming ſuch ſoils is, by planting on them thoſe vegetables whoſe ſpreading roots ſerve to bind the earth together, and at the ſame time, in a great meaſure, exclude the action of the atmoſphere upon it. The practice of flooding, alſo, where a command of water can be obtained, has proved a cheap and efficacious mode of reclaiming them in ſome inſtances. Some caſes, at leaſt, have occurred where ſuch ſoils have been brought into a ſtate of cultivation for *meadows*, with the happieſt ſucceſs, by it, which had failed under contrary methods of management.

In moſt of theſe caſes, the firſt means which are neceſſary, after well ditching and draining the ſoils or lands, and levelling the imperfections and inequalities on their ſurfaces, is to apply earthy matters over them. For this purpoſe, the lumpy earthy parts, or elevations on them, are to be pared off and intimately blended up with lime into compoſts, which, with other heavy materials of proper earthy kinds, are to be placed and ſpread out on the lands or ſoils in an even manner. And afterwards, when the ground or ſoil becomes firm and ſolid, with much coarſe plants and herbage riſing upon it, eating it conſtantly cloſe down with light neat cattle and ſheep, will be very beneficial, eſpecially where ſuch ſoils or grounds are deſigned for paſtures. When for tillage, there are various other means which may be had recourſe to in different circumſtances, for rendering them more firm and dry, with great ſucceſs. See SWAMPY *Land.*

The management of ſuch ſoils, in all theſe different methods, has been productive of great benefit in different inſtances, and the land, when improved, is commonly of the moſt valuable kind. See BOG, and SPRING-*Draining.*

8. *Heathy or Moory Soils.*—Theſe form a claſs of ſoils that occupy very extenſive tracts in different diſtricts of the kingdom, and which have conſiderable relation to thoſe of the peaty ſort, though they differ in many particulars. In the ſouthern part of the country they are moſtly known under the titles of *heathy* or *moory* ſoils, but in Scotland they have the name of *muir* ſoils.

It is remarked by Mr. Somerville, in the agricultural Survey juſt noticed, that theſe ſoils, like thoſe of the moſſy kinds, owe their origin evidently to the ſame cauſe, namely, the decay of the plants that formerly occupied the ſurface. This muir ſoil is of two kinds, one of which is black, ſoft, and porous, and admits moiſture in a greater degree than any other ſoil; it is at the ſame time covered with ſtones of a white colour; evidently whinſtone bleached with an acid: the parts, when examined, exhibit the appearance commonly met in turning over the aſhes formed by the burning of vegetables, where the ſkeletons of the plants and roots are ſeen naked, ſapleſs, and deſtitute of any of the uſeful properties they once contained. It is difficult to form an opinion of the cauſe of theſe appearances, or to conceive how lands that had once been covered with plants ſo ſtrong and numerous as to form a thick ſod, ſhould become ſo barren as to be totally unfit for vegetation, as the greateſt parts of theſe muirs are. Were a judgment to be formed from appearances, fire might be ſuppoſed to have been the cauſe; but as the conſumption of vegetables by that element, however great the waſte may be of a part of their uſeful principles, is always productive of more or leſs fertility, the appearances above-mentioned muſt be owing to cauſes of which no correct opinion ſeems to be at preſent entertained. This deſcription of muir is the moſt barren, and its improvement the moſt hopeleſs, of any ſoil known there, and no attempts hitherto made have either rewarded the enterprize of the undertakers, or held out inducements to others to follow their example. But there is another ſpecies of muir ſoil, which conſiſts, like that already deſcribed, of a ſtratum of vegetable ſubſtances upon the top, not of a black or burnt appearance, but reſembling the plants in a dry ſtate intermixed with earth, without having been acted upon by any thing but the weather. Theſe, when examined, are found to contain a conſiderable proportion of the properties common to all vegetables, and when properly treated, are capable of being converted into a ſoil friendly to vegetation. The ſtones upon this kind of muir are of the ſame colour with thoſe met with upon the beſt ſoils. There are conſiderable tracts of this ſoil, which, by good management, might be conſiderably improved: indeed a great part has been much ameliorated of late years, in many diſtricts, and is in a progreſſive ſtate of improvement.

And in the analyſis of the ſame writer of the turf of theſe ſoils in the diſtrict noticed above, he diſcovered nearly the ſame principles as are found in thoſe of the moſſy kind.

No gypſum was obtained from this turf, nor did the trial by the magnet diſcover any iron. Many other trials were made with different kinds of turf, taken principally from muiriſh ſoils, the reſult of which ſeems to eſtabliſh the conſtituent parts of the turf to be, 1, an acid; 2, an alkali; 3, oil; and 4, vegetable earth, in a conſiderable quantity. In caſes where the turf is pared very thin, it is found to contain leſs acid and more alkaline ſalts and vegetable earth than where it is deep cut, and much of the ſoil taken along with it.

In the improvement of theſe kinds of ſoils different methods muſt be purſued, according as they poſſeſs more or leſs of the vegetable principle, and as they are of the deeper or thinner kinds. Where there is much heath, the great object will however be that of deſtroying it as quickly as poſſible, in which view paring and burning may be had recourſe to with vaſt advantage and ſucceſs. The application of cauſtic lime has likewiſe been found highly beneficial in the ſame intention.

The uſe of different ſubſtances of the animal and vegetable kinds, as dung and the mud of ponds, in the form of earthy compoſts, may likewiſe be found advantageous on ſoils of this nature, with judicious modes of cropping with plants of the grain and green kind; the latter being fed off as much as poſſible upon the land by ſheep.

Some think the beſt means of improving all ſorts of ſoil of this nature, is, after the heath has been, in ſome meaſure, removed, where it is long, by the application of lime or marle over the ſurface, allowing it to continue in that ſtate for the ſpace of two or three years, when theſe ſoils are to be broken up and ſown with proper ſorts of crops in alternation with turnips and potatoes, the ground being laid down again to graſs when it has been brought into proper condition for it. The turnips, where it is practicable, ſhould always be eaten off upon the ground. Where the heath is of the long ſtrong kind, it may be deſtroyed either by burning, pulling it up by the roots, or by ſuffering the graſs to riſe and choak it up. See WASTE-*Land*.

All theſe and ſome other modes may be practiſed in improving heathy ſoils with much ſucceſs in different caſes.

It therefore appears, from the whole of what has been ſaid upon ſoils, that great care and attention are always requiſite in improving the nature and qualities of them, and that the farmer ſhould conſtantly be properly on his guard in undertaking ſuch ſorts of work.

SOIL, in *Gardening*, the fine ſurface-mould or earthy materials, in which plants and trees grow and afford their produce. Different ſorts or qualities of ſoils are neceſſary, in this point of view, for different uſes and applications; but for the more general purpoſes of culinary gardening, thoſe of the more light and dry loamy kinds, which are readily broken down and reduced in their particles, are probably the moſt extenſively uſeful and beneficial, particularly when they have been well impregnated and enriched with proper ſorts of manure, or other ſimilar matters. See COMPOST and MANURE.

Some, however, think that the beſt general ſoil in this intention, is that middling kind of loam, which, in ſome parts, is capable of being made of very different degrees of lightneſs and friability, ſo as to ſuit and be proper for different ſorts of vegetable crops, by the ſimple addition of ſand or ſandy matters, in due proportions; and in other parts, of different degrees of ſtiffneſs, tenacity, and coheſion, by the ſuitable addition of clays or clayey materials, in the neceſſary quantities. There are others who prefer ſoils of very different natures and qualities, or which are very differently conſtituted, for the uſe of raiſing the many different ſorts of garden vegetables, and think it incapable of being accompliſhed in the beſt and moſt perfect manner, where this is not the caſe. It is therefore probable, that conſiderably more latitude in reſpect to the nature of ſoils is neceſſary in the garden cultivation of plants, than in that of the field.

In general, the depth of a garden-ſoil, where the bottom or ſub-ſoil is perfectly open and dry, ſhould be conſiderable, as not leſs than three feet, or more, in any caſe where ſuch a depth is to be procured; but where there is a bottom or ſub-ſoil of rather moiſt clay, or any other impervious material of that nature, a leſs depth may ſometimes be more ſuitable and proper, and particularly where ſuch bottom or ſub-ſoil has been well drained and freed from too much wetneſs: however, in all or moſt inſtances where this is incapable of being properly effected, or the trouble and expence of getting and providing a ſtratum or layer of gravel, or other ſimilar ſubſtance, to be placed over it, are too great to be incurred, the depth of the ſoil ſhould not by any means be leſs than four feet, as when it is of leſs thickneſs, there may be danger of the roots of herbaceous vegetables, and of fruit and other trees, reaching and ſtriking into it, and being thereby greatly injured or deſtroyed. And for ſome purpoſes, as thoſe of growing particular kinds of fruit-trees, ſuch a ſoil would be quite ruinous and wholly improper, unleſs ſome ſort of impediment was given to the roots ſtriking downwards, by forming a kind of pavement with ſtones, bricks, or tiles, about two and a half or three feet under the ſurface of the ground, juſt above the clayey bed. The depth of good garden ſoils ſhould, of courſe, in common, be from two to three feet, and in particular caſes four feet or more. The nature of the particular ſoils, and the ſub-ſoils or bottoms on which they reſt, muſt, however, in a great meaſure, regulate their depths.

In caſes where the natural ſoils of gardens are to be removed, and thoſe of new and better kinds formed and provided, much regard is neceſſary to be had, in the introduction of the different kinds of earthy materials of which they are to be compoſed. The ſoils of all the different parts are modes as are the moſt effectual in promoting the exit or paſſage of the ſtagnant water which they contain. Different materials may then be applied with the intention of improving their textures, and promoting the diſſolution of the undecayed parts of the vegetable matters that are contained in them. The firſt may be accompliſhed by the application of various gravelly ſubſtances, ſand and coarſe earth; and the latter, eſpecially where there is a large growth of coarſe plants, by the uſe of lime in its cauſtic ſtate; but where ſuch plants do not ſo much abound, alkaline ſubſtances, chalk, calcareous marle, the ſhelly kinds of ſea-ſand, and the carbonate of lime, may be more advantageouſly made uſe of. And as ſhell-marle, chalky ſubſtances, rich clays, and limeſtone gravels, are frequently met with under deep peat moſſes, they ſhould be tried for by boring in various parts. Paring and burning is alſo uſeful where the quantity of vegetable matters on the ſurface is conſiderable, and of the coarſe kind; but the method of applying good earthy matter is to be preferred where it can be procured in an eaſy and cheap manner. And advantages may be gained in promoting the fertility of theſe ſoils by cropping with particular ſorts of vegetables, as ſuch as have large branching ſtems, and cover the ſurface of the ground very much, ſo as to exclude the action of the air in a great meaſure upon it.

It is probable, too, that the hot limes, as they are called by farmers, may be laid upon theſe ſoils in full proportions with very great advantage in ſome caſes; and that where lands of any kind have been hurt by the too great uſe and abundance of them, peat will prove a good means of reſtoring them.

In theſe different ways very great improvements have been made in peaty and moſſy ſoils, eſpecially where the drains have been formed ſufficiently near to each other, and to proper depths for taking away the water in an effectual manner. Great advantage has alſo been derived by laying the ſurfaces of ſuch lands over with any ſort of heavy earthy matters to the thickneſs of three or four inches, ſuch, for inſtance, as the heavy ſorts of marle, the ſcrapings of roads, the heavy mud of rivers and ponds, &c. By theſe means, where they are intended for graſs, a finer kind of herbage is brought up, and where for the purpoſes of tillage, the ſurface is well conſolidated, and rendered more ſuitable to the growth of crops of that ſort.

7. *Boggy Soils.*—Theſe are alſo ſoils that have much of the nature of the preceding, but which differ in ſome reſpects from them, being chiefly in low confined ſituations, and of leſs depth than the heavier moſſy ſoils, and of more than thoſe of the lighter deſcription of that ſort of ſoil. There are ſoils of this deſcription frequently met with in Ireland, and occaſionally in low meadows and near large ponds or lakes in this country. Theſe ſoils are gradually formed by the depoſition and decay of the different vegetables that grow in ſuch ſituations as thoſe of the luxuriant aquatic kinds; and the ſtagnation of much moiſture upon them, by which the roots alſo become deſtroyed and reduced to the ſtate of earth. They have of courſe different appearances or colours, according to the ſtate of putrefaction and decay to which the different parts have advanced, and the nature of the other earthy materials with which they are blended; in ſome caſes being of a lightiſh brown aſpect, as where the fibrous and ligneous matters have only undergone a ſlight change; but where this has been carried to a conſiderable extent, they are of a dark colour, approaching to black, or of a deep duſky hue. See Peaty and Mossy *Land.*

As the great defects in ſoils of this nature are chiefly thoſe of their being too much charged with moiſture, and of too open and porous a texture, the means of bringing them into a proper condition are obvious. In deep boggy ſoils, the buſineſs of draining ſhould firſt, when practicable, be reſorted to, in order to draw off the exceſſive moiſture. After which, various hard dry earths will be found of great uſe in improving bogs, ſuch as gravel, chalk, ſtony matters, ſand, ſhell-marle, &c. as theſe ſubſtances contribute to bind, ameliorate, and warm the ſoil, while they prevent ſprings from oozing out and overflowing the ſurface. Where they are over-run with ruſhes and ſimilar coarſe vegetables, quick-lime may be beneficially applied, and paring and burning may be employed, ſometimes with advantage. And another uſeful mode of reclaiming ſuch ſoils is, by planting on them thoſe vegetables whoſe ſpreading roots ſerve to bind the earth together, and at the ſame time, in a great meaſure, exclude the action of the atmoſphere upon it. The practice of flooding, alſo, where a command of water can be obtained, has proved a cheap and efficacious mode of reclaiming them in ſome inſtances. Some caſes, at leaſt, have occurred where ſuch ſoils have been brought into a ſtate of cultivation for *meadows*, with the happieſt ſucceſs, by it, which had failed under contrary methods of management.

In moſt of theſe caſes, the firſt means which are neceſſary, after well ditching and draining the ſoils or lands, and levelling the imperfections and inequalities on their ſurfaces, is to apply earthy matters over them. For this purpoſe, the lumpy earthy parts, or elevations on them, are to be pared off and intimately blended up with lime into compoſts, which, with other heavy materials of proper earthy kinds, are to be placed and ſpread out on the lands or ſoils in an even manner. And afterwards, when the ground or ſoil becomes firm and ſolid, with much coarſe plants and herbage riſing upon it, eating it conſtantly cloſe down with light neat cattle and ſheep, will be very beneficial, eſpecially where ſuch ſoils or grounds are deſigned for paſtures. When for tillage, there are various other means which may be had recourſe to in different circumſtances, for rendering them more firm and dry, with great ſucceſs. See Swampy *Land.*

The management of ſuch ſoils, in all theſe different methods, has been productive of great benefit in different inſtances, and the land, when improved, is commonly of the moſt valuable kind. See Bog, and Spring-*Draining.*

8. *Heathy or Moory Soils.*—Theſe form a claſs of ſoils that occupy very extenſive tracts in different diſtricts of the kingdom, and which have conſiderable relation to thoſe of the peaty ſort, though they differ in many particulars. In the ſouthern part of the country they are moſtly known under the titles of *heathy* or *moory* ſoils, but in Scotland they have the name of *muir* ſoils.

It is remarked by Mr. Somerville, in the agricultural Survey juſt noticed, that theſe ſoils, like thoſe of the moſſy kinds, owe their origin evidently to the ſame cauſe, namely, the decay of the plants that formerly occupied the ſurface. This muir ſoil is of two kinds, one of which is black, ſoft, and porous, and admits moiſture in a greater degree than any other ſoil; it is at the ſame time covered with ſtones of a white colour; evidently whinſtone bleached with an acid: the parts, when examined, exhibit the appearance commonly met in turning over the aſhes formed by the burning of vegetables, where the ſkeletons of the plants and roots are ſeen naked, ſapleſs, and deſtitute of any of the uſeful properties they once contained. It is difficult to form an opinion of the cauſe of theſe appearances, or to conceive how lands that had once been covered with plants ſo ſtrong and numerous as to form a thick ſod, ſhould become ſo barren as to be totally unfit for vegetation, as the greateſt parts of theſe muirs are. Were a judgment to be formed from appearances, fire might be ſuppoſed to have been the cauſe; but as the conſumption of vegetables by that element, however great the waſte may be of a part of their uſeful principles, is always productive of more or leſs fertility, the appearances above-mentioned muſt be owing to cauſes of which no correct opinion ſeems to be at preſent entertained. This deſcription of muir is the moſt barren, and its improvement the moſt hopeleſs, of any ſoil known there, and no attempts hitherto made have either rewarded the enterprize of the undertakers, or held out inducements to others to follow their example. But there is another ſpecies of muir ſoil, which conſiſts, like that already deſcribed, of a ſtratum of vegetable ſubſtances upon the top, not of a black or burnt appearance, but reſembling the plants in a dry ſtate intermixed with earth, without having been acted upon by any thing but the weather. Theſe, when examined, are found to contain a conſiderable proportion of the properties common to all vegetables, and when properly treated, are capable of being converted into a ſoil friendly to vegetation. The ſtones upon this kind of muir are of the ſame colour with thoſe met with upon the beſt ſoils. There are conſiderable tracts of this ſoil, which, by good management, might be conſiderably improved: indeed a great part has been much ameliorated of late years, in many diſtricts, and is in a progreſſive ſtate of improvement.

And in the analyſis of the ſame writer of the turf of theſe ſoils in the diſtrict noticed above, he diſcovered nearly the ſame principles as are found in thoſe of the moſſy kind.

No gypſum was obtained from this turf, nor did the trial by the magnet diſcover any iron. Many other trials were made with different kinds of turf, taken principally from muiriſh ſoils, the reſult of which ſeems to eſtabliſh the conſtituent parts of the turf to be, 1, an acid; 2, an alkali; 3, oil; and 4, vegetable earth, in a conſiderable quantity. In caſes where the turf is pared very thin, it is found to contain leſs acid and more alkaline ſalts and vegetable earth than where it is deep cut, and much of the ſoil taken along with it.

In the improvement of theſe kinds of ſoils different methods muſt be purſued, according as they poſſeſs more or leſs of the vegetable principle, and as they are of the deeper or thinner kinds. Where there is much heath, the great object will however be that of deſtroying it as quickly as poſſible, in which view paring and burning may be had recourſe to with vaſt advantage and ſucceſs. The application of cauſtic lime has likewiſe been found highly beneficial in the ſame intention.

The uſe of different ſubſtances of the animal and vegetable kinds, as dung and the mud of ponds, in the form of earthy compoſts, may likewiſe be found advantageous on ſoils of this nature, with judicious modes of cropping with plants of the grain and green kind; the latter being fed off as much as poſſible upon the land by ſheep.

Some think the beſt means of improving all ſorts of ſoil of this nature, is, after the heath has been, in ſome meaſure, removed, where it is long, by the application of lime or marle over the ſurface, allowing it to continue in that ſtate for the ſpace of two or three years, when theſe ſoils are to be broken up and ſown with proper ſorts of crops in alternation with turnips and potatoes, the ground being laid down again to graſs when it has been brought into proper condition for it. The turnips, where it is practicable, ſhould always be eaten off upon the ground. Where the heath is of the long ſtrong kind, it may be deſtroyed either by burning, pulling it up by the roots, or by ſuffering the graſs to riſe and choak it up. See WASTE-*Land*.

All theſe and ſome other modes may be practiſed in improving heathy ſoils with much ſucceſs in different caſes.

It therefore appears, from the whole of what has been ſaid upon ſoils, that great care and attention are always requiſite in improving the nature and qualities of them, and that the farmer ſhould conſtantly be properly on his guard in undertaking ſuch ſorts of work.

SOIL, in *Gardening*, the fine ſurface-mould or earthy materials, in which plants and trees grow and afford their produce. Different ſorts or qualities of ſoils are neceſſary, in this point of view, for different uſes and applications; but for the more general purpoſes of culinary gardening, thoſe of the more light and dry loamy kinds, which are readily broken down and reduced in their particles, are probably the moſt extenſively uſeful and beneficial, particularly when they have been well impregnated and enriched with proper ſorts of manure, or other ſimilar matters. See COMPOST and MANURE.

Some, however, think that the beſt general ſoil in this intention, is that middling kind of loam, which, in ſome parts, is capable of being made of very different degrees of lightneſs and friability, ſo as to ſuit and be proper for different ſorts of vegetable crops, by the ſimple addition of ſand or ſandy matters, in due proportions; and in other parts, of different degrees of ſtiffneſs, tenacity, and coheſion, by the ſuitable addition of clays or clayey materials, in the neceſſary quantities. There are others who prefer ſoils of very different natures and qualities, or which are very differently conſtituted, for the uſe of raiſing the many different ſorts of garden vegetables, and think it incapable of being accompliſhed in the beſt and moſt perfect manner, where this is not the caſe. It is therefore probable, that conſiderably more latitude in reſpect to the nature of ſoils is neceſſary in the garden cultivation of plants, than in that of the field.

In general, the depth of a garden-ſoil, where the bottom or ſub-ſoil is perfectly open and dry, ſhould be conſiderable, as not leſs than three feet, or more, in any caſe where ſuch a depth is to be procured; but where there is a bottom or ſub-ſoil of rather moiſt clay, or any other impervious material of that nature, a leſs depth may ſometimes be more ſuitable and proper, and particularly where ſuch bottom or ſub-ſoil has been well drained and freed from too much wetneſs: however, in all or moſt inſtances where this is incapable of being properly effected, or the trouble and expence of getting and providing a ſtratum or layer of gravel, or other ſimilar ſubſtance, to be placed over it, are too great to be incurred, the depth of the ſoil ſhould not by any means be leſs than four feet, as when it is of leſs thickneſs, there may be danger of the roots of herbaceous vegetables, and of fruit and other trees, reaching and ſtriking into it, and being thereby greatly injured or deſtroyed. And for ſome purpoſes, as thoſe of growing particular kinds of fruit-trees, ſuch a ſoil would be quite ruinous and wholly improper, unleſs ſome ſort of impediment was given to the roots ſtriking downwards, by forming a kind of pavement with ſtones, bricks, or tiles, about two and a half or three feet under the ſurface of the ground, juſt above the clayey bed. The depth of good garden ſoils ſhould, of courſe, in common, be from two to three feet, and in particular caſes four feet or more. The nature of the particular ſoils, and the ſub-ſoils or bottoms on which they reſt, muſt, however, in a great meaſure, regulate their depths.

In caſes where the natural ſoils of gardens are to be removed, and thoſe of new and better kinds formed and provided, much regard is neceſſary to be had, in the introduction of the different kinds of earthy materials of which they are to be compoſed. The ſoils of all the different parts are to be formed and prepared with great attention to their ſeveral uſes and intentions; and where fruit-trees are to be grown, particular care ſhould be taken, that the borders for ſuch purpoſes be formed and made up to proper depths, with ſuitable materials, and upon proper kinds of ſubſtrata. By ſufficiently regarding theſe points, garden ſoils of proper qualities, and fit for every purpoſe, may moſtly be provided without much difficulty.

The work of forming and compoſing garden ſoils is by far the moſt cheaply, properly, and eaſily performed at firſt when the garden is laid out; as, when done at an after period, great injury and deſtruction are cauſed in different finiſhed parts, and in various other places, by defacing and cutting them up in the labour, and rendering their appearance diſguſting to the eye, though the buſineſs is ſtill capable of being accompliſhed without any very great difficulty or expence. In all caſes of this ſort, whatever depth of natural ſoil may be wanting to form the ſoils to the proper depths or thickneſſes, as ſuggeſted above, muſt be ſupplied, by conveying it into the garden from the neighbouring lands or other ſituations, where the proper kind is to be met with in ſufficient quantity; as it is rarely, or never adviſeable to raiſe and mix up any great quantity of the ſub-ſoil, or bottom part, whatever its nature, texture, or properties may be, with it. For, in many caſes, the ſoils of gardens are greatly injured, or nearly ruined, by the improper mixing of the ſub-ſoil with the ſurface-mould. Level ſpots are ſeldom ſo proper for gardens as others, as the ſoils of them have rarely a dry bottom, and the draining of them, when neceſſary, is a great deal more difficult, than where there is ſome degree of declivity. Where there is from a foot in twelve, to that of a foot in thirty or forty feet, it will commonly ſucceed pretty well; but when about one foot in twenty-five, it has the moſt happy effect in freeing the ſoil and ſub-ſoil from too much wetneſs.

It is remarked by the "Scotch Forcing and Kitchen Gardener," as a fortunate and deſirable circumſtance, that in many inſtances the different ſorts of ſoil are met with in the ſame acre or portion of ground, and that they ſhould never be wanting in the ſame garden, but that where they are naturally deficient, in this reſpect, in ſuch ſituations, recourſe muſt be had to artificial means, in the manner that has been already ſuggeſted, for providing and producing them; for the variety of vegetables which are to be cultivated in gardens require a variety of ſoils in them for their production. It would, however, be perfectly abſurd, it is ſuppoſed, to conceive, that for every particular ſort of vegetable there ſhould be a particular kind of ſoil formed and prepared. The varieties of ſoil which are abſolutely neceſſary in almoſt any garden, may, it is thought, be confined with propriety to the following,—ſtrong clayey loam,—light ſandy loam, a compoſition of one-fourth ſtrong, with three-fourths light loam, half ſtrong and half light, and one-fourth light and three-fourths ſtrong; the two firſt being obviouſly the grand or principal ſorts, and made to form and compoſe the whole of the others. Theſe, with the proper and ſuitable applications of manures to them, may, it is believed, be rendered capable of producing any of the known and commonly cultivated garden vegetables, in the higheſt ſtate of perfection.

This is probably, however, limiting them too much or too narrowly, as though the principal ſorts of culinary vegetables may be raiſed upon them in an eaſy and perfect manner, there are ſeveral kinds of plants grown in ſuch ſituations that require ſoils of other qualities to produce them in perfection, and ſome that cannot be grown at all without thoſe of quite a different nature.

Garden ſoils, in many caſes, may be greatly and cheaply improved by very ſimple means, as by the properly drawing away and diſcharging any over-degree of moiſture, where the bottom is wet, and the ſub-ſoil of a cankering ochrey quality; and by ſupplying and intimately incorporating with the ſoil, where it is of a very ſtiff obſtinate nature, ſubſtances of the ſmall gravel, pebbly, and ſhelly ſea-ſand, coal-aſh, lime-gravel, reduced brick-bat, brick-kiln aſh, mouldering-chalk, and different other ſimilar kinds. In caſes where the ſoil is of a poor ſandy, gravelly, or other quality of ſomewhat the ſame deſcription, the improvement is to be effected by ſupplying and intermixing clay, ſtrong clayey loam, ſcourings of ditches found on clayey ſub-ſoils, muddy depoſitions of ſimilar ſituations, ſcrapings of muddy roads, and other matters of the ſame kind with them, in ſuitable proportions and an even manner.

Where ſoils of the pure ſandy, ſea-ſandy, or peat-earthy kinds, are wanted, they are to be formed by the ſupply of theſe different ſorts of materials in the proper and neceſſary proportions to ſome part of the common ſoil of the garden, as the caſe may be, without their being blended or united with it. In all other caſes the buſineſs is to be accompliſhed in ſomewhat ſimilar ways.

It is a very common opinion among gardeners, that culinary vegetables may be raiſed and grown to the beſt advantage, and in the fulleſt perfection, on what is denominated *new*, or rather freſh lands or ſoil, and this is evidently proved to be the caſe in a great number of inſtances. The ſoil or ground, in conſequence of its being exhauſted, or *worn out*, as it is termed, is found incapable of producing certain kinds of vegetables of the above nature; not becauſe it is of a poor or hungry nature or quality, or that it is wholly unſuitable for the production of them, having probably, at a former period, produced them in an abundant manner, but on account of, or from the ſurface ſoil having been ſo long under ſuch crops without any ſufficient or ſuitable change. This is, however, much leſs the caſe, in open field garden grounds, than ſuch as are incloſed for the purpoſe of producing the finer ſorts of fruit and vegetables.

The inconvenience in theſe caſes is ſuppoſed to be capable of being wholly removed, or greatly relieved, by trenching the ſoil in a peculiar manner at proper periods, ſo as to have conſtantly a new or freſh ſoil for the growth of ſuch vegetables and fruits. See *Rotation of* CROPS, and TRENCHING.

The ſoils of gardens in all caſes, except where they are too light and friable, are capable of receiving much improvement, by being fully laid up in ſuch a manner as to expoſe the largeſt poſſible ſurface to the operation of the weather, whenever they are unoccupied by crops, and eſpecially during the froſty periods of winter. On all ſtiff, heavy, clayey, loamy, and cankering gravelly ſoils, the improvement by this means is very great, and ought never to be neglected. On very light ſoils of the ſandy ſort, it ſhould, however, be very cautiouſly employed. See RIDGING *up*.

The moſt ſuitable kinds of ſoil for the growth of different ſorts of fruit-trees in gardens, are very various according to their nature and habits, but they all require that they ſhould be of a ſomewhat dry quality, as will be ſeen under their different proper heads. Where fruit-trees of the apple kind are grown in ſuch ſituations, which ſhould as rarely as poſſible be the caſe, they ſucceed in the beſt manner, are the moſt healthy, and of the greateſt durability in ſoils of the brown loamy kind, which have a middling degree of conſiſtence, and a depth of a foot and a half or more, reſting on a dry, ſandy, or ſoft clayey bottom: they will, however, anſwer tolerably on any of the loamy ſorts of ſoil which lie upon dry ſubſtrata. In all ſoils which have wet retentive bottoms, they are ſoon deſtroyed. The pear ſtands in need of a ſtronger and more clayey ſoil than the above, which has much greater depth, but which reſts on the ſame ſorts of ſubſtrata. Similar ſorts of ſoil are alſo the moſt adapted to the growth of the cherry and the plum. And the ſmall fruit-trees, in ſuch caſes, may be well grown in any ſoil which is not of the ochrey or wet ſtiff clayey kind. See Small *Fruits*, and Standard *Fruit-trees*.

Soils for the purpoſe of ornamental gardening are not only of great utility in growing and rearing the different plants and trees which are neceſſary for it, but have been employed in the way of contraſt, and for relieving them. Formerly, much advantage was taken in this manner, by the introduction of different coloured earths or ſoils, but they have ſince, probably with juſtice, been reprobated as too trifling and inſignificant by lord Bacon: the natural ſoil throughout is always, Mr. Loudon thinks, preferable; and when taſtefully varied by the green of vegetation, will have a very harmonious effect in ſuch caſes.

The quality of the ſoil for the growth of moſt ſorts of ornamental plants and ſhrubs, ſhould, it is ſaid, be rather poor; for moſt of thoſe of the wild or botanical kind, various, though principally dry paſture loam of a virgin nature; but for the ericas or heath ſorts, and moſt of the American and Cape plants, as well as ſome others, moſſy or peaty, and rather moiſt.

The ſoil, in its different kinds, has much effect in improving, or *breaking*, as it is termed by the floriſts, ſome ſorts of fine flowering plants, as ſeveral of the bulbous-rooted and more tender herbaceous kinds, ſuch as tulips, pinks, carnations, and many others. The common plants of the latter deſcription will, it is believed, grow in almoſt any ſort of ſoil.

The particular ſort of ſoil in which moſt of the moſs-plants and ſhrubs commonly grow to the beſt advantage, is, it is ſuppoſed, that of a ſandy moſs or peat of a moderate degree of moiſture. The ſoils for wild plants are almoſt, it is remarked, as various as their names, but, in common, ſuch as are mentioned below, will grow moſt of them when cultivated in a garden:—dry virgin mountain earth or ſoil; moſſy earth or ſoil in a damp ſituation; half of each of the above in a moiſt ſituation; half of each in a dry poſition; moiſt clay and moſs or peat well blended; dry gravel and ſand incorporated well together; a clear ſandy or gravelly bottom ſoil, where there is a ſlight trickling of water; a muddy bottom ſoil, in a low ſtagnant pond or other water; rock-work, differently conſtructed, forms a ſoil for certain plants, as ſome moſſes, ferns, and others of the ſame ſort; living full-grown trees, as well as ſuch as are decayed, provide a ſoil for the growth of particular moſſes and funguſes; the ſoil of the ſea-ſhore is proper for the growth of ſea-plants; and the differently formed ſoils in heated houſes and other places, are ſuited to the growth of moſt ſorts of exotic plants. The two firſt ſorts, with thoſe of the trickling and ſea-ſhore kinds, will, however, it is ſuppoſed, nearly ſerve the purpoſes of all the others, when properly managed.

For the purpoſe of raiſing different ſorts of foreſt-trees, and forming ornamental plantations, great variety of ſoils is neceſſary; ſuch as thoſe of the more light ſandy and gravelly kinds, which reſt upon free, open, porous under ſoils or bottoms; ſandy and gravelly loams on the ſame ſorts of bottoms; the ſame and perfectly loamy ſoils, on bottoms which are of a more retentive or wet nature; chalky or calcareous loams, and gravelly mouldering chalks on open bottoms; loamy clays and clayey loams, on ſimilar bottoms; ſtrong ſoils of both theſe ſorts on more retentive and moiſt under ſoils; thin, peaty, heathy, and moory ſoils, which lie on gravelly and other ſorts of open dry bottoms; and ſimilar ſoils, reſting on more ſtiff and retentive ſubſtrata, or ſuch as are of a moiſter quality.

Other variations in the nature of garden-ſoils may likewiſe be occaſionally neceſſary for particular purpoſes, as well as in thoſe of grounds which are intended to be laid out and ornamented.

Soil, *Night*, in *Agriculture*, the excrementitious matter which is taken from privies or other places in which it is depoſited. Sir Humphrey Davy has remarked, that it is a well-known very powerful manure, which is extremely liable to decompoſe. That it differs in compoſition, but conſtantly abounds in ſubſtances conſtituted of carbon, hydrogen, azote, and oxygen. And that from the analyſis of Berzelius, it appears that a portion of it is always ſoluble in water; and in whatever ſtate it is employed, whether recent or fermented, it ſupplies abundance of food to plants, either as crops, or in other ways.

It is ſuggeſted, that its diſagreeable ſmell may be corrected and deſtroyed by mixing quicklime with it; and that, if expoſed to the atmoſphere in thin layers, ſtrewed over with quicklime in fine weather, it ſpeedily becomes dry, is eaſily reduced into powder, and in this ſtate may be made uſe of in the ſame way as rape-cake and other ſimilar manures, being delivered into the drill-furrows at the ſame time with the ſeed.

The refuſe of charcoal warehouſes, and the powdery matter of that ſubſtance, might alſo probably be intermixed with the calcareous and excrementitious materials in the above compoſition with great advantage.

It is ſtated that the Chineſe, who have more practical knowledge of the uſe and application of manures than any other people exiſting, mix their ſoil of this ſort with one-third its weight of a fat marle, make it into cakes, and dry it by expoſure to the ſun. Theſe cakes, as has been ſaid by the French miſſionaries, have no diſagreeable ſmell, but form a common article of commerce in the empire. It is ſuppoſed that the earth, by its abſorbent properties, probably prevents, to a certain extent, the action of moiſture upon the excrement, and likewiſe defends it from the effects of the air.

The Japaneſe, and ſome other of the eaſtern nations, are likewiſe very careful in preparing and preſerving this ſort of manure; and different methods of collecting, increaſing, and ſecuring it in this country have been noticed in ſpeaking of manure. See Manure.

It is ſuppoſed by ſome to have a great ſuperiority over all other ſorts of manure, even that of the rotten horſe-dung kind, being conſidered nearly five times as valuable as this laſt ſort. There is conſequently believed to be a great ſaving in the purchaſe of this manure, by thoſe who have the carting of their dung ſeven or eight miles, as their teams would bring as much of it in one, as would be equal to what is uſually brought of the other by them in five days: that they would have as much as is equivalent in value for one guinea, to what formerly coſt them five. And though the price of it may be on the increaſe, that ſhould not, it is thought, deter them from the purchaſe of it, as the ſaving in carriage is, it is ſaid, amply ſufficient to repay every advance in the firſt coſt of the material.

Others, however, ſuppoſe that this ſort of ſubſtance in manuring land will not go farther than three times that of common dung, in giving fertility. It is uſually ſold at 5*s.* the load. It has lately, in ſome places, been the practice to mix and work up this ſort of ſoil or excrement with mould or other earthy matters, in a regular manner, to conſiderable extent. This is largely done, it is ſaid, in the neighbourhood of the metropolis.

Upon the whole, conſidering the ſmallneſs of the quantity which is neceſſary, this may be allowed to be the moſt powerful and effectual manure of any which is now in uſe for improving land.

In the county of Eſſex, about Hornchurch, Mr. Newman has found that, for paſture, this ſort of manure is, of all others, the moſt capital; two waggon-loads on the acre, which coſt 7*s.* beſides carriage, are, it is ſaid, beyond every thing, and ſecure a carpet of fine herbage. On corn-land, however, it is thought that it forces ſtraw too much. Others have alſo found this to be the caſe, but when well mixed with good earthy ſubſtances, in ſufficiently full proportions, there can be no doubt of its being equally ſuitable for raiſing good grain crops.

On account of the increaſing ſcarcity of manure, this ſort of material ſhould be every where more attended to and preſerved than has hitherto been the caſe; and it may be largely increaſed as a manure by the addition of ſuitable quantities of earthy or other proper matters, according to circumſtances, and the purpoſes for which it is to be employed, as well as be rendered more fit and convenient for carriage and application.

SOIL, *Preparation and after-cultivation of, for and in planting*, in *Agriculture* and *Gardening*, the manner of rendering it ſuitable and proper for the reception of the trees, and of keeping and preſerving it in order afterwards.

The nature, ſituation, and ſtate of the ſoil, muſt unqueſtionably have much influence in determining and directing the degrees of preparation that may be requiſite in the different caſes; and though there may be ſome ſoils which require very little, this can but ſeldom be the caſe, as good ſoils ſhould never be planted, except for ornamental purpoſes, and then as little as poſſible. It conſequently appears proper, that ſome degree of preparation of the ſoil ſhould conſtantly take place in almoſt all caſes, however the miſtaken notion in regard to the expence attending it may have hitherto prevented the general adoption of the practice.

The expence of the proper preparation of the ſoil, before the work of planting commences, in many caſes, is not by any means great, when properly managed; and in no few inſtances, may be more than repaid by the kinds of crops that are afterwards grown for two or three years, and ſometimes longer: nay, even where ſuch crops cannot be raiſed and produced, the ſaving in plants and planting, which would otherwiſe be required, will often wholly or nearly defray the charges of the preparation. Thus, it is ſaid by Mr. Loudon, that, independently of timber produce, it would ſeem that the extra charges of preparing the ſoil may commonly be provided for in the immediately ſucceeding years to the work's being finiſhed, either poſitively by the growth of proper crops, or negatively by obviating the incurring of additional expences. And that, when the difference in the returns of timber produce are taken into the account, it may appear aſtoniſhing that the cultivators in this way ſhould diſregard their own advantage ſo much as to neglect and omit the proper preparation of the ſoil. For if it ſhould be ſuppoſed that, during the firſt ten years, trees grow only twice as faſt where the ſoil is properly prepared, as where it is not, then even a plantation worth 100*l.* in fifty years, had the ſoil been well prepared, would have been worth 200*l.* in the ſame length of time. But it muſt be allowed that many kinds of deciduous trees will grow three, four, and even ten times faſter in prepared than in unprepared ground, and, of courſe, the return of profits be in the ſame proportion.

Theſe ſtatements can ſurely leave no doubt of the propriety of preparing the ſoil with a view to theſe ſorts of undertakings.

The preparation of the ſoil will vary according to its nature, and the circumſtances of it; after the ſtagnant wetneſs, where preſent, has been properly removed, and the ſurface impediments cleared away as much as may be found neceſſary. In all ſtiff ſoils the land muſt be more wrought and expoſed than in the contrary ſorts, which often require but little ſtirring or expoſure. In extenſive tracts, the ground or ſoil, when poſſible, ſhould be prepared by means of the plough, by turning it up and expoſing it to the operation of the atmoſphere and froſts in the ſummer, autumnal, and winter months, when of the more rough and obſtinate kind, repeating the ploughings, and making harrowings as there may be occaſion. In extremely rough moory, and ſome other coarſe ſorts of ſoil, this may be neceſſary for more than one ſeaſon. After this, trench-ploughing may be had recourſe to wherever it is wanted, and is capable of being practiſed. By the uſe of the plough in theſe ways, the organic matter becomes more decompoſed, and the particles of the ſoil more fully and completely broken down and reduced, than by performing the work with the ſpade, while the coſt is not more than one-third.

In places where the plough cannot be admitted, other methods muſt be had recourſe to, as thoſe of the ſpade, the broad-mouthed mattock, and the ſharp-pointed ſtrong hoe. The ſpade muſt be employed in all caſes where digging and trenching can be practiſed, where the plough cannot work, and in forming pits, ſlits, and other modes of putting in the plants. Where the ſpade cannot be made to perform the buſineſs, the mattock not unfrequently does the work in a ready and effectual manner. And where the mattock cannot be brought into uſe, the hoe often completes the work without difficulty. The two laſt methods may be uſeful in ſteep banks and ſpots filled with ſtones and other obſtructions to the ſpade. The ſoil in all theſe caſes is to be properly reduced and rendered ſufficiently fine for the reception of the tree-plants, by being ſtirred, incorporated, and mixed together in a ſuitable manner.

Particular ſituations may require particular modes of preparing the ſoil and putting in the plants: thus, where there is danger of looſe ſoil being carried away by winter rains, the land ſhould be prepared in the previous ſummer ſeaſon, by making holes or openings, the earth of one of which is thrown into another with the turf or ſward-ſide downwards, which, when opened again for planting, is become rotten, and intermixed with the reſt of the ſoil in putting in the plant. In other ſituations, where the wind and rain are liable to carry off the ſoil, the only ſafe mode of preparing the ſoil is in pits, holes, and ſlits, and placing the plants in them. And in ſtill more difficult places, little or no preparation is neceſſary, only putting in the plants in openings or ſlits, or ſowing the ſeeds, which will often grow in rocky crevices, where little or no earthy matter is to be ſeen or met with. The nature of growth in the plants or ſeeds points out in ſome caſes the modes of preparation of the ſoil for them; thus, in the very young plants, and in ſeeds of the oak-kind, where they are only uſed, the placing them in holes or pits, prepared in a proper manner, is all that is neceſſary, as they receive the chief of their ſupport from their tap-root, which runs directly downwards.

In regard to the cultivation of the ſoil, after the work of planting the young trees has been performed, it muſt obviouſly be of great uſe and importance to keep the ſurface looſe, clean, and free from the production of all ſorts of improper plants of the weed kind, as the health, growth, and ſucceſs of ſuch tree-plants will very much depend upon it; and, beſides, it may be advantageous in other ways. In caſes where this is neglected, or improperly managed, there is often much injury ſuſtained by the young tree-plants, as they are not unfrequently liable to be more choaked up and inconvenienced in their growth by the riſing of coarſe graſſes and other productions, than if the ſoil had not been prepared previouſly to the trees being put into it. The cauſe of this is thought, by Mr. Loudon, to be extremely plain; as, if the ſoil, by preparation, be better ſuited to the growth of trees which are foreign to it, it muſt be much better adapted to the growth of the plants which it naturally produces in abundance. Conſequently, to check and remove theſe, ſo that the roots of the young tree-plants may range, and extend themſelves in a free manner, ſo as to require and enjoy the full ſtrength and ſupport of the ſoil, muſt be of very material benefit in raiſing plantations of the tree-kind.

The nature of the cultivation which is to be purſued muſt be varied ſo as to ſuit the particular quality of the ſoil, the ſituation, and the kind of plantation for which it is employed; but the great object, in all ſuch caſes, ſhould conſtantly be, to have in view utility, with as much immediate profit as poſſible, without the riſk of injury to the young tree-crops. Conſequently, wherever the ground or ſoil is capable of admitting and producing any ſort of proper uſeful vegetable, and the roots of the trees do not interfere by approaching too nearly to each other from the different rows, ſome of them ſhould be planted, or the ſeeds of them ſown in a regular manner, all along the centre parts of the intervals between ſuch rows, for ſome length of time, as a year or two, and more in ſome inſtances, after the planting has been performed. The moſt uſeful and valuable vegetable crops to be grown in this way, are thoſe of the potatoe, turnip, cabbage, dwarf bean, and ſome other ſimilar ones of the green kind. The introduction of ſuch crops neceſſarily ſuppoſes that the whole of ſuch planted grounds are to be wrought over, and kept in a clean order by ſome proper means, during the lengths of time that have been ſtated; after which they need only be hoed over two or three times in the courſe of the year, until the ſurfaces of them be covered and concealed by the trees, which they will moſtly be about the fourth or fifth year from the period of planting. All the work of the above kind, where the ſcale of planting is extenſive, may be executed by means of the plough and horſe-hoe; except occaſionally, perhaps, ſome little hand-hoeing about the bottom ſtems of the tree-plants, where there might be danger in letting the other tools work too near them. Where, from different circumſtances, it may be impoſſible to introduce the plough, the ſpade and hand-hoe muſt, of courſe, be had recourſe to in working the ſoil. But wherever the ſoil is incapable of admitting and producing uſeful vegetables, or where it may be thought not adviſeable to grow and cultivate them, the ground or ſoil may perhaps be the moſt properly and advantageouſly preſerved in clean order, ſimply by hoeing over the ſurface; or ſometimes probably by light ploughing or working with the ſpade, for a year or two at firſt, and then to depend on hoeing. The chief point in all caſes is the promoting the progreſs of the young trees, and the preventing them from being injured by the ſtiffneſs, rawneſs, and want of cleanneſs in the ſoil.

Whenever the ſurface of the ground or ſoil is covered by the young trees, there is no longer any neceſſity for cultivation, it being from that time preſerved in a ſufficient looſe and open ſtate, and the ſurface properly free from weedy matters, by the cloſeneſs and ſhade of the trees, and the annual falling of the leaves; and particularly where the planting conſiſts of reſinous trees. It is noticed, too, by the above writer, that it is the peculiar property of deciduous plantations, that the ſurface among them is covered with herbage of the paſture kind, the ſeeds of which ſhould be ſown when the trees are about nine inches or a foot in diameter, they having been well preſerved from weeds previouſly to the period of ſowing. See PLANTATION and PLANTING.

It is not improbable, but that when the buſineſs of preparing and cultivating the ſoil for plantations becomes better underſtood, and its uſes and advantages more fully appreciated, more ſuitable implements, tools, and contrivances may be provided for accompliſhing the work in a more eaſy, ready, cheap, and convenient manner, than has yet been employed.

SOILS, *Cutting Surface of*, the opening and breaking the ſurfaces of them in different intentions; as for the purpoſe of rendering them more dry and firm, of producing a more mellow, mouldy, or powdery ſtate in them, and for improving the nature of their ſwards and graſſy herbage in thoſe of the moſſy, rough, mowing, and paſture kinds. It may likewiſe be uſeful to them for ſome other purpoſes in huſbandry. It is performed in different manners, and by different means, according to the circumſtances of the different caſes, and the uſes which it is deſigned to ſerve. See SPIKE *Roller*, and SWARD *Cutter and Dreſſer*.

SOIL, in *Zoology*, is uſed in ſome parts of England as the name for the *phoca*, or *ſea-calf*.

This creature, in Cornwall, they frequently find ſleeping on the ſhore, and kill him, ſometimes by ſhooting, and ſometimes by ſtriking him over the head with long poles. He defends himſelf, when on ſhore, by throwing ſtones backwards with great violence.

SOILING, in *Agriculture*, the practice of ſupporting animals of different kinds, in the ſummer ſeaſon, with green food of various ſorts, cut daily, and given to them in racks in the houſes, ſtalls, or yards. A vaſt number of different plants and graſſes may be had recourſe to in this intention, as almoſt all thoſe which have a quick and luxuriant growth; as lucern, tares, clover, ſaintfoin, chicory, &c. And it has been ſuggeſted, that by having recourſe to ſoiling, a greater variety of plants may be conſumed, and conſequently prevented from running to waſte. Alſo, that if the conſumption of plants be an object principally regarded, it is obvious that the benefits thence derived will be very great, as experience has clearly proved that cattle will eat with avidity many plants, if cut and given to them in the houſe, which they never will touch while growing in the field; ſuch are the dock, cow-parſley, thiſtles, nettles, and numerous other plants. But to whatever circumſtance this may be attributed, the fact is, that the animals will eat them without exhibiting any marks of diſlike or reluctance, even when they are not preſſed by hunger, and they often greedily devour ſuch plants, as ſoon as they are brought in from the field, and before they can have poſſibly had time to become hungry. There are even vegetables, which, in a green ſtate, are poiſonous to cattle; but which, when cut and dried into hay or fodder, may not only be given with impunity, but are alſo eaten with avidity. Such as the water-crowfoot, with which, Dr. Pulteney ſays, the cottagers in the vicinity of Ringwood, on the banks of the Avon, almoſt entirely ſupport their cattle; and ſo eagerly do theſe animals conſume it, that they deem it unſafe to allow them more than a certain quantity. Cows indeed are aſſerted to be ſo peculiarly fond of this vegetable (which keeps them in good milking condition), that, excluſive of the ſcanty pittance which they obtained on an adjacent heath, *five* cows and one horſe did not conſume more than half a ton of hay in the courſe of a year. Thus it is evident, that fewer plants will either be rejected, or ſuffered to run up to waſte. And that it is further well known that many of the beſt and fineſt graſſes, which, when young, form a moſt palatable food to cattle, are, if once ſuffered to get into ear, ſo much diſliked by them, that the beaſts will never taſte them unleſs compelled by extreme hunger. And, as in moſt paſtures many of theſe graſſes get into ear from various cauſes, their produce is of courſe inevitably loſt to the farmer; whereas, if cut down by the ſcythe in proper time, not one plant will be ſuffered to get into that nauſeating ſtate, and conſequently no waſte be ſuſtained on this account. Alſo, that, in addition, thoſe few plants which are totally diſregarded by one claſs of animals, ſo as to be rejected by them even in the houſe, will not, on that account, become leſs acceptable to others, but greatly the reverſe. Thus graſs, or other food that has been *blown* or *breathed upon* by any animal for a conſiderable time, becomes unpleaſant to other beaſts of the ſame ſpecies, but not ſo to ſtock of another claſs or variety, as for them it appears to acquire a higher reliſh. Even greater defilement by one animal ſeems to render food more acceptable to others; for ſtraw, which in a clean ſtate has been refuſed by cattle, if employed as a litter for horſes, acquires for the former ſuch a reliſh, that they ſeek for it with avidity. Hence it happens, that the ſweepings of the ſtalls from one animal ſupply a pleaſing repaſt for thoſe of another kind, which can be eaſily removed from one to the other, if the plants are conſumed in the houſe, but which muſt otherwiſe have been loſt in the field.

This is a practice which is alſo recommended by the food being conſumed with much leſs waſte, conſequently going much further than when fed upon the land; by the great increaſe of good manure that is produced; and by that of the ſtock feeding with leſs interruption and inconvenience, from their being more effectually ſhaded from the exceſſive heat of the ſun, and better protected from the attacks of flies and other inſects. In all theſe reſpects it would ſeem to have a great ſuperiority over that of letting the animals range over the paſtures or other graſs lands. One great and principal objection that has been oppoſed to this plan of feeding, is that of the expence of conducting the buſineſs being too conſiderable. But the extenſive trials of Mr. Mure and Young, and other cultivators and promoters of the practice, fully ſhew that it may be executed at an expence that can never form any real objection to it. It has likewiſe been contended, in oppoſition to this practice, that ſuch parts of the live-ſtock as are in milk do not afford it ſo abundantly as when fed in the paſtures, but which is probably a mere ſuppoſition, as it has been almoſt invariably found that moſt of the green crops that are cut and employed in this manner have greater effect in exciting that ſecretion than the common paſture-graſs. But as particular ſorts of vegetables, as well as other ſubſtances, act more powerfully on ſome of the glandular organs than others, it is probable that ſome kinds of plants may have a greater tendency to promote this kind of ſecretion than others, and on this account, cows fed on one ſort of food in this practice may afford leſs milk than on others.

Farther, it is a proceſs of feeding that has alſo been oppoſed, on the idea that animals do not thrive ſo well as when grazed in the paſtures. It is, however, well remarked, that the more quiet and free from diſturbance cattle are kept, the better they thrive and improve in their fleſh. It is not probable that green food, when properly conſumed in the ſheds of a farm-yard, will be leſs advantageous in promoting the growth and fattening of ſtock, than when eaten in the field, when expoſed to the great heat and conſtant attacks of flies, and of courſe kept in a continual ſtate of reſtleſſneſs and inquietude. Beſides, in experiments to which we might refer, the cattle were found to go on better than ſtock of the ſame kind, fed in the paſtures in the moſt favourable ſeaſons for the purpoſe. And this is further ſupported by trials carefully made, and detailed in the Annals of Agriculture. This notion does not, therefore, appear well ſupported by facts, or to have had any foundation in the experience of farmers in general.

But its ſuperiority in reſpect to the economical conſumption of the food cannot be diſputed. In numerous experiments made in proof of the great ſaving in this way, it has been found to go from twice to four or five times as far as when fed on the land; and in ſome trials, much more. Mr. Cloſe found that with graſs, clover, lucern, and tares, three times as many cattle were capable of being ſupported in better condition than in the paſture mode of feeding; and with other experimenters it has been found equal to five or ſix times as many. The author of a late work has remarked, that in the field it is obvious that great waſte muſt be committed by the graſs being trampled down, dunged upon, and in many other ways, eſpecially where a great number of cattle are paſtured together, moſt of which are avoided in the ſtall method.

It has been, however, ſtated, that it is an error to ſuppoſe that all the waſte is in feeding in the field, and none in the ſtall: there is, on the contrary, a waſte in ſoiling; as in caſes where the tares become podded, from the butt ends of the plants being coarſe, and in a ſtate of decay by lying on the ground, and, of courſe, rejected by the animals. The ſame thing alſo occurs with lucern, when in full bloſſom. Alſo, in the heating of the food, by its remaining heaped together, loſs may likewiſe be ſuſtained in ſome inſtances; but it ſhould moſtly be conſumed quite freſh in this practice, and no more cut than is neceſſary for the day.

However, whatever the waſte in theſe different ways may be, various trials detailed in the Annals of Agriculture clearly prove, that a greatly increaſed ſtock may be kept upon the ſame extent of land in the ſoiling method, over that of the grazing of the cattle in the fields where the plants grow.

But the moſt intereſting circumſtance in which this practice excels that of paſture feeding is, however, in the immenſe quantity of excellent manure that is raiſed and provided for the production of increaſed crops of various kinds, and the additional improvement of the lands. It has been well remarked, that this is a method admirably calculated for producing an abundance of manure; as from the great increaſe in the urinary diſcharges, in the conſumption of green food in this way, and the heat of the ſeaſon, the littering material, whatever it may be, is ſpeedily converted into manure; by which means, with proper attention, vaſt ſtores may conſequently be raiſed, where there would otherwiſe be none; which is a circumſtance of the greateſt importance, and which abundantly ſhews the great utility and ſuperiority of the practice. By theſe means, the ſummer produce in manure may probably be made to exceed that of the winter, and at the ſame time be ſuperior in quality; as there is reaſon to ſuppoſe that the manure produced by any kind of cattle fed in the ſame way, when not in a ſtate of fattening, is much better in the ſummer than in the winter ſeaſon. The proportion of valuable manure that the careful farmer may be capable of providing, by this ſyſtem of management, is ſcarcely to be conceived, except by thoſe who have been in the actual practice of it. In this view, it is of much importance to have reſervoirs for the reception of the urine, in order that it may be occaſionally thrown up over the litter, and thereby promote its ſpeedy converſion into manure. The manure afforded by fattening animals, ſuch as hogs and neat cattle, is in all ſeaſons of a rich and valuable quality.

But in order to enſure the fulleſt benefit and advantage from this ſyſtem of management, the moſt ſtrict attention is neceſſary to different circumſtances: ſuch as thoſe of having convenient ſheds and yards for the purpoſe; providing ſuitable crops in proper ſucceſſion, to the proportion of ſtock to be kept; the feeding and managing the animals in a proper manner; and the making a full proviſion of the materials, for the purpoſe of littering down the ſtalls or farm-yards. And further, in this ſyſtem of management, much depends on the convenience of the yards and ſheds, in reſpect to the economy of labour in feeding the cattle, as well as making of manure: it is, of courſe, neceſſary to have them upon ſuch plans as may afford the greateſt advantage in theſe ways. It has been ſuggeſted by ſome, in order to ſave the labour and expence of cleaning and feeding in this ſyſtem, to have the cattle left looſe in the yards, ſo as to conſume the food from racks or cribs; the bottoms of the yards being prepared by marle, or other ſimilar materials, and a coat of litter applied, ſo as that the urine may be abſorbed, retained, and contribute to the converſion of them into manure. But a ſuperior plan is probably that of having them tied up in ſtalls, in ſheds for the purpoſe; as, although ſomething may be gained in the former mode in the labour of cleaning, the latter has conſiderable advantage in the goodneſs of the manure, and in the animals being kept more quiet, and leſs expoſed to diſturbance from inſects of different kinds. In the former of theſe modes, the ſtock ſhould be ſorted, and thoſe of the ſame age or ſize fed together.

In the experience of Mr. Cloſe, it was found advantageous to ſoil horſes in cheap thatched ſheds, in which they have room to walk and roll; and with bullocks and cows, in ſtalls ſeven feet wide, each ſtall holding two faſtened by the necks to the ſides, by which they are prevented from inconveniencing each other while feeding.

In this method of management, it is not unlikely that great benefit might be produced by having low ſheds fixed up round the yards, or other places, with ſuitable contrivances for the cattle receiving the food from, ſo as to cauſe the leaſt poſſible loſs; and by having the ſtock in all caſes properly ſorted, in regard to ſize, kind, and ſtrength. Such ſheds might, in ſome inſtances too, be provided, with very great utility and convenience, near to the grounds whence the food is raiſed and procured. In this way, a great ſaving of labour and expence would neceſſarily be made in different ſituations.

In all the caſes where low ſheds are made uſe of in this intention, there ought to be proper drains formed for conveying the urine and other fluid matters into the littered yards, and other places deſigned for forming manure, ſo that they may have a conſtant operation in the preparation of it.

It may alſo be neceſſary and beneficial, in this practice, ſometimes to have different ſets and ſorts of animals, in order that the refuſe of the food left by one ſet may be eaten by another, and no kind of loſs ſuſtained.

But in order that this buſineſs may be conducted in the moſt beneficial manner, it is neceſſary the farmer ſhould carefully attend to the culture of ſuch green crops as have been mentioned above, and which can be beſt applied in this way, on a ſcale fully ſufficient for this purpoſe. In the view of early application, a full proportion of lucern ſhould be raiſed on the moſt deep and fertile ſoils; and on the better ſorts of land, that may be in the condition of fallow, clover and tare crops may be grown. Theſe muſt be ſown ſo as to come into uſe at different times; the firſt crop of winter tares ſucceeding to the early cut lucern; the later put in winter tares following, after which the clover will moſt probably be ready, to which the third crop of tares and the ſecond cut of lucern may ſucceed: at a ſtill later period the ſpring tares may be employed; and in ſucceſſion to this, the third cutting of lucern will in general be ready. But there are many other plants that may perhaps be made uſe of in this way, as chicory, which may be had recourſe to with advantage in this management; as in ſoils that are tolerably fertile, it will admit of repeated cutting. With theſe different crops there will probably be ſeldom any neceſſity for the uſe of common cut graſs; though this may be employed, if there ſhould be occaſion. The proper foddering of the animals in this practice is a matter of great conſequence. It is obſerved in the Annals of Agriculture, that one great object is never to ſuffer them to have too much at once; as when this is the caſe, from the heat of the ſeaſon, it quickly takes on a degree of fermentation, and is rejected or only picked among by the cattle, in conſequence of which much waſte may be committed, which would otherwiſe be avoided; and in addition, it is not improbable but that the ſtock may thrive better by having their food more frequently, and of courſe in a more freſh ſtate. But it ſhould never, on any account, be left packed in the carts for any length of time. The beſt mode ſeems to be that of adapting the ſize of the cart to the exact conſumption of the ſtock; as in this way, the whole may be conveniently diſtributed in the cribs or racks at once, the moment it is wanted, before it becomes unpalatable by fermentation, and the leaſt poſſible loſs may be incurred. It is conſtantly neceſſary to watch the conduct of labourers in this particular, as they are in general much diſpoſed to over-feed. And there is another matter which ſhould not be diſregarded, which is that of not ſuffering the crops that are uſed in ſoiling to advance to too great a head; as by attention in this reſpect, the food may be more cleanly eaten up and conſumed.

However, it muſt be obſerved, a late writer ſays, that in this ſyſtem litter becomes an object of the greateſt importance, as the large quantity of urine that is made by cattle, when ſoiled on theſe luxuriant ſorts of green food, is capable, by its moiſtening property, of aiding in the hot ſeaſon, the more quick fermentation of ſuch materials, and of reducing a very large proportion into the ſtate of manure. In this view, the attentive farmer ſhould, therefore, make an abundant proviſion, in the winter time, of other ſorts of materials, where a proper ſupply of ſtraw cannot be reſerved for the purpoſe. There are various matters that may be made uſe of in this intention, ſuch as ſtubble, fern, ruſhes, and other aquatic plants, which may be cut and raked together in the places in which they are moſt abundantly produced, in order to be ſtacked up for future uſe. Leaves might alſo, in woody ſituations, be uſeful for the ſame purpoſe. And in addition to theſe vegetable matters, there are other ſubſtances that are capable of being employed with utility, ſuch as peat or bog earth, freſh vegetable mould, ſand, and the ſcrapings of roads; as during the decompoſition of the various vegetable materials made uſe of in this practice, not only much hydrogen and carbonic gas are ſet at liberty, but ammonia is formed in large quantities, in the manner that has already been explained, which, from its action upon ſuch earthy materials, is highly uſeful in bringing them into the ſtate of manure for the improvement of lands. See MANURE.

Some other ſorts of matters might likewiſe, in different ſituations, be employed in this manner with conſiderable benefit; ſuch as ſaw-duſt, when to be procured in large quantities; and the refuſe materials of different manufactories, as the weld of the callico-printer, the bark of the tanner, &c. Many of theſe kinds of ſubſtances are excellent for the purpoſe of manure.

And in ſupport of the advantages of this management, various facts have been ſtated by writers on farming. It is remarked by the Rev. Mr. Duncan, in the fourth volume of Communications, that he always keeps his work-horſes on red clover through the ſummer; and they are as healthy and fit for labour as any of his neighbours', that are turned out into the paſture. Laſt year he cut the clover three times, and thirty falls or perches yielded as much as one horſe was able to conſume. He has frequently intended to try a crop of gooſe-graſs for hay, upon ſome piece of ground which was not to remain in paſture; but he has always met with ſome avocation, at the time when the ſeed of this graſs could be procured. He is ſurpriſed that gooſe-graſs has been ſo long neglected, nay deſpiſed. It is conſidered as a weed among rye-graſs, though he has obſerved that the horſes are not of the ſame opinion. Its hay is moſt ſubſtantial, and were it allowed to come to maturity, its ſeed would, he ſuppoſes, be little inferior in weight to oats, and would probably be an excellent ſubſtitute for them in the food of horſes. And it is added, that he who can procure 200 carts of dung, from the ſame extent of ground where 100 only were formerly produced, certainly poſſeſſes a double power of improving it. A great reſerve of ſtraw is neceſſary for litter to horſes, when living on red clover. When the ſtraw fails, ſome bed their horſes with dried ruſhes; but ruſhes contribute very little to the manufacture of dung. When fern, or, as it is ſometimes called, the "braken," can be gotten, he would recommend it as next to ſtraw for littering of horſes or black cattle, and as the beſt of all land vegetables for the dunghill.

Mr. Rawſon in the ſame work alſo highly approves of, and has long practiſed, the feeding of horſes and ſpring cattle in ſummer upon clover; he has found that an acre of clover, cut and carried to the cattle and horſes in their hovels and ſtalls, will maintain double the quantity of ſtock to an acre paſtured; beſides the very great quantity of manure produced by this mode of feeding, which ſecures almoſt to a certainty the turnip crop.

Alſo in a trial made by Mr. Mure in ſoiling bullocks with winter tares, as ſtated in the Annals of Agriculture, the advantages of this practice over that of feeding in the paſtures is very fully ſhewn. The ſame ſyſtem of ſoiling has been practiſed with advantage by many others, as Mr. J. Wright, &c.

The ſame ſyſtem has been carried to a far more conſiderable extent, and with a new and quite different object, at the callico-printing works at Banniſter Hall, near Preſton, in the ſame county, under the direction and management of Charles Swainſon, eſq. Here the ſoiling with tares and clover is practiſed with a view of procuring the pure dung of the cattle which is ſo uſeful and neceſſary in this ſort of printing buſineſs, as well as for the common purpoſes, and producing a large ſupply of milk. The ſyſtem is practiſed to the extent of twenty-five cows and ſix horſes, by which a prodigious ſaving of expence in the raiſing and providing of dung is made, as well as in the procuring of hay; while the appearance and condition of the cattle are far better than in the uſual methods of managing them.

The horſes are ſome of them ſoiled upon and conſume the refuſe food from the cows, ſo that nothing is waſted or loſt. The team-horſes are kept in the ſtable, the others in a ſmall encloſure, eating their food out of racks. The litter employed is the weld which has been uſed in dyeing, but very little of it is uſed, as the pure dung of the neat cattle is a material object.

The cows are bound up in ſheds or cow-houſes, and kept properly ſupplied with theſe ſorts of green food, in conſequence of which they give large quantities of excellent milk. They are kept conſtantly ſoiled in this way during the ſummer, except while they are conſuming the after-graſs of the meadows. And it is only the trouble and attention which are required in raiſing and providing other kinds of green food for winter uſe, which is wholly incompatible with large works, that have prevented the ſame practice in feeding from being followed during the winter ſeaſon, as the great ſuperiority and advantage of green food over that of dry in the milking ſyſtem, as well as the raiſing of pure dung, are well underſtood.

The cows, though confined to the houſe during the whole of the day, are let out once or twice in that time for the purpoſe of exerciſe and water, but drink little under the ſoiling practice. There is often much advantage in varying their food, in the quantity of milk which is afforded. Cows, when tired of clover, will greedily devour tares, and theſe laſt when podded are found to be moſt excellent food in the view of producing milk. The ſame variety may likewiſe be equally beneficial in the uſe of other ſorts of crops.

It is conſidered as of material importance in this practice with milch cows, that they are kept cool and in the ſhade.

Sir Humphrey Davy thinks, that in feeding cattle with green food, there are many advantages in the practice of ſoiling, or ſupplying them with food, where their manure is preſerved, out of the field; the plants, it is conceived, are leſs injured when cut, than when torn or jagged by the teeth of the cattle, and no food is waſted by being trodden down. The cattle are likewiſe obliged to feed without making any ſelection; and in conſequence the whole food is conſumed: the attachment or diſlike to a particular kind of food exhibited by animals, affords, it is ſuppoſed, no proof of its nutritive properties or powers, as cattle at firſt refuſe linſeed cake, one of the moſt nutritive ſubſtances upon which they can be fed. See STOCK, *Choice of Food in.*

Many ſtatements, which the nature of our work does not allow our inſerting, ſufficiently prove the great benefits which may be derived from a more general introduction of this practice in all caſes where it can be had recourſe to, which are probably much more numerous than are commonly ſuppoſed; as in all places where there are lands proper for the purpoſe of raiſing the neceſſary ſorts of green crops, it may be reſorted to in the moſt ſucceſsful manner. The great cauſes which have retarded and prevented the ſpreading of the ſoiling ſyſtem of management would ſeem to be the fear of the great expence of labour that attends it, and the taking of farmers out of their uſual methods of cattle feeding. The former has, however, been ſhewn to be a mere nothing when compared with the number of animals; and the latter obviouſly deſerves no attention whatever. It is not improbable but that great benefit might alſo ariſe in many inſtances from ſoiling other ſorts of animals in this way; ſuch as ſheep, hogs, deer, &c. as vaſt quantities of manure would be produced, and at the ſame time the animals be kept in better order, and afford greater improvement and profit.

This is a method of practice that has been found, by the moſt exact trials, to anſwer perfectly both with horſes, neat cattle, and ſwine; and with cows it has been found very beneficial in the trials of Mr. Curwen and ſeveral others, as well as in other inſtances. See SWINE and TEAM.

The writer of the corrected account of the ſtate of agriculture in the county of Middleſex has, however, obſerved, in oppoſition to this ſyſtem of management, that though “it has lately been ſuggeſted by ſeveral writers, that carrying graſs into the yards, and giving it to cattle there, is more adviſeable than permitting them to collect their own food: where the party can manure half his land annually, or the whole every ſecond year, it may, it is ſuppoſed, be expected to ſupport ſuch a high degree of exhauſtion; but in other caſes, the paſture would ſoon be ſo much impoveriſhed, as to produce nothing for the owner of it to mow. Meadows which can be flooded by art at any period of ſummer, would probably, too, it is thought, admit of having their produce continually carried off: in all other caſes, ſuch a ſyſtem would, in the opinion of the writer, in a ſhort time ruin the land.”

But ſurely no rational or conſiſtent practical agriculturaliſt ever inculcated the neceſſity or utility of the practice of mowing and carrying the graſs of paſture or hay-lands to be conſumed in the farm-yards by cattle. The ſyſtem of uſeful ſoiling, ſo far as it is known to us, has been uſually confined to luxuriant crops of the artificial graſs kind, raiſed by means of tillage, and provided for by the increaſed quantity of manure which is produced and preſerved in the proceſs or practice.

“The increaſed labour and expence of ſuch a practice would alſo, it is ſaid, render it unprofitable; one man employed in that manner, with a horſe and cart, could not attend the cattle, and bring in the produce of many acres, though it would coſt a grazier in this county, annually, it is ſuppoſed, one hundred and thirteen pounds; to which ought to be added, that the manure would be waſted in ſuch a manner, as to loſe a large moiety of it; in all which ways one hundred and twenty pounds would be expended, which is a greater ſum than this practice is calculated to repay.”

It is evident, however, from what has been ſeen above, that one man can not only attend to the cattle, but convey the produce of many acres to the places where it is to be eaten, beſides doing much other work; and as to the horſes and carts which are neceſſary, as thoſe of the ſmall kind are commonly the moſt ſuitable, they will be found on almoſt all farms where ſuch a method of cattle management can be had recourſe to with any benefit. Such an imaginary charge, therefore, ſeems to be founded on no juſt grounds. And that there would be any great deal more waſte of manure in this than in other ways, is probably a mere ſuppoſition, as under good management, evaporation in hot ſeaſons would be guarded againſt, and the accumulation of it in the practice is univerſally allowed to be extremely great. There is conſequently no well-founded reaſon for concluding that the practice will not amply repay every expence attending it when properly carried on.

“The only advantage which it promiſes is, it is ſaid, to avoid the damage done by the treading of cattle: it muſt be admitted, that in wet ſeaſons and deep graſs this is conſiderable: but *a few additional acres* would, it is believed, ſupply a ſimilar quantity of herbage at a leſs expence; where that cannot be obtained, reducing the number of cattle would, it is ſaid, have the ſame effect, and might be done without incurring ſo great a diminution of profit as the foregoing one hundred and twenty pounds would certainly be.

“It is obvious, (the writer ſays, after ſtating other objections,) that this is one of the cloſet ſyſtems of ſupporting cattle, which cannot be reduced to practice beyond the extent of a very few acres, and only then, when it can be done without any additional men or horſes. If the expence of the men and teams is to be brought into the account, it will, it is ſaid, be altogether unprofitable. Such an expence would, in this county, amount, it is ſuppoſed, in fifteen weeks, to thirty-four pounds ten ſhillings; which, divided by the number of acres (ten), proves the charge to be, on each acre, three pounds nine ſhillings; or divided by the number of oxen (ſix), it would be, on each, five pounds fifteen ſhillings: add this extra expence, it is ſaid, to a long liſt of uſual and unavoidable charges, and it will ſwell the account to ſuch a ſum, as would exceed the value of the improvement of any cattle whatever.”

The ſyſtem of ſoiling animals can clearly be extended to more than a few acres, and even where additional men and horſes are required, though there will be ſeldom any occaſion for them in the practice. Nor is the expence of the men or teams employed about it any real objection, when juſtly and fairly calculated, or even that of the cattle *per* head of any account, ſo as to make it more than equal to their advancement in condition. Where no ſufficient data are given, from actual trials, it is eaſy to arrive at concluſions; but the practice and experience of farmers in the beſt cultivated diſtricts, ſet all ſuch opinions and concluſions at naught.

SOINI, in *Geography*, a town of Sweden, in the government of Waſa; 70 miles E. of Waſa.

SOINIDRO, a town of the iſland of Cuba; 75 miles E.S.E. of Havanna.

SOJOURNERS, among the *Athenians*, were permitted to dwell in the city, and follow their own buſineſs, without diſturbance, provided they obſerved all the laws and cuſtoms of the country; but were allowed no ſhare in the government. However, they were not allowed to act any thing, or manage any buſineſs in their own names, but were obliged to chooſe out of the citizens one, to whoſe care and protection they would commit themſelves, whoſe duty it was to defend them from all violence and oppreſſion. He was called *proſtates*.

SOJOWIZ, in *Geography*, a town of Bohemia, in the circle of Boleſlau; 4 miles S. of Benatek.

SOISSONS, a town of France, and principal place of a diſtrict, in the department of the Aiſne, ſeated on the Aiſne. Before the revolution it was the ſee of a biſhop, ſuffragan of Rheims, and the capital of a diſtrict, called “Soiſſonnois.” In the time of Cæſar this town was conſiderable, and called “Noviodunum.” It afterwards took its name from the Sueſſiones, who were among the laſt that remained ſubject to the Romans. At the death of Clovis I. his ſon Clothaire made it the place of his reſidence, 6½ poſts N.W. of Rheims. The place contains 8189, and the canton 14,839 inhabitants, on a territory of 125 kiliometres, in 20 communes. N. lat. 49° 23′. E. long. 3° 20′.

SOIT *fait il comme deſiré*, be it done as it is deſired; a form uſed when the king gives the royal aſſent to a private bill preferred in parliament.

SOITA, in *Ancient Geography*, a town of Aſia, in the Greater Armenia. Ptolemy.

SOITO *de Rebordoins*, in *Geography*, a town of Portugal, in the province of Entre Duero e Minho; 6 miles N. of Barcelos.

SOK, SOKE, *Soc*, in the *Ancient Cuſtoms*. See SOC.

The word is ſometimes alſo uſed for the privilege of tenants excuſed from cuſtomary impoſitions.

Alſo for a quit-rent, or payment made to the lord by his tenant, for acting in quality of *ſoc-man*, or freeholder. See Socage.

SOKALLEN, in *Geography*, a town of Ruſſian Lithuania; 9 miles S. of Ragnit.

SOKASPOGE, a town of the ſtate of Georgia; 4 miles N.E. of Oakfuſkee.

SOKE, in *Rural Economy*, an ancient term, uſed to ſignify the privilege of mills, &c. By it the lord, in certain caſes, was enabled to raiſe a conſiderable rent.

Soke-*Mill*, that kind of mill which belongs to the lord or ſuperior of the manor, and at which all the tenants, and ſometimes the whole pariſh, are bound to grind their grain. Mills of this nature were once very common, and they exiſt ſtill in a few places.

SOKELY, in *Geography*, a town of Norway, in the province of Bergen; 24 miles S.W. of Romſdal.

SOKEMANS. See Socmen.

SOKER, in *Geography*, a ſmall iſland in the Red ſea; 3 miles E. of Dſjabbel.

SOKE-REEVE, in our *Old Writers*, the lord's rent-gatherer in the *ſoke*, or *ſoken*.

SOKHIO, in the *Materia Medica*, a name uſed by ſome authors for a peculiar ſpecies, if it may be ſo called, of the lignum aloes.

It is of a greyiſh colour, and ſeems to have been the blea, or outer part of the wood next the bark.

SOKO, in *Geography*, a diſtrict of Africa, on the Gold Coaſt, extending about a league along the ſea-coaſt, on the borders of the river Volta. The land is fertile, but the inhabitants are poor, and employ themſelves chiefly in fiſhing.

SOKOLMA, a town of Poland, in Volhynia; 12 miles N. of Luckow.

SOKOLOW, a town of Poland, in Podolia; 54 miles N.W. of Kaminiec.

SOKOLOWKA, a town of Auſtrian Poland, in Galicia; 20 miles S. of Lemberg.

SOKOLVOD, or Knezdo, a mountain of Croatia; 32 miles E. of Bihacs.

SOKOR ZOK, a town of Armenia, ſituated on a ſmall hill, equally diſtant from Betlis and Diarbekir, governed by a powerful, independent, and hereditary prince, who has under his orders many different tribes of Kurds, Yezedis, and Turkomans, of a martial and barbarous diſpoſition, and who, it is ſaid, can bring an army of 20,000 men into the field. The climate of this place is leſs ſevere than that of Betlis; the diſtricts are extenſive, and covered with villages, but the population of the town does not exceed 6000 ſouls. South of Zok is the town of Sahert, or *Serud;* which ſee.

SOKOTKA, a town of Lithuania; 15 miles S.W. of Grodno.

SOL, a ſyllable in the firſt elements of vocal muſic, which, in major keys, always implies the 5th above the key-note: as, *do re mi fa ſol;* or *do—ſol.*

Sol, or *Sou*, *Shilling*, in *Commerce*, a French coin, according to the old ſyſtem, which prevailed before the revolution, of billon, *i. e.* of copper with a little ſilver mixed, equal to twelve deniers, or French pence, or four liards; and the twentieth part of the livre Tournois, or pound. See Shilling.

The word is formed from the Latin, *ſolidus*, a ſhilling. Bodin is miſtaken when he derives it *à ſole*, by reaſon of the ſun ſtruck on it.

The ſol was firſt ſtruck on the foot of twelve deniers Tournois, whence it was alſo called *douzain*, a name it afterwards retained, though its ancient value was changed; the ſol having been ſince augmented by three deniers, and ſtruck with a puncheon of a fleur-de-lis, to make it current for fifteen deniers. Soon after the old ſols were coined over again, and both old and new were indifferently made current for fifteen deniers. In 1709, the value of the ſame ſols was raiſed to eighteen deniers. Towards the latter end of the reign of Louis XIV. the ſols of eighteen deniers were again lowered to fifteen. The ſol of fifteen deniers was called *ſol Pariſis*. According to the old ſyſtem, the ſilver coins in France were the ecu, or crown of ſix livres; the petit ecu, or half-crown (alſo called ecu) of three livres: pieces of twenty-four, twelve, and ſix ſous; alſo pieces of two ſous and ſix liards, or one and a half ſou, containing five parts of ſilver to nineteen of copper; and pieces (entirely copper) of one ſou, two liards, and one liard, or twelve, ſix, and three deniers. The piece of twenty-four ſous, compared in fineneſs with the Engliſh ſtandard of 11 oz. 2 dwts., is W. 0 dr. 7 dwt., its weight 3 dr. 20 gr., its content in pure ſilver is 83.4 gr., and its value in ſterling is 11¼*d.* The pieces of twelve and ſix ſous are in proportion. The piece of thirty ſous of 1791 is W. 3 oz. 8 dwt., its weight 6 dwt. 12 gr., its contents in pure ſilver 100.2 gr., and its value in ſterling 1*s.* 2*d.* The piece of fifteen ſous is in proportion.

In old authors we read of gold ſols, which were different at different times. In the time of the Salic law, the gold ſol was forty deniers; and thus it continued till the time of king Pepin, when it was reduced to twelve. Some have alſo imagined, that the French had anciently ſilver ſols.

The Dutch have alſo two kinds of ſols: the one of ſilver, called *ſols de gros*, and likewiſe *ſchelling;* the other of copper, called alſo the *ſtuyver*. See Coin.

The ſol, or ſou, is alſo a money of account and copper coin in Switzerland.

Sol, in *Aſtrology*, &c. ſignifies the ſun. Sol in Aries, &c. See Sun.

Sol, *Sun*, in *Chemiſtry*, is gold; thus called from an opinion that this metal is, in a particular manner, under the influence of that luminary.

What ſhould have been the principal inducement of torturing this metal, with ſo much violence, to obtain from it ſome medicinal virtues, Dr. Quincy obſerves, is not eaſy to be gueſſed.

Moſt, indeed, acknowledge, that gold in ſubſtance, or reduced into the ſmalleſt particles by the hammer, as in the leaf-gold, is not digeſtible in the ſtomach, ſo as to be tranſmitted into the blood, and be of any efficacy there. But there are nevertheleſs many, who are confident of its doing extraordinary matters, if reduced into a powder, by amalgamation with mercury, and by evaporating the mercury afterwards.

Zacutus Luſitanus is one of the ſmarteſt pleaders on this ſide the controverſy, againſt Muſa, Picus Mirandola, and Platerus; who, beſides many inſtances of its efficacy, urges the authority of Avicen, Serapion, Geber, and many of the Arabian phyſicians, with thoſe of other countries, and of later date. Quercetan, Schroder, Zwelfer, and Etmuller, with many other more modern practical phyſicians, have fallen into the ſame opinion. But which ſide ſoever is right, the preſent practice rejects all pretenſions to medicines from it. See Gold, in *Medicine* and *Chemiſtry*.

Sol, in the *Hermetical Philoſophy*, ſignifies ſulphur.

Sol, in *Heraldry*, denotes *or*, the golden colour in the arms of ſovereign princes.

Sol *Galiczk*, in *Geography*, a town of Ruſſia, in the government of Koſtrom; 96 miles N.N.E. of Koſtrom. N. lat. 59°. E. long. 42° 24′.

Sol *Vitchegodſk*, a town of Ruſſia, on the river Vitchega; 36 miles N. of Uſtiug. N. lat. 61° 30′. E. long. 46° 14′.

SOLA, a ſmall iſland in the Caribbean ſea; 30 miles E. of Margarita.—Alſo, a ſmall iſland among the Philippines, near the S. coaſt of the iſland of Luçon. N. lat. 13° 22′. E. long. 12° 46′.

Sola, *La*, *Pylſtart's Iſlands*, ſo called by Maurelle. See Pylstart.

SOLÆUS, in *Anatomy*. See Soleus.

SOLAGNA, in *Geography*, a town of Italy, in the Treviſan; 5 miles S. of Ciſme.

SOLAGUR, a town of Bengal; 25 miles W.N.W. of Silhet.

SOLAKI, a town of Dageſtan; 60 miles N.N.W. of Derbend.

SOLAN, a town of Africa, in Caſhna. N. lat. 16° 30′. E. long. 10°.

SOLANA, in *Ancient Geography*, a town of Aſia, in Serica. Ptolemy.

SOLAND, or Solan-*Gooſe*, in *Ornithology*. See Pelecanus *Baſſanus*.

SOLANDER's Island, in *Geography*, an iſland in the South Pacific ocean, near the S. coaſt of New Zealand, diſcovered by captain Cook in March 1770; and ſo named after Dr. Solander. It is merely a barren rock, about a mile in circuit, remarkably high, and lying full five leagues diſtant from the main. The ſhore of the main lies neareſt E. by S. and W. by N., and forms a large open bay, in which there is no appearance of any harbour or ſhelter for ſhipping againſt S.W. and ſoutherly winds: the ſurface of the country is broken into craggy hills of a great height, on the ſummits of which were ſeveral patches of ſnow; it is not, however, wholly barren, for wood was ſeen not only in the vallies, but upon the higheſt ground; but it exhibited no ſigns of being inhabited. S. lat. 46° 31′. W. long. 192° 49′. Hawkeſworth's Voy. vol. iii.—Alſo, a ſmall iſland in the Mergui Archipelago. N. lat. 10° 39′.

SOLANDERS, in *Farriery*. See Malanders.

SOLANDRA, in *Botany*, was originally deſtined by the younger Linnæus, to preſerve the memory of his friend Dr. Daniel Charles Solander, F.R.S., ſo well known in England as the companion of ſir Joſeph Banks, in his voyage round the world, and afterwards one of the librarians of the Britiſh Muſeum. He was intimately connected with the moſt eminent cultivators of natural ſcience here in England, eſpecially Ellis (ſee that article); being no leſs eſteemed for his polite and agreeable manners, than his extenſive knowledge. He died of an apoplexy, in 1782, aged 46. His learned botanical manuſcripts remain in the Bankſian library; his premature deceaſe having prevented his finiſhing, for publication, any conſiderable work, though his information enriched every thing that appeared in this country during his reſidence here. The great Linnæus, who juſtly conſidered Solander as one of his ableſt pupils, had named a *Solandra* in the 6th edition of *Gen. Pl.* but this was ſubſequently referred to *Hydrocotyle*. The genus we are now to deſcribe, muſt be conſidered as firſt publiſhed, by being repreſented on the honorary medal ſtruck in Sweden ſoon after Dr. Solander's death; and thus it takes place of the leſs certain and ornamental *Solandra* of Murray, in Linn. Syſt. Veg. ed. 14. 623, not publiſhed till 1784.—Swartz in Stock. Tranſ. for 1784. 300. t. 11. Ind. Occ. v. 1. 386. Schreb. 793. Willd. Sp. Pl. v. 1. 936. Mart. Mill. Dict. v. 4. Saliſb. Tr. of L. Soc. v. 6. 99. t. 6. Ait. Hort. Kew. v. 1. 388.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Luridæ*, Linn. *Solaneis affine*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, angular, with from three to five lanceolate, erect teeth, ſubſequently more deeply ſeparated, permanent. *Cor.* of one petal, thrice the length of the calyx, funnel-ſhaped; tube inflated and bell-ſhaped in the upper part, five-ribbed; limb in five roundiſh, ſpreading, reflexed, wavy, partly doubly crenate, lobes. *Stam.* Filaments five, thread-ſhaped, declining, the length of the tube, inſerted into its middle part; anthers terminal, verſatile, ſomewhat pyramidal, of two cells. *Piſt.* Germen ſuperior, oval; ſtyle thread-ſhaped, declining, longer than the ſtamens; ſtigma obtuſe, compreſſed, ſlightly two-lobed. *Peric.* Berry oval, pointed, ſmooth, of four cells. *Seeds* very numerous, kidney-ſhaped, imbedded in pulp, inſerted into a four-branched receptacle.

Eſſ. Ch. Calyx tubular, ſplitting. Corolla funnel-ſhaped, inflated, irregular; limb in five rounded, reflexed, unequal ſegments. Berry of four cells, with many ſeeds.

1. S. *grandiflora*. Great-flowered Solandra. Willd. n. 1. Ait. n. 1. Jacq. Hort. Schonbr. v. 1. 21. t. 45.—Native of Jamaica, where, according to Swartz, it occupies the clefts of rocks, and the trunks of the largeſt trees, climbing, by roots thrown out of the ſtem, to their very ſummits, from whence its long, ſpreading, leafy, dependent *branches* hang down very far, flowering in January and February, and ripening fruit in Auguſt. The plant was introduced at Kew by Mr. Maſſon, in 1781, and long known by the extemporaneous name of *Portlandioides*, given by its finder; for being treated with the uſual ſupplies of water, and a rich ſoil, it grew every year luxuriantly, but never flowered, till accidentally ſet aſide and neglected, in the dry ſtove. By ſuch management it has often flowered ſince, and Jacquin ſays it ripens fruit and ſeed at Schonbrun. The *wood* is ſpongy. *Stem* and *branches* round. *Leaves* ſcattered, moſt crowded about the ends of the branches, reflexed, ſtalked, obovate, or elliptic-oblong, acute, entire, ſomewhat undulated, ſingle-ribbed, ſlightly ſucculent, more or leſs downy, from four to ſix inches long; paler beneath. *Footſtalks* an inch long, round, downy. *Flowers* uſually ſolitary, terminal, nearly ſeſſile, very large, a ſpan long, magnificent in appearance, and delicioully fragrant. The *corolla* is cream-coloured, with a tinge of yellow; the outſide often purpliſh, and ſlightly downy; the ſegments of the limb flaccid, partly entire, partly crenate, and waved, in an elegant manner. *Fruit* ſometimes as big as a hen's egg, white, red within, of a ſweet ſubacid taſte.—The inhabitants of Jamaica know this plant by the name of the Peach-coloured Trumpet-flower. Plumier is ſaid to have left a ſketch of it, among his drawings, by the name of *Stramonium ſcandens, flore luteo.*

SOLANEÆ, the 41ſt natural order in Juſſieu's ſyſtem, the 8th of his 8th claſs. It is thus named from the Nightſhade, (ſee Solanum,) which is one of the tribe, and the order is nearly equivalent to the Linnæan Luridæ, ſee that article. We refer the reader to Gentianæ for the character of Juſſieu's 8th claſs; and to Lysimachiæ, Pediculares, Sapotæ, and Scrophulariæ, for ſome orders belonging to it.—The *Solaneæ* are thus defined.

Calyx generally in five ſegments, more or leſs deeply ſeparated, for the moſt part permanent. *Corolla* generally regular, and five-cleft. *Stamens* moſtly five, uſually inſerted into the lower part of the corolla. *Style* ſolitary. *Stigma* ſimple, or rarely cloven. *Fruit* moſtly of two cells, with many ſeeds; ſometimes capſular, of two valves, with a partition parallel thereto, as in the *Scrophulariæ*; or more frequently pulpy, with central receptacles for the ſeeds attached to the middle of the partition, at each ſide, and uſually prominent, ſo as to ſeparate each principal cell of the berry internally into two parts, or, by a ſtill further imperfect ſubdiviſion, into more. *Corculum* of the ſeed curved, lodged in a farinaceous *albumen*. *Stem* herbaceous or ſhrubby. *Leaves* alternate; in ſome inſtances there are two floral ones from the ſame point. *Flowers* variouſly diſpoſed, often extra-axillary, that is, placed near the ſide of the inſertion of the leaves, not ſpringing from their boſoms.

The firſt ſection, with a capſular or dry fruit, conſiſts of *Celſia*, *Verbaſcum*, *Hyoſcyamus*, *Nicotiana*, and *Datura*.

The ſecond, with a berry, of *Triguera* of Cavanilles, which we have recently diſcovered to be the very identical *Verbaſcum Oſbeckii* of Linnæus, a plant that no ſubſequent botaniſt could ever make out; (ſee VERBASCUM and TRIGUERA;) *Jaboroſa* of Juſſieu; *Mandragora* of Tournefort; *Atropa*; *Nicandra* of Adanſon, which is *Atropa phyſaloides* of Linnæus; *Phyſalis*; *Witheringia* of l'Heritier; *Aquartia*; *Solanum*; *Capſicum*; *Lycium*; and *Ceſtrum*.

Section third contains three genera, reckoned akin to the former; theſe are *Bontia*, *Brunfelſia*, and *Creſcentia*. With theſe laſt the true *Solandra* is, as Juſſieu ſuſpected, to be aſſociated. See SOLANDRA.

SOLANILLOS, in *Geography*, a town of Spain, in New Caſtile; 23 miles E. of Guadalaxara.

SOLANO, a ſmall iſland near the coaſt of Peru. S. lat. 12° 20′.—Alſo, a river of Mexico, which runs into the Pacific ocean, N. lat. 10° 18′.

SOLANOIDES, in *Botany*, a name given by Tournefort to the *Rivina* of Linnæus, on account of its reſemblance to SOLANUM; which ſee. See alſo RIVINA.

SOLANOS, in *Meteorology*, a name given to winds, which, blowing over an extenſive tract of highly heated land, become ſo very drying, ſcorching, and ſuffocating, as to produce dreadful effects, and are often felt in the deſerts of Arabia, in the vicinity of the Perſian gulf, in the interior of Africa, and in ſome other places.

SOLANTA, in *Geography*, a town on the N. coaſt of the iſland of Sicily, which gives name to a cape and bay: 8 miles E. of Palermo. N. lat. 38° 9′. E. long. 13° 36′.

SOLANUM, in *Botany*, an ample genus, compriſing various kinds of Nightſhade, and other deadly plants, along with the eſculent Tomato, Egg-plant, and even the valuable Potatoe, owes its name, according to ſome authors, to its comforting quality, ſuch authors ſuppoſing the word to have originated from *ſolamen*. This indeed might apply to the potatoe, could that poſſibly have been in the contemplation of thoſe who gave the name. The common derivation *a ſole*, from the ſun, carries no more conviction along with it; nor can we for a moment admit the true orthography to be *Sulanum*, from *Sus*, becauſe the plant is uſeful to ſwine. It is far more prudent to leave *Solanum* among the few ancient names whoſe ſource cannot be traced.—Linn. Gen. 100. Schreb. 134. Willd. Sp. Pl. v. 1. 1025. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 256. Prodr. Fl. Græc. Sibth. v. 1. 154. Ait. Hort. Kew. v. 1. 396. Brown Prodr. Nov. Holl. v. 1. 444. Purſh v. 1. 156. Juſſ. 126. Tourn. t. 62. Lamarck Illuſtr. t. 115. Gærtn. t. 131. (Lycoperſicon; Tourn. t. 63. Melongena; ib. t. 65.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Luridæ*, Linn. *Solaneæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cut half way down into five, erect, acute, permanent ſegments. *Cor.* of one petal, wheel-ſhaped; tube very ſhort; limb large, plaited, ſpreading, ſomewhat reflexed, cut half way down into five acute ſegments. *Stam.* Filaments five, awl-ſhaped, very ſmall; anthers large, erect, oblong, converging, ſlightly connected, of two cells, opening each by a terminal pore. *Piſt.* Germen ſuperior, roundiſh; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma obtuſe. *Peric.* Berry roundiſh, ſmooth, marked with a dot-like ſcar at the ſummit, of two cells, divided by a fleſhy receptacle, which is convex at each ſide. *Seeds* numerous, roundiſh, lodged in ſoft pulp.

Eſſ. Ch. Corolla wheel-ſhaped. Anthers ſlightly connected, opening by two terminal pores. Berry ſuperior, of two cells.

Notwithſtanding the rude and irregular habit of this genus, the flowers are often ſo handſome as to attract much notice, and the fruit is, in ſome caſes, very ſtriking and ornamental. The ſtem is branched, herbaceous or ſhrubby, ſmooth, hairy or prickly. Leaves alternate, ſimple or compound, lobed, cut or entire; ſometimes prickly. Infloreſcence often lateral, and extra-axillary. Corolla blue, purple, white, or yellow. Fruit yellow or red, rarely black or white. The herbage is fœtid, narcotic, and dangerous. Flowers without ſcent. Fruit often very nauſeous, and in no inſtance eatable without dreſſing.

The ſpecies are diſpoſed in three ſections. The fourteenth edition of Linn. Syſt. Veg. contains forty-ſix; Willdenow has eighty-three. Some new ones are added by Brown, Purſh, Aiton, &c. We ſelect the following, adding ſeveral unknown to the author whoſe arrangement we adopt.

Section 1. *Without prickles.* Forty-four ſpecies in Willdenow; two Britiſh.

S. *laurifolium.* Laurel-leaved Nightſhade. Linn. Suppl. 148. Willd. n. 1.—Stem arboreous, unarmed. Leaves ſtalked, ovate-oblong; downy beneath. Panicle terminal, repeatedly forked, divaricated. Calyx briſtly on the inner ſide.—Native of the vaſt foreſts of Surinam; unknown in the European gardens; nor has a figure of this ſpecies appeared. The *branches* are woody, round and ſmooth. *Leaves* near a ſpan in length, entire, pointed, veiny; ſhining, and ſlightly downy, above; clothed with ſoft depreſſed hairs, ſpreading from all the fineſt veins, beneath. *Footſtalks* an inch long, rather ſilky. *Panicle* repeatedly forked and racemoſe, widely ſpreading, compoſed of innumerable *flowers*, of which the *calyx* only remains on our ſpecimens, which is ſmall, with five acute ſpreading ſegments, moſt hairy or briſtly within. *Berries* black, the ſize of a Black Currant.

S. *verbaſcifolium.* Mullein-leaved Nightſhade. Linn. Sp. Pl. 263. Willd. n. 2. Ait. n. 1. Jacq. Hort. Vind. v. 1. 5. t. 13. (S. maximè tomentoſum, ſpinis carens, virginianum; Pluk. Almag. 351. Phyt. t. 316. f. 1.)—Stem ſhrubby, unarmed. Leaves alternate, ſtalked, ovate, denſely downy, entire. Corymbs terminal, divided. Calyx with five ſhort teeth.—Native of the Weſt Indies, from whence Cateſby communicated it to Miller. The plant is preſerved in ſome curious ſtoves, and flowers in ſummer. The *branches*, *ſtalks*, *calyx*, and both ſides of the *leaves*, are hoary, denſely clothed with cloſe ſtarry down. *Flowers* white, with yellow *anthers*, far inferior in ſize and beauty to the Potatoe-bloſſom. The ſhallow diviſions of the *calyx*, and the cloſe, not ſhaggy, *hairs* of the ſtalks and branches, diſtinguiſh it from the *auriculatum* hereafter deſcribed.

S. *inæquale.* Unequal-leaved Woolly Nightſhade.—Stem ſhrubby, unarmed. Leaves in pairs, ſtalked, ovate, entire, denſely downy; unequal at the baſe. Cluſters lateral, divided. Calyx of the fruit in five deep ſegments.—Gathered in New Granada by Mutis. The younger Linnæus confounded

founded the ſpecimen with *S. verbaſcifolium*, from which it eſſentially differs in the inequality of the two ſides of each *leaf*, at the baſe, and eſpecially in the *infloreſcence*. The twin racemoſe *flower-ſtalks* ſpring laterally from the intermediate ſpaces of the branches, between the *leaves*, and two of the latter always grow together, nearly from the ſame point. Whether the *calyx* of the *flower* be deeply divided, we cannot, becauſe of its woollineſs, determine; but that of the *fruit* is ſeparated into five lanceolate ſegments, to the very baſe. *Berry* the ſize of a red currant, beſprinkled with ſtarry hairs.

S. *auriculatum*. Ear-leaved Nightſhade. Ait. ed. 1. v. 1. 246. ed. 2. n. 2. Willd. n. 3. (S. mauritianum; Scop. Del. Inſubr. v. 3. 16. t. 8.)—Stem ſhrubby, unarmed. Leaves ſtalked, ovate, pointed, entire; very ſoft above; acute at the baſe. Stipulas heart-ſhaped. Corymbs terminal, divided. Calyx cloven half way down.—Native of Madagaſcar, the Mauritius, and the Eaſt Indies. A tall *ſhrub*, with the habit of *S. verbaſcifolium*, but larger; the pubeſcence of the *ſtalks* uſually more ſhaggy; the greener upper ſurface of the *leaves* remarkable for a velvet-like ſoftneſs; the under white and woolly. *Calyx* ſeparated half way down into five broad ſegments, which are not deeper in the *fruit* than in the *flower*. The *ſtipulas* are often wanting, but the ſpecies is ſufficiently diſtinct.

S. *Pſeudocapſicum*. Shrubby Winter-cherry Nightſhade. Linn. Sp. Pl. 263. Willd. n. 6. Ait. n. 3. (Amomum Plinii; Lob. Ic. 265. Ger. Em. 361. Pſeudocapſicum; Dod. Pempt. 718. Strychnodendron; Beſl. Hort. Eyſt. æſtiv. arb. t. 14. f. 1.)—Stem ſhrubby, unarmed. Leaves lanceolate, wavy, ſmooth. Umbels lateral, ſeſſile.—Native of Madeira. One of our popular hardy greenhouſe plants from Gerarde's time to this day. The *ſtem* is buſhy, a yard high. *Leaves* ſtalked, ever-green, about two inches long. *Flowers* few together, drooping, white, with orange *anthers*. *Fruit* ſcarlet, globoſe, the ſize of a ſmall cherry.

S. *diphyllum*. Two-leaved Nightſhade. Linn. Sp. Pl. 264. Willd. n. 10. Ait. n. 4. Jacq. Ic. Rar. t. 322. Coll. v. 2. 331. (S. americanum, ſtrychnodendro accedens, fructu medio, antè maturitatem, quaſi fiſſo; Pluk. Phyt. t. 111. f. 4.)—Stem ſhrubby, unarmed. Leaves in pairs, elliptic-oblong, ſmooth; one ſmaller than the other. Flowers cymoſe, oppoſite to the leaves.—Native of the Weſt Indies, from whence it was brought early to this country; but is only occaſionally kept in ſtoves, rather for curioſity's ſake than otherwiſe, being leſs ornamental than the laſt, with ſmaller *flowers* and *fruit*, and much more tender.

S. *Dulcamara*. Woody Nightſhade, or Bitter-ſweet. Linn. Sp. Pl. 264. Willd. n. 15. Fl. Brit. n. 1. Engl. Bot. t. 565. Curt. Lond. faſc. 1. t. 14. Woodv. Med. Bot. t. 33. Fl. Dan. t. 607. (Amara dulcis; Ger Em. 350.)—Stem ſhrubby, twining, unarmed. Upper leaves haſtate. Cluſters cymoſe, drooping, oppoſite to the leaves. Fruit elliptical.—Native of moiſt buſhy places throughout Europe, from Norway to Greece, flowering in ſummer. The branching zigzag *ſtems* climb upon other ſhrubs, and diſplay their elegant bunches of violet-coloured *flowers*, each of whoſe ſegments has two green dots at the baſe, in an elegant manner. The ſcarlet pellucid *berries* are alſo beautiful, though of a bitter and dangerous quality. The *leaves* are ovate, acute, uſually ſmooth, on long ſtalks, ſome ſimple, others haſtate, rarely diſtinctly auricled. The bark and roots are ſaid to be bitter, with a ſubſequent ſweetneſs. The young ſhoots have been recommended, in decoction, for rheumatic and ſcorbutic diſeaſes. We have ſometimes doubted whether this might not be the κυκλαμινος ἑτερα of Dioſcorides, a much diſputed plant: but the flowers are neither white, nor fragrant, as he deſcribes them. We readily concur with Willdenow in believing the Linnæan β, figured in Dill. Elth. t. 273. f. 352, to be a diſtinct ſpecies, nor do we doubt its being the *quadrangulare*, hereafter mentioned.

S. *Seaforthianum*. Lord Seaforth's Nightſhade. Andr. Repoſ. t. 504. Ait. Epit. 374.—Stem ſhrubby, twining, unarmed. Leaves ſimple or ternate, ovate, pointed, ſmooth. Panicles lateral, drooping, compound. Corolla without dots.—Native of the Weſt Indies, from whence it was brought by the late earl of Seaforth. This beautiful ſpecies is ſaid to ſucceed beſt in a conſervatory. Its general appearance reſembles the laſt, but the large pendulous *panicles* of numerous pale-purple *flowers*, deſtitute of green dots, are very different, and extremely ornamental on a trellis. The *infloreſcence* often ſeems terminal, but is properly lateral. Of the *berries* we have no information.

S. *ſcandens*. Climbing Surinam Nightſhade. Linn. Suppl. 147. Amoen. Acad. v. 8. 253. Willd. n. 17.—Stem twining, unarmed. Leaves ovate; heart-ſhaped at the baſe; downy beneath. Panicle terminal, cymoſe. Calyx ſmooth on the inſide.—Native of Surinam. The *leaves* betray a conſiderable affinity to our firſt ſpecies, *laurifolium*, but the downineſs of their under ſurface conſiſts of little, forked or ſtarry, ſcattered hairs, not of ſimple ones proceeding in double rows from each vein. The *branches* moreover are long and flaccid, apparently herbaceous; and the *calyx* is not briſtly within, but nearly ſmooth on both ſides. *Corolla* downy, divided almoſt to the bottom. Lower half of the *ſtyle* hairy. *Berries* the ſize of a cherry.

S. *quercifolium*. Oak-leaved Nightſhade. Linn. Sp. Pl. 264. Willd. n. 20. Ait. n. 6. (S. foliis quernis; Feuill. Peruv. 722. t. 15.)—Stem ſomewhat herbaceous, angular, zig-zag, rough-edged, erect, unarmed. Leaves pinnatifid. Cluſters cymoſe.—Gathered by Feuillé, on the mountains of Valparaiſo, in Chili. Linnæus raiſed the plant at Upſal, from ſeeds ſent by Juſſieu, but it has only lately found its way to the Engliſh gardens. The *root* is thick, fleſhy, and perennial. *Stem* four or five feet high, branched, leafy, with ſeveral unequal angles, that are rough, with minute ſharp tubercles. *Leaves* regularly pinnatifid, of five or ſeven bluntiſh, entire, rather diſtant lobes, nearly ſmooth; their long *footſtalks* ſlightly winged. *Flowers* drooping, violet, with yellow *anthers*; their *corolla* broader than that of *S. Dulcamara*. *Berries* red, ovate.

S. *radicans*. Rooting Nightſhade. Linn. Sp. Pl. 264. Willd. n. 22. Ait. n. 8. Linn. fil. Dec. 1. 19. t. 10.—Stem ſomewhat herbaceous, unarmed, roundiſh, proſtrate, nearly ſmooth, taking root. Leaves pinnatifid. Cluſters cymoſe.—Native of Peru. Very nearly related to the laſt, but differing in its proſtrate creeping *ſtem*, whoſe angles are leſs marked, and almoſt ſmooth. The ſegments of the *leaves* are never more than five. *Cluſters* ſimple. *Flowers* fewer and ſmaller, white; purpliſh beneath. *Berries* yellow, globoſe or two-lobed.

S. *laciniatum*. Cut-leaved Nightſhade. Ait. ed. 1. v. 1. 247. ed. 2. n. 7. Willd. n. 21. Br. n. 4. Curt. Mag. t. 349. (S. aviculare; Forſt. Prodr. 18. Pl. Eſcul. 42.)—Stem ſomewhat ſhrubby, unarmed, ſmooth. Leaves linear-lanceolate, undivided or pinnatifid, entire, ſmooth. Cluſters lateral, corymboſe. Calyx cloven half way down. Segments of the corolla emarginate. Stamens ſpreading. Berry oval.—Native of New Zeeland, New South Wales, and Van Diemen's land. A greenhouſe ſhrub, introduced by ſir J. Banks in 1772. The *leaves* are dark green, nearly ſeſſile; ſometimes quite undivided, ſometimes deeply pinnatifid, on the ſame or a different plant; their length from four to eight inches. *Flowers* purple, large and handſome, with rounded notched ſegments. *Anthers* yellow, ſoon widely ſpreading from each other. *Fruit* yellow, the ſize of a large plum, acid, ſweetiſh, but with a diſagreeable flavour. Forſter ſays the inhabitants, as well as the ſmall birds, of New Zeeland, greedily devour this fruit, nor did the European voyagers entirely reject it.

S. *corymboſum*. Corymboſe Peruvian Nightſhade. Ait. ed. 1. v. 1. 248. ed. 2. n. 11. Willd. n. 26. Jacq. Ic. Rar. t. 40. Coll. v. 1. 78. Retz. Obſ. faſc. 5. 22.—Stem unarmed, ſomewhat ſhrubby, ſmooth. Leaves ovato-lanceolate, entire; tapering at the baſe. Flower-ſtalks lateral, branched, corymboſe.—Found by Dombey at Lima, growing near waters. M. Thouin ſent ſeeds to Kew in 1786, when we ſaw the plant flowering in the ſtoves at Paris, in Auguſt. Its beauty ſcarcely exceeds our wild *S. nigrum*. The *flowers* are copious, ſmall, purpliſh. *Cluſters* ſeveral together, on a common corymboſe ſtalk, oppoſite to each leaf. *Berries* ſcarlet, the ſize of a ſmall pea.

S. *quadrangulare*. Quadrangular African Nightſhade. Linn. Suppl. 147. Willd. n. 27. Thunb. Prodr. 36. (S. Dulcamara β; Linn. Sp. Pl. 264. S. craſſifolium; Lamarck Dict. v. 4. 284. S. dulcamarum africanum, foliis craſſis hirſutis; Dill. Elth. 365. t. 273. t. 352.)—Stem ſhrubby, unarmed, angular, rough. Leaves ovate; undivided, or with angular lobes. Panicles terminal, cymoſe.—Found by Thunberg, at the Cape of Good Hope. Cultivated by Sherard at Eltham, and therefore entitled to a place in Mr. Aiton's work. The figure of Dillenius is very characteriſtic, as to the *foliage* and *flowers*, but does not expreſs the remarkably angular *ſtem*, except towards the top of the ſpecimen. Hence it has been overlooked with regard to this plant. The *branches* in Thunberg's two ſpecimens before us are irregularly quadrangular, very rough, with callous points and briſtly hairs. *Leaves* ſtalked, fleſhy, ſmooth, except at the edges, an inch or inch and half long, obtuſe, ovate; either quite entire, or on luxuriant ſhoots, furniſhed with one or two large, prominent, tooth-like lobes at each ſide. *Flowers* larger, paler, and leſs expanded than in our *Dulcamara*; the points of the *corolla* hairy.

S. *bonarienſe*. Tree Nightſhade. Linn. Sp. Pl. 264. Mant. 205. Willd. n. 29. Ait. n. 12. (S. bonarienſe arboreſcens, papas floribus; Dill. Elth. 364. t. 272. f. 351.)—Stem ſhrubby, nearly unarmed. Leaves ovate-oblong, waved and ſinuated, rough. Fruit half the diameter of the flowers.—Native of Buenos Ayres. Raiſed from ſeed by Sherard in 1726, or thereabouts, and now a frequent greenhouſe plant, of a tall buſhy habit, eſteemed for its copious large white *flowers*, with orange *anthers*. The *leaves* are from three to ſix inches long, beſprinkled with little ſtarry rigid hairs. *Flower-ſtalks* corymboſe, oppoſite to the leaves. *Berries* yellow, ſcarcely half an inch broad. The young *ſtems* are prickly in the lower part, and indeed not unfrequently in the upper, ſo that this ſpecies would ſtand better in the ſecond ſection.

S. *macrocarpon*. Large-fruited Nightſhade. Linn. Mant. 205. Willd. n. 30. Ait. n. 13. (S. caule inermi ſuffruticoſo, foliis oblongo-ovatis ſinuatis utrinque glabris, floribus alaribus; Mill. Ic. v. 2. 196. t. 294. Lycoperſicum arboreſcens, foliis angulatis, fructu aureo; Plum. Ic. 219. t. 224. f. 2.)—Stem ſhrubby, unarmed. Leaves wedge-ſhaped, waved and ſinuated, ſmooth. Fruit thrice the diameter of the flowers.—Native of Peru. A ſtove-plant, cultivated by Miller, and flowering in ſummer. This is of a larger ſize, and ſtouter habit, than the laſt, with which Linnæus long confounded it. The *flowers* are blue; their *corolla* ſmaller, with more pointed ſegments, and the *corymbs* leſs compound, than in *S. bonarienſe*, but the *fruit* is ten times as large, ſupported by a ſhort thick ſtalk.

S. *tuberoſum*. Common Potatoe. Linn. Sp. Pl. 265. Willd. n. 31. Ait. n. 14. (S. tuberoſum eſculentum; Bauh. Prodr. 89. Battata virginiana; Ger. Em. 927. Papas Peruanorum; Beſl. Hort. Eyſt. autumn. t. 27. f. 1.)—Stem unarmed, herbaceous. Leaves interruptedly pinnate, entire. Flower-ſtalks ſubdivided.—Native of Peru. Gerarde ſays he received roots from Virginia, which ſucceeded well in his garden. No ſimilar acquiſition was ever more important to this country. The *herbage* is annual, impatient of cold, buſhy, with copious roughiſh *leaves*, pinnate in a lyrate form, with very ſmall intermediate leaflets. *Flowers* panicled, large, purpliſh or white, drooping, very handſome. *Fruit* globoſe, purpliſh.—For the different varieties, uſes, and cultivation of this valuable plant, ſee POTATOE.

S. *Lycoperſicum*. Tomato, or Love-apple. Linn. Sp. Pl. 265. Willd. n. 33. Ait. n. 15. (Poma amoris; Camer. Epit. 821. Ger. Em. 346. Beſl. Hort. Eyſt. autumn. t. 1, 2.)—Stem unarmed, herbaceous. Leaves interruptedly pinnate, cut. Cluſters deeply divided, leafleſs. Fruit ſmooth.—Native of South America. A tender annual, cultivated in England ever ſince Gerarde's time, for the ſake of its large, variouſly-ſhaped, ſcarlet or orange *fruit*, which many people eſteem a great luxury, either in ſoups; or broiled with pepper and ſalt, as an addition to roaſt-meat, or game. In the hotter parts of Europe, the Tomato has more acidity and briſkneſs of flavour, and is therefore the more welcome in ſuch climates. It has alſo the reputation of being ſtimulant, or aphrodiſiacal. The *root* is fibrous. *Herb* of rank growth, weak and decumbent, fœtid, glutinous, downy. *Leaflets* acute, coarſely cut and toothed, with a double ſeries of ſmall ſtalked intermediate ones. *Flowers* yellow, in large divided bunches. *Fruit* ſhining, pendulous, very ornamental.—Whether Jacquin's *Pſeudo-lycoperſicum*, with its ſimple *cluſters*, and ſmall globular *fruit*, be a diſtinct ſpecies, we greatly doubt; ſee his Hort. Vind. v. 1. t. 11. Linnæus did not diſtinguiſh it. Nor have we abſolute confidence even in *S. peruvianum*, Linn. Sp. Pl. 265. Willd. n. 35. Jacq. Coll. v. 2. 284. Ic. Rar. t. 327, diſtinguiſhed by its bracteated or leafy *cluſters*, and ſomewhat downy *fruit*. Its *root* indeed is perennial, and the herbage more compact, neat, and hoary, than the common Love-apple.

S. *multifidum*. Ragwort-leaved Nightſhade. Lamarck Dict. v. 4. 287. Illuſtr. t. 115. f. 3, not 2.—Stem herbaceous, unarmed, winged. Leaves doubly pinnatifid, obtuſe. Panicle cymoſe.—Gathered by Dombey, in ſandy ground at Lima. The *root* is fibrous, apparently annual. *Stem* twelve or eighteen inches high, branched, ſpreading, leafy, bordered at each ſide with an entire, uninterrupted wing. *Leaves* ſucculent, rather downy, elegantly ſubdivided, decurrent; all their lobes obtuſe. *Flowers* white, or purpliſh, ſeveral together, in long-ſtalked, terminal, cymoſe or forked *panicles*. *Corolla* but ſlightly divided.

S. *nigrum*. Common or Garden Nightſhade. Linn. Sp. Pl. 266. Willd. n. 39. Fl. Brit. n. 2. Engl. Bot. t. 566. Fl. Dan. t. 460. Curt. Lond. faſc. 2. t. 14. Woodv. Med. Bot. t. 226. (S. hortenſe; Ger. Em. 339. Camer. Epit. 812. Matth. Valgr. v. 2. 415.)—Stem herbaceous, unarmed, erect. Leaves ovate, with tooth-like angles. Umbels lateral, drooping.—Native of cultivated and waſte ground in all parts of the world. *Root* annual. *Stem* buſhy, more or leſs angular. *Leaves* ſcattered, ſtalked, ovate, ſlightly downy; elongated at the baſe; either entire, wavy, or coarſely toothed, at the margin. *Umbels* lateral, not quite oppoſite to the leaves, ſolitary, ſtalked, compoſed of numerous ſmall white *flowers*, with yellow *anthers*. *Berries* the ſize of currants, uſually black, but occaſionally yellow, even in England, according to Hudſon. Authors enumerate ſeveral varieties of this ſpecies, differing in the more or leſs angular, and ſomewhat criſped or toothed, *ſtem*, and more hairy or ſmoother *herbage*. Willdenow ſays theſe are permanent, but we can ſcarcely define the diſtinctive marks of each. Several of them are exhibited in Dill. Elth. t. 274 and 275.

S. *anguſtifolium*. Narrow-leaved Nightſhade. Lamarck Dict. v. 4. 291.—Stem unarmed, ſomewhat herbaceous. Leaves ſtalked, linear-lanceolate, obtuſe, entire, ſmooth. Cluſters lateral, divided.—Gathered by Commerſon at Buenos Ayres. The *ſtem* is branched, leafy, ſomewhat angular, zigzag, or perhaps rather twining. *Leaves* alternate, uniform, about two inches long, and a quarter or half an inch broad, with one rib, and a few lateral connected veins. *Flowers*, in our ſolitary ſpecimen, certainly not terminal, but oppoſite to a leaf, in a divided *cluſter*, not numerous, on long partial ſtalks. *Calyx* hemiſpherical, nearly or quite ſmooth, with very unequal broad ſegments. *Corolla* blue, half an inch wide, finely downy at the outſide.

S. *betaceum*. Beet-leaved Nightſhade. Cavan. Ic. v. 6. 15. t. 524. Ait. n. 18. Andr. Repoſ. t. 511.—Stem ſhrubby, round, unarmed. Leaves ovate, pointed, fleſhy, ſmooth; heart-ſhaped at the baſe; wavy at the edges. Cluſters lateral, ſtalked, divided, pendulous.—Probably a native of South America. Seeds were ſent, in 1803, by Cavanilles, from the Madrid garden to the writer of this article. The plant is gigantic, twelve feet high or more, fleſhy, very fœtid when touched or bruiſed, growing luxuriantly if turned out againſt a ſouth wall in ſummer, but not of ſufficient beauty to excite general notice. Some *leaves* meaſure twenty inches in length, and fifteen in breadth. The *flowers* are ſmall in proportion, not quite ſo big as a potatoe-bloſſom, but more deeply divided, light purple with yellow *anthers*.

S. *Melongena*. Egg-plant Nightſhade. Linn. Sp. Pl. 266. Willd. n. 41. Ait. n. 19. (Melongena; Camer. Epit. 820. Matth. Valgr. v. 2. 424. Mala inſana; Ger. Em. 345. Fuchſ. Hiſt. 533. Melauzana fructu pallido; Beſl. Hort. Eyſt. autumn. t. 3.)—Stem herbaceous, unarmed. Leaves ovate, wavy, clothed with ſtarry down. Flower-ſtalks deflexed, ſwelling. Calyx moſtly unarmed. Fruit ovate, ſmooth and even. Native of tropical climates; cultivated in various parts of the world by means of hot-beds or ſtoves, for the ſake of its *fruit*, which reſembles a large egg, and is uſually of a pure poliſhed white, though ſometimes tinged with violet. It is eaten in Italy, Spain, and other warm countries, like the Tomato. We have under the article MELONGENA, traced the origin of that word, and ventured to derive from thence the frightful appellation of *Mala inſana*, Mad-apples, given to the fruit in queſtion, which it appears not particularly to deſerve. The *herbage* is branched, clothed with ſtarry, not very denſe, pubeſcence. *Flowers* purpliſh, large, drooping, lateral or axillary, not many together. Segments of the *calyx* lanceolate, or nearly linear; ſometimes prickly.—Gerarde ſays of theſe apples, "the people of Toledo eat them with great devotion, being boiled with fat fleſh, putting to it ſome ſcraped cheeſe, which" (the apples) "they do keep in vinegar, honey, or ſalt pickle, to procure luſt."

Section 2. *Prickly*. Thirty-eight ſpecies in Willdenow; none Britiſh.

S. *inſanum*. Prickly Mad-apples. Linn. Mant. 46. Willd. n. 45. (S. pomiferum, magno fructu ex albo et atropurpureo nitente, foliis et calyce ſpinoſis; Pluk. Phyt. t. 226. f. 3. S. pomiferum, fructu nigro ſpinoſo; Moriſ. ſect. 13. t. 2. f. 2.)—Stem prickly, herbaceous. Leaves ovate, ſinuated, denſely downy. Flower-ſtalks deflexed, ſwelling. Calyx armed with ſtrong prickles. Fruit oblong, ſmooth, furrowed.—Native of tropical climates. Linnæus originally confounded this plant with *S. Melongena*, of which it may, after all, be only a thorny variety. *Trongum hortenſe*, Rumph. Amboin. v. 5. 238. t. 85, ſeems rather to belong to the *Melongena*.

S. *mammoſum*. Nipple Nightſhade or Bachelor's Pear. Linn. Sp. Pl. 267. Willd. n. 51. Ait. n. 24. Purſh n. 3. (S. barbadenſe ſpinoſum, foliis villoſis, fructu aureo rotundiore, pyri parvi inverſi formâ et magnitudine; Pluk. Phyt. t. 226. f. 1. Pomum Sodomæ; Merian. Surin. 27. t. 27.)—Stem hairy, prickly, herbaceous. Leaves heart-ſhaped, lobed and angular; prickly and hairy on both ſides. Fruit pointed.—Native of the Weſt Indies. An annual ſtove-plant, which may perhaps have been frequently introduced, and ſoon again loſt. The whole of the *herbage* is very villous, the *footſtalks*, and ribs of the *leaves*, more eſpecially, armed with formidable ſtraight yellow thorns. *Flowers* pale blue, in ſmall lateral cluſters, with a hairy *calyx*, and large *anthers*. *Fruit* ſolitary, yellow, about two inches long, ovate with a point. Merian ſays it is very poiſonous to men and beaſts. Mr. Purſh found this ſpecies on the ſea-coaſts of Virginia and Carolina, its ſeeds, as we ſhould ſuppoſe, having floated thither.

S. *virginianum*. Virginian Nightſhade. Linn. Sp. Pl. 267. Willd. n. 55. Ait. n. 25. Purſh n. 4. (S. americanum laciniatum ſpinoſiſſimum; Dill. Elth. 360. t. 267. S. annuum nigricans virginianum ſpinoſiſſimum latè ſe ſpargens, flore cæruleo, glabrum; Pluk. Phyt. t. 62. f. 3.)—Leaves pinnatifid, with ſinuated obtuſe ſegments, ciliated, very prickly on both ſides, as well as the herbaceous upright ſtem, the ſtalks, and the calyx. Fruit globoſe.—On road-ſides, and in ſandy fields, from Virginia to Carolina, flowering in July. *Purſh*. A tender biennial with us. The *root* is fibrous. *Stem* branched, erect, ſpreading. *Leaves* three or four inches long, deeply ſinuated and cut, minutely fringed, but otherwiſe the whole plant is deſtitute of pubeſcence, though every where copiouſly armed with awl-ſhaped pale-yellowiſh thorns, ſometimes near an inch long. *Flowers* lateral, diſtant from the leaves, ſimply racemoſe, blue. *Fruit* ſmall, globoſe, variegated with green and white.

S. *Jacquini*. Jacquin's Nightſhade. Willd. n. 56. Ait. n. 26. (S. virginianum; Jacq. Coll. v. 2. 285. Ic. Rar. t. 332.)—Leaves pinnatifid, with ſinuated obtuſe ſegments, ſmooth, very prickly on both ſides, as well as the decumbent, ſpreading, herbaceous ſtem, the ſtalks, and the calyx. Fruit globoſe.—Native of the Eaſt Indies, iſle de Bourbon, &c. Sent to Kew by ſir Joſeph Banks about 1804. A tender annual, flowering in September and October. Very nearly akin to the laſt, but the decumbent *ſtem*, and ſmooth edges of the *leaves*, are, in conſideration of its oriental origin, ſuppoſed to indicate a ſpecific difference. Some ſtarry hairs occur on the young *leaves*, and extremities of the *branches*. The *fruit* is the ſize of a gooſeberry, variegated with light and dark green. *S. xanthocarpum*, Schrad. Sert. Hannov. t. 2, is too nearly related to this to be conſidered as more than a variety.

S. *ſodomeum*. Dark-thorned Nightſhade. Linn. Sp. Pl. 268. Willd. n. 63. Ait. n. 29. Sm. Fl. Græc. Sibth. t. 235, unpubliſhed. (S. pomiferum fruteſcens africanum ſpinoſum nigricans, borraginis flore, foliis profundè laciniatis; Herm. Lugd. Bat. 573. t. 575. Tourn.

Inſt. 149. S. pomiferum, foliis quercûs utrinque ſpinoſis, flore borraginis; Moriſ. ſect. 13. t. 1. f. 15.)—Stem ſhrubby, round, prickly. Leaves deeply pinnatifid, roundly lobed, roughiſh, with ſcattered thorns. Calyx prickly, much ſhorter than the fruit.—Native of Africa, and the ſouth of Europe. A greenhouſe ſhrub, flowering in June and July. The *ſtem* is erect, branched, brown or purpliſh, more or leſs roughiſh, like the reſt of the herbage, with ſomewhat ſtarry hairs, and bearing, like the ribs of the *leaves* above and below, and all the *ſtalks*, copious, ſtrong, browniſh, ſcarcely black, ſtraight thorns, broad at the baſe. The *leaves* are green, very deeply, often doubly, pinnatifid, with wide ſinuſes, and blunt rounded lobes, like thoſe of ſome American oaks. *Cluſters* lateral, ſimple. *Flowers* large and handſome, purple, with ſhortiſh yellow *anthers*. *Calyx* very thorny. *Fruit* yellow, globoſe, pendulous, an inch or two in diameter.

S. *Pyracantha*. Orange-thorned Nightſhade. Lamarck Dict. v. 4. 299. Ait. n. 30. Sm. Exot. Bot. v. 2. 9. t. 64.—Stem ſhrubby, very thorny, as well as the foliage and calyx. Leaves oblong, acute, pinnatifid, denſely downy. Cluſters lateral, woolly.—Native of Madagaſcar. Sent by M. Thouin, in 1789, to Mr. Aiton. It flowers in the ſtove in Auguſt and September, but, according to Mr. Lambert, ſucceeds well during autumn, if turned out under a ſouth wall. The whole plant is rendered very brilliant by the copious, large, bright-orange thorns, and the downy ribs of the *leaves* are of the ſame rich hue. Each *leaf* is often a foot long, with ſpreading, parallel, acute, lanceolate, angular lobes, clothed on both ſides with denſe, white, ſtarry pubeſcence. *Branches* and *ſtalks* woolly. *Cluſters* ſimple. *Calyx* woolly, thorny at the baſe only; its ſegments linear-lanceolate. *Corolla* violet, with green branching veins. *Anthers* yellow, equal. *Stigma* ſimple. *Berry* globoſe, reddiſh.

S. *ſiſymbrifolium*. Rocket-leaved Nightſhade. Lamarck Dict. v. 4. 307.—Stem ſhrubby, thorny, as well as the foliage and calyx. Leaves doubly pinnatifid, acutely notched, hairy. Cluſters lateral, with hairy ſtalks. Stigma two-lobed.—Gathered at Buenos Ayres, by Commerſon, whoſe ſpecimen is before us. The *leaves* are not half ſo long as the laſt, but broader in proportion, and green, not white or hoary, their pubeſcence, and that of the whole herbage, being ſimply hairy, apparently viſcid, not at all ſtellated. The *thorns* are ſlender, of a tawny or orange hue, and are extremely abundant about the baſe of the *calyx*. *Cluſters* longer than the leaves, ſimple, of a few large, white, or bluſh-coloured, *flowers*, whoſe *ſtigma* is capitate, of two downy lobes.

S. *argentatum*. Silvery-coated Nightſhade.—Stem ſhrubby, prickly, as well as the foliage and calyx. Leaves oblong, obtuſe, bluntly ſinuated, clothed, like the ſtalks, calyx, and back of the corolla, with depreſſed, ſtarry ſcales.—Native of Buenos Ayres. We preſume this may be the ſuppoſed variety, mentioned by M. Poiret in Lamarck, with ſimply pinnatifid *leaves*. Probably that able botaniſt viewed it but ſlightly, for nothing can be more diſtinct than our plant, gathered by Commerſon, nor are many of its genus more elegant. The *leaves*, on long ſpinous *ſtalks*, are pretty exactly of the ſize and figure of our Common Oak, but thickly clothed on both ſides with curious ſtarry ſcales, rather than hairs, more denſe and hoary on the under ſurface, and more ſilvery on the *flower-ſtalks*, *calyx*, and even the back of the *corolla* itſelf. The *thorns* of the whole plant are ſlender, and orange-coloured. The *calyx* is bell-ſhaped, angular, with ſhort ſlender teeth; its baſe prickly.

S. *cornutum*. Horn-flowered Nightſhade. Lamarck Dict. v. 4. 308. "Juſſ. Annal. du Muſ. d'Hiſt. Nat. v. 3. 120. t. 9;" *Purſh*.—Stem herbaceous, thorny, as well as the foliage and calyx. Leaves doubly pinnatifid, lyrate, nearly ſmooth. Anthers declining; the lower one much the largeſt.—Native of Vera Cruz, from whence Thierry de Menonville brought ſeeds to the Paris garden. We know not whether the *root* or *ſtem* be perennial or no, but the plant ſeems of luxuriant growth, with copious, long, ſlender, pale-yellow thorns. The *leaves* are green, not hairy, but roughiſh with minute points, at leaſt in a dry ſtate; the whole leaf, as well as each diviſion, particularly the terminal one, elegantly lyrate; the ribs beſet with fine briſtly thorns. *Cluſters* lateral, denſe, with ſlightly downy ſtalks. *Flowers* large, yellow, remarkable for the great ſize of their lowermoſt *anther*.

S. *heterandrum*. North American Horned Nightſhade. Purſh n. 6.—Stem herbaceous, thorny, as well as the foliage and calyx. Leaves doubly pinnatifid, hairy and downy on both ſides; their ſegments obtuſe. Anthers ſpreading; the lower one as long as the corolla. Berry encloſed in the armed calyx.—Found by Mr. Nuttall, on the banks of the Miſſouri, flowering in July. Annual, with large yellow *flowers*. Nearly allied to the laſt. *Purſh*.

S. *capenſe*. Thorny Cape Nightſhade. Linn. Suppl. 147. Willd. n. 64. Thunb. Prodr. 37.—Stem ſhrubby, round, thorny, as well as the foliage and calyx. Prickles crowded, ſtraight. Leaves bluntly pinnatifid, rough with ſtarry hairs. Fruit-ſtalks lateral, in pairs, unarmed, recurved.—Brought by Thunberg from the Cape of Good Hope. The *ſtem* is woody, very much branched, knotty, rigid, apparently of humble ſtature, armed with plentiful, ſharp, ſtraight, tawny prickles, from a quarter to half an inch long; the young *branches*, and *ſtalks*, clothed with lax ſtarry hairs. The *leaves* are ſtalked, barely an inch long, ſinuated like an oak-leaf, with two rounded lobes at each ſide, bearing a few large prickles, and clothed all over with the ſame ſtarry pubeſcence as the ſtalks, though deſcribed by the younger Linnæus and Thunberg as naked. The *flowers* we know nothing of. *Berries* globoſe, orange-coloured, poliſhed, naked, the ſize of Black Currants, two or three together, on ſtrong recurved *ſtalks*, ſhorter than the leaves, and almoſt entirely deſtitute of prickles, though the deeply-divided calyx bears ſeveral large ones. No figure, nor, till now, any full deſcription, of this ſpecies has been publiſhed.

S. *marginatum*. White-margined Nightſhade. Linn. Suppl. 147. Willd. n. 65. Ait. n. 31. Jacq. Coll. v. 1. 50. Ic. Rar. t. 45.—Stem ſhrubby, woolly, prickly, as well as the foliage and ſtalks. Leaves heart-ſhaped, waved or ſinuated, white-edged; denſely woolly beneath.—Said to have been brought by Mr. Bruce, the celebrated traveller, from Abyſſinia, or at leaſt from Africa, and introduced at Kew in 1775. Jacquin gives Paleſtine as its native country. This is a handſome greenhouſe *ſhrub*, flowering moſt part of the ſummer, and diſtinguiſhed by the pure-white margin of its rather large *leaves*, on the upper ſide, eſpecially when young. The ſnowy, granulated, minutely ſtarry pubeſcence of the whole plant, very denſe on the backs of the *leaves*, is alſo ſtriking. The *prickles* are ſmall and few. *Flowers* the ſize of a potatoe-bloſſom, cymoſe, with purple ribs. *Calyx* woolly, unarmed, ſplitting unequally. *Fruit* ovate, of a dirty yellow.

S. *Veſpertilio*. Bat-flowered, or Canary, Nightſhade. Ait. ed. 1. v. 1. 252. ed. 2. n. 33. Willd. n. 67. Wendl. Hort. Herrenh. faſc. 4. 5. t. 21. (Nycterium cordifolium; Venten. Malmaiſ. t. 85.)—Stem ſhrubby, prickly. Prickles conical. Leaves heart-ſhaped, undivided; woolly beneath.

Corolla irregular. Lower anther greatly elongated.—Brought by Mr. Maſſon, from the Canary iſlands, in 1779. A greenhouſe ſhrub, flowering in March and April. The upright branching *ſtem* is armed with abundance of ſhort, ſtraight, conical, browniſh *prickles*. *Leaves* the ſhape and ſize of thoſe of the *Catalpa;* green, beſprinkled with minute ſtarry hairs, above; denſely downy, and hoary, beneath. *Flowers* about the ſize of the laſt, and in like manner lateral and cymoſe, often, if not always, four-cleft and tetrandrous, their *ſtalks*, unarmed *calyx*, and back of the purple irregular *corolla*, covered with ſtarry down. Lowermoſt *anther* declining, ending in a long recurved beak, as in *S. cornutum* and *heterandrum*, already deſcribed, upon which character principally Ventenat founds his genus of *Nycterium*, ſo called from νυκτερις, *a bat*. Such a genus would differ from *Solanum* nearly as *Celſia* does from *Verbaſcum*, and if ſeveral more ſpecies ſhould occur, it might, for convenience at leaſt, be adopted.

S. *tomentoſum*. Woolly Nightſhade. Linn. Sp. Pl. 269. Willd. n. 70. Ait. n. 34. Thunb. Prodr. 36. (S. coccineum; Jacq. Miſc. v. 2. 329. Ic. Rar. t. 43. S. ſpinoſum, maximè tomentoſum; Bocc. Sic. 8. t. 5. f. 1.)—Stem ſhrubby, with a few briſtly prickles. Leaves heart-ſhaped, unarmed, wavy, clothed with denſe ſtarry wool on both ſides.—Native of the Cape of Good Hope; introduced into the European greenhouſes about the middle of the 17th century. A pretty ſpecies, with a zig-zag *ſtem* of no great elevation, its branches and whole herbage remarkably woolly and white, with a few ſcattered, minute, needle-like prickles, eſpecially on the *flower-ſtalks*. The pubeſcence of the young budding *leaves* is uſually tinged with violet. *Calyx* bell-ſhaped, cloven half way down, unarmed. *Corolla* purple or lilac, woolly at the outſide. *Fruit* globoſe, of a beautiful ſcarlet, varying in ſize from that of a pea to a ſmall gooſeberry.

S. *giganteum*. Tall Snowy-leaved Nightſhade. Jacq. Coll. v. 4. 125. Ic. Rar. t. 328. Willd. n. 74. Ait. n. 36. (S. niveum; Thunb. Prodr. 36. Vahl. Symb. v. 2. 41.)—Stem ſhrubby, armed with downy conical prickles. Leaves elliptic-lanceolate, acute, unarmed; ſmooth above; ſnow-white and downy beneath. Cluſters terminal, forked, cymoſe. Fruit erect.—Native of the Cape of Good Hope. Introduced by Mr. Maſſon, in 1792. A greenhouſe ſhrub, flowering in June and July, of a tall and ſtriking habit, like that of ſome *Echium* or *Tournefortia*. The *branches* are thick and round. *Prickles* copious, ſhort. *Leaves* numerous about the tops of the branches, from three to five inches long, ſtalked, recurved; dark green above; peculiarly white and ſoft beneath. *Flowers* numerous, purple, rather ſmall, drooping, on corymboſe ſtalks, which become entirely erect as the *fruit* advances.

S. *rubiginoſum*. Ruſty Nightſhade.—Stem ſhrubby, armed, like the footſtalks and ribs of the leaves, with hooked prickles. Leaves elliptical, acute; nearly naked above; downy and ruſty beneath. Cluſters terminal, forked, cymoſe. Corolla downy.—Gathered in Cayenne by Mr. Von Rohr, who ſent it to ſir Joſeph Banks as the *S. rubiginoſum* of Richard. But we find no ſuch name in the catalogue of Cayenne plants by this botaniſt, in the Actes de la Soc. d'Hiſt. Nat. de Paris, v. 1. 105. Aublet appears by his herbarium to have called this ſpecies *rhamnoides*, but it does not occur in his book. The dried ſpecimen is diſtinguiſhed by a peculiarly ſtriking ruſty tint, which may poſſibly not be ſo ſtrong in the living plant. The *branches* are round, covered with brown, minutely ſtarry, cloſe down, and armed with numerous, ſmall, ſmooth, very ſharp, ſtrongly hooked prickles. *Footſtalks* an inch long, angular, ſimilarly clothed and armed. *Leaves* three or four inches in length, and an inch and a half in breadth, entire, with one rib, prickly in the lower part, and many interbranching veins; their upper ſurface green, ſhining, ſmooth and naked, except a few ſcattered, rigid, ſtarry hairs, which cauſe a roughneſs to the touch; under ſurface marked with prominent veins, and denſely covered with cloſe, ſhining, ruſty or whitiſh, ſoft, ſtarry down. *Infloreſcence* ſimilar to the laſt, to which this fine ſpecies ſeems moſt akin, but the *ſtalks*, *calyx*, and under ſide of the *corolla*, are clothed with ruſty ſtarry pubeſcence. The *branch* is ſubſequently continued beyond the *flowers*.

S. *polyacanthos*. Many-thorned Nightſhade. Lamarck Tabl. Encycl. v. 2. 23. n. 2377. Dict. v. 4. 304 Willd. n. 79. (S. parviflorum; Cavan. Ic. v. 3. 19. t. 236. Phytolacca fruteſcens ſpinoſiſſima, foliis anguſtis et criſpis; Plum. Ic. 218. t. 224. f. 1.)—Stem ſhrubby, very prickly as well as the foliage. Prickles long, ſtraight, and ſlender. Leaves linear-lanceolate, obtuſe, ſlightly waved, nearly ſeſſile, hairy. Stalks axillary, ſingle-flowered.—Native of Hiſpaniola, where our ſpecimen was gathered by Thierry. The whole herbage is exceſſively prickly, with yellow needle-like thorns, green, rough with ſtarry hairs, not hoary. *Leaves* copious, an inch and a half long, rather convex, all ſimple and undivided. *Flowers* very ſmall, ſolitary, drooping, white. *Berry* globoſe, hardly bigger than a muſtard-ſeed. *Calyx* unarmed.

S. *igneum*. Red-ſpined Nightſhade. Linn. Sp. Pl. 270. Willd. n. 80. Ait. n. 37. Jacq. Hort. Vind. v. 1. 5. t. 14. (S. ſpiniferum fruteſcens, ſpinis igneis, americanum; Pluk. Phyt. t. 225. f. 5.)—Stem ſhrubby, prickly, as well as the footſtalks and foliage. Prickles ſcattered, ſomewhat conical, ſhining. Leaves lanceolate, entire, ſlightly downy on both ſides.—Native of South America. Cultivated for more than 100 years paſt in the ſtoves of this country, where it is moſt conſpicuous for the little ſhining flame-coloured thorns, ſometimes making the ſhrub look as if on fire. The *branches* are round. *Leaves* ſtalked, green, three or four inches long. *Flowers* white, often only four-cleft, in ſlender, ſimple, lateral cluſters.

S. *ſtelligerum*. Starry Nightſhade. Sm. Exot. Bot. v. 2. 57. t. 88. Brown. n. 8.—Stem ſhrubby, prickly, with taper thorns. Leaves lanceolate, entire, unarmed; ſmooth above; denſely woolly and veiny beneath. Wool ſtarry. Corymbs lateral.—Native of New South Wales, as well as of the tropical part of New Holland, in which laſt-mentioned country the prickles were obſerved by Mr. Brown to be more perfectly ſtraight. This pretty ſpecies has not yet appeared in any garden. The *ſtem* is buſhy, from three to five feet high, with round, downy, leafy, prickly *branches*, but every other part is unarmed. *Leaves* about three inches long, on woolly *ſtalks;* their upper ſide green, ſhining, quite ſmooth except the rib; under covered with denſe white wool, compoſed of ſtarry hairs, elevated on ſtalks. *Flowers* numerous, three-quarters of an inch broad, light blue, with orange *anthers*, each of whoſe terminal pores is cloſed by a ſeparate lid. *Berries* ſcarlet, erect, the ſize of a currant, not longer than the lanceolate ſegments of their unarmed *calyx*.

S. *Milleri*. Miller's Nightſhade. Jacq. Coll. v. 4. 209. Ic. Rar. t. 330. Willd. n. 81. Ait. Epit. 374. (S. trilobatum, floribus parvis albis; Linn. Sp. Pl. 270. S. Schiru-ſchuna; Mill. Dict. ed. 8. n. 32.)—Stem ſhrubby, armed with hooked compreſſed prickles. Leaves ſinuated or pinnatifid, obtuſe, ſlightly prickly, ſmooth. Stalks moſtly in pairs, ſingle-flowered.—Native of the Cape of Good Hope. Cultivated by Miller in 1762, but we know not whether it exiſts at preſent in any garden. The *branches* are irregular and ſpreading, bearing copious tawny prickles, ſhaped like thoſe of a wild briar. *Leaves* ſtalked, an inch or inch and half long, green, ſinuated like thoſe of an oak. *Flowers* ſmall, white, not unlike thoſe of *S. nigrum*, but their *calyx* is thorny. *Berries* black, reſembling the fruit of that ſpecies.

S. *trilobatum*. Three-lobed Nightſhade. Linn. Sp. Pl. 270. Willd. n. 82. Ait. n. 38. Burm. Ind. 57. t. 22. f. 2.—Stem ſhrubby, armed with hooked compreſſed prickles. Leaves angular, ſomewhat three-lobed, obtuſe, unarmed, ſmooth. Flowers racemoſe.—Native of the Eaſt Indies. Cultivated by Miller in 1759. A ſtove-plant, flowering in Auguſt. More ſlender than the laſt, with more diſtant, and leſs ſinuated *leaves*, on longer *ſtalks*. But the much larger purple *flowers*, in double-branched lateral *cluſters*, eſſentially diſtinguiſh the preſent plant, whoſe *branches* and *leaves*, the prickles excepted, might be thought to belong to ſome ſpecies of *Boerhavia*. Plukenet's t. 316. f. 5, is rather more like *S. Milleri*, but cannot be preciſely determined, for want of the infloreſcence.

Section 3. *Branches ending in thorns.* One ſpecies.

S. *lycioides*. Box-thorn Nightſhade. Linn. Mant. 46. Willd. n. 83. Ait. n. 39. Jacq. Coll. v. 1. 96. Ic. Rar. t. 46.—Stem ſhrubby; branches with terminal thorns. Leaves elliptical. Flowers ſolitary.—Suppoſed to be a native of Peru. A ſtove-plant in England, flowering in May and June. Its habit is correctly compared by Linnæus to that of a *Lycium*. The *ſtem* is woody, with many long, trailing, ſlender, angular, ſmooth, leafy *branches*, finally becoming ſpinous at the extremity. *Leaves* ſtalked, about an inch long, ſmooth, entire. *Flowers* elegant, ſolitary, on lateral ſlender ſtalks, an inch in length. Segments of the *calyx* narrow, ſmooth. *Corolla* light-blue. *Anthers* ſhort, orange. *Berry* ſcarlet, the ſize of a currant.

Notwithſtanding our having here added twelve ſpecies to Willdenow's liſt, we are conſcious that many ſtill remain unſettled, of which we have only imperfect or uncertain ſpecimens. The tropical regions of Africa probably poſſeſs ſeveral more. Beſides thoſe we have noticed, Mr. Brown defines fourteen new ſpecies in his *Prodromus* of the Flora of New Holland, under the following names. *S. tetrandrum*, *viride*, and *biflorum*, without prickles. *S. diſcolor*, *violaceum*, *furfuraceum*, *parvifolium*, *ellipticum*, *armatum*, *Hyſtrix*, *cinereum*, *pungetium*, *campanulatum*, and *echinatum*, with prickles on the ſtem, ſtalks, leaves or calyx. Among theſe the *Hyſtrix* is moſt remarkable for having prickles on the corolla itſelf.

SOLANUM, in *Gardening*, contains plants of the herbaceous, ſhrubby, and tuberous-rooted, eſculent kinds, of which the ſpecies cultivated are: the love-apple, or tomato (S. lycoperſicum); the Ethiopian nightſhade (S. æthiopicum); the large-fruited nightſhade, or egg-plant (S. melongena); the woody nightſhade, or bitter-ſweet (S. dulcamara); the mullein-leaved nightſhade (S. verbaſcifolium); the ſhrubby nightſhade, or winter cherry (S. pſeudocapſicum); the oak-leaved nightſhade (S. quercifolium); the dug-fruited nightſhade (S. mammoſum); the Indian nightſhade (S. indicum); the Carolina nightſhade (S. carolinenſe); the black-ſpined nightſhade (S. ſodomeum); the Paleſtine nightſhade (S. ſanctum); and the tuberous-rooted nightſhade, or common potatoe (S. tuberoſum).

In the firſt ſort the fruit is ſmooth, but varies in form, ſize, and colour, from which Miller has formed two varieties; the firſt of which is commonly cultivated in the ſouth of Europe to put into ſoups and ſauces, to which it imparts an agreeable acid flavour: the fruit is very large, compreſſed both at top and bottom, and deeply furrowed all over the ſides, and of a red-yellow or yellowiſh colour. The latter is round, about the ſize of a large cherry, either yellow or red. It is a native of South America, flowering from July to September.

And in the third ſort there are varieties with oblong violet-coloured fruit, with an oblong, white, large fruit, with a globular violet-coloured fruit, and with a globular white or variegated fruit. Some make other varieties, as red-fruited, yellow-fruited, prickly-fruited, &c.

Alſo in the fourth ſort there are varieties with fleſh-coloured, with white flowers, and with variegated leaves. Some have likewiſe gold ſtriped-leaved, African thick-leaved, &c.

The ſixth ſort has alſo varieties with red and with yellowiſh fruit.

In the laſt ſort, which is probably a native of Peru, or ſome part of that tract of continent, the principal varieties may be diſtinguiſhed into two kinds, as the red-rooted and white-rooted ſorts; the ſub-varieties of which are extremely numerous; but for garden purpoſes, the following are the moſt uſeful kinds that are generally employed.

The early dwarf-red, the round-red, the oblong-red, the pale-red, the blood-red, the Iriſh red or painted lord, old winter-red, rough-red, and ſmooth-red.

Early forcing potatoe, the early dwarf-white, brown early, Cumberland early, early Scot, golden dun, early champion, white bloſſom, Manly white, kidney-white and red, red-noſed, true white, flat white, and ſuperfine white early.

Many other kinds or varieties are made uſe of in gardens for raiſing the late as well as the early crops of this moſt uſeful root. In Lancaſhire, for the very early crops, they have principally recourſe to the early kings, and foxes ſeedlings.

They alſo cultivate a ſmall everlaſting potatoe, as it is called, in the ſame ſituations, covering the beds with ſtraw or ſome other material in the winter ſeaſon, when neceſſary. A ready ſupply of the root may, it is ſaid, be provided in this way by this ſort of potatoe.

In the firſt volume of the Tranſactions of the Horticultural Society of London, ſir Joſeph Banks has given the following curious and intereſting account of the introduction of this ſpecies of ſolanum, or the common potatoe, into this country and Europe. The notes from which this account has been principally taken, have, it is ſaid, been ſome of them collected from authorities of difficult acceſs by the learned and very intelligent Mr. Dryander.

It is ſtated, that the potatoe now in uſe was brought to England by the coloniſts ſent out by ſir Walter Raleigh, under the authority of his patent, granted by queen Elizabeth "for diſcovering and planting new countries, not poſſeſſed by Chriſtians," which paſſed the great ſeal in 1584. Some of ſir Walter's ſhips ſailed in the ſame year, others, on board of one of which was Thomas Herriot, afterwards known as a mathematician, in 1585; the whole of them, however, returned, and probably brought with them the potatoe, on the 27th of July, 1586.

The ſaid Thomas Herriot, who was probably ſent out, as it is ſaid, to examine the country, and report to thoſe who employed him the nature and produce of the ſoil, wrote an account of them, which is printed in the firſt volume of De Bry's Collection of Voyages. In this account, under the article of roots, in p. 17, he deſcribes a plant which is called Opanawk. "Theſe roots are," he ſays, "round, ſome as large as a walnut, others much larger; they grow in damp ſoil, many hanging together, as if fixed on ropes: they are good food either boiled or roaſted."

Gerarde in his Herbal, publiſhed in the year 1597, gives a figure of the potatoe, under the name of the potatoe of Virginia, and aſſerts, that he received the roots from Virginia, which are otherwiſe denominated Norembega.

The manuſcript minutes of the Royal Society, 13th of December, 1693, aſſure us, that ſir Robert Southwell, then preſident, informed the fellows, at a meeting, that his grandfather brought potatoes into Ireland, who firſt had them of ſir Walter Raleigh.

This evidence, it is ſuppoſed by ſir Joſeph, proves, in no ſatisfactory manner, that the potatoe was firſt brought into England, either in the year 1586, or very ſoon after that period, and ſent from thence to Ireland without delay, by ſir Robert Southwell's anceſtor, where it was cheriſhed and cultivated for food before the good people of England knew its value; for Gerarde, who had this plant in his garden in 1597, recommends the roots to be eaten as a delicate diſh, not as common food.

It appears, however, he ſays, that it firſt came into Europe at an earlier period, and by a different channel; for Cluſius, who at that time reſided at Vienna, firſt received the potatoe, in 1598, from the governor of Mons, in Hainault, who had procured it the year before from one of the attendants of the pope's legate, under the name of Taratonfli; and learned from him, that in Italy, where it was then in uſe, no one certainly knew whether it originally came from Spain, or from America.

Peter Cicca, in his Chronicle, which was printed in 1553, tells us, it is ſaid, in chap. xl. p. 49, that the inhabitants of Quito, and its vicinity, have, beſides mays, a tuberous root, which they eat, and call papas; this Cluſius gueſſes to be the ſame ſort of plant he received from Flanders, and this conjecture has, it is ſaid, been confirmed by the accounts of travellers, who have ſince that period viſited the country.

It is concluded that, from theſe details, it may fairly be inferred, that potatoes were brought into Europe from the mountainous parts of South America, in the neighbourhood of Quito; and that, as the Spaniards were the ſole poſſeſſors of that country, there can be little doubt of their having been carried firſt into Spain, but that as it would take ſome time to introduce them into uſe in that country, and afterwards to make the Italians ſo well acquainted with them as to give them a name, there is every reaſon to believe, that they had been ſeveral years in Europe before they were ſent to Cluſius.

As the name of the root in South America is papas, and in Virginia that of opanawk; the name of potatoe was, it is ſaid, evidently applied to it on account of its ſimilarity in appearance to the battata, or ſweet potatoe; and our potatoe appears to have been diſtinguiſhed from that root, by the appellation of potatoe of Virginia, until the year 1640, if not longer.

It is added, that ſome authors have aſſerted, that potatoes were firſt diſcovered by ſir Francis Drake in the South ſeas, and others, that they were introduced into England by ſir John Hawkins; but in both inſtances, the plant alluded to is, it is ſaid, clearly the ſweet potatoe, which was uſed in England, as a delicacy, long before the introduction of our potatoes; it was imported, it is ſaid, in conſiderable quantities, from Spain and the Canaries, and was ſuppoſed to poſſeſs the power of reſtoring decayed vigour. The kiſſing comfits of Falſtaff, and other confections of ſimilar imaginary qualities, with which our anceſtors were duped, were, it is ſaid, principally compoſed of theſe, and eringo roots.

It is alſo further noticed, that the potatoes themſelves were ſold by itinerant dealers, chiefly in the neighbourhood of the Royal Exchange, and purchaſed, at no inconſiderable coſt, by thoſe who had faith in their alleged properties. The alluſions to this opinion are, it is obſerved, very frequent in the plays of that age.

Method of Culture.—Theſe plants, from the great differences in their natures, habits of growth, and other qualities, muſt evidently require different modes of cultivation and management.

Culture in the Annual Kind. — The three firſt ſpecies, which are of this ſort, may be raiſed from ſeed, which ſhould be ſown in the early ſpring on hot-beds, moulded over to the depth of ſix or ſeven inches with light rich mould, in drills or pots plunged into the beds. When the plants come up, they ſhould be properly thinned, have a pretty free admiſſion of air, and occaſional waterings; and the love-apple kinds, when they have attained ſome growth, as five or ſix inches, and the weather becomes ſettled warm, ſhould be removed into the open ground, planting them in a warm ſheltered border, and placing them at a conſiderable diſtance. Some may be trained againſt a ſouth fence, to have the advantage of the full ſun: they ſhould always be ſupported by ſome means or other to ſhew themſelves, and ripen their fruit. But the egg-plants ſhould be pricked out, when a few inches in height, into another hot-bed prepared for the purpoſe, at the diſtance of four or five inches; and ſome may be put in ſeparate pots, and plunged in the bed, giving water and ſhade till they are freſh rooted; the waterings ſhould be duly repeated, and freſh air freely admitted, when the weather is fine: it may alſo be requiſite to remove them with balls about their roots to a third hot-bed, in order to have them very fine and ſtrong: the frame ſhould be raiſed as they advance in growth, and when the weather becomes fine and hot, they ſhould be gradually hardened, and finally ſet out in the pots, &c. where they are wanted.

Culture in the Hardy Shrubby Kind.—The fourth ſort, which is of this nature, may be increaſed by layers and cuttings, which may be laid down or planted out in the autumn or ſpring, where they will be well rooted by the following autumn, when they may be taken off and removed into nurſery-rows, or where they are to grow for good.

Culture in the Shrubby Greenhouſe Kind.—Likewiſe all the eight following ſorts, which are of this deſcription, may be increaſed by ſeeds, which ſhould be ſown thinly in rich light earth in the early ſpring in ſmall pots, plunging them in the hot-bed under frames and glaſſes, watering them frequently, when the plants will ſoon come up, admitting freſh air daily; and when the plants are about two inches high, they ſhould be pricked out upon another hot-bed, giving water and ſhade, till they are freſh rooted; and ſome may be put into pots, plunging them in the bed. As the warm weather advances, they ſhould be gradually hardened to the open air, ſo as to be ſet out into it about the middle of the ſummer, when the weather is mild and fine.

And they ſhould afterwards be managed as other ſhrubby exotic greenhouſe plants.

There are alſo many of the tender ſhrubby hot-houſe or ſtove kinds, that are highly deſerving of cultivation, ſuch as the fiery-thorned American, Guinea, tomentoſe trilobate, and ſeveral other ſpecies.

Theſe may all be increaſed by ſowing the ſeeds of them, in the ſpring, in pots of light earth, to be plunged into a hot-bed;

hot-bed; when the plants are come up two or three inches in height, they ſhould be pricked out ſeparately into ſmall pots, which are alſo to be plunged into the hot-bed or bark-bed of the ſtove, afterwards managing them as other ſhrubby exotics of the ſtove kind. The propagation and increaſe of them may likewiſe be tried, in ſome caſes, by cuttings, which are to be ſet or planted in pots, and the whole plunged into the bark-bed, covering them cloſe down by means of a hand-glaſs.

All theſe plants muſt be conſtantly kept in pots filled with light rich earth, and be retained, the moſt part of the year, in the ſtove, among collections of that ſort, except for juſt a month or two in the height of the ſummer, when the heat is conſiderable. In this way they not unfrequently ſucceed very well.

Theſe plants, in all the ſorts, are very ornamental among other potted plants; and the firſt is cultivated likewiſe for the fruit as a pickle: the fourth is alſo ornamental in the borders, &c. of gardens and ſmall pleaſure-grounds.

Culture in the Potatoe Kind.—This laſt ſort is highly valuable for its tuberous eſculent root, which is well known under the title of potatoe. Theſe roots may be obtained for uſe plentifully almoſt the year round: the early ſorts, being planted forward in the ſpring, often afford tolerable crops fit to take up in the beginning of June and in July following, eſpecially in rich warm grounds; but the main crops are permitted to continue growing till autumn, as about the latter end of October or beginning of November, when the ſtalks or haulm begin to decay, at which time the roots will be arrived to full maturity: and being then taken out of the ground, and houſed in ſome cloſe dry apartment, keep in good perfection for eating all winter and ſpring, until the arrival of the new crops in the following ſummer.

With regard to the properties of the different ſorts or varieties of this root, ſo far as they relate to their uſefulneſs as food, or their nouriſhing qualities, there is probably no very material difference; but inſomuch as their agreeableneſs for the purpoſe of eating by man is concerned, there is conſiderable diverſity, ſome ſorts being naturally farinaceous and mealy, while other kinds are heavy and clayey, or waxy, the former of which are, for the moſt part, highly deſirable and greatly reliſhed, while the latter are diſagreeable to and diſreliſhed by many. The red ſorts were formerly held in great eſteem, and ſuppoſed the beſt; and though they are moſt probably in no reſpect inferior to thoſe of the white kinds, theſe have of late, in general, been much preferred, eſpecially the round, the oblong-white or whitiſh red, and the kidney ſorts, as being more productive, more ſaleable in the markets, and the moſt deſirable for eating.

This has cauſed the culture of the large red ſort to be in a great degree overlooked and neglected, though ſome think that the potatoes of this kind are ſuperior to thoſe of the white ſort in the richneſs of their flavour and ſome other qualities.

As both ſorts, however, poſſeſs good qualities in different ways, the beſt and moſt uſeful varieties, in each kind, ſhould be cultivated in ſufficient and ſuitable proportions. The early ſorts are, however, the moſt proper and ſuitable for being cultivated in gardens in moſt caſes.

It is of importance in the garden, as well as the field, to have good-ſized potatoes for ſets, or for taking the ſets from, whatever the ſort may be, as the very ſmall potatoes, or chats, as they are called, never anſwer well in this intention. And it is equally important to have a frequent change of the ſeed or ſets which are employed for raiſing the crops, as every two or three years, new, or ſuch potatoes as are freſh from other grounds, being found highly uſeful in preventing degeneracy and promoting the goodneſs and abundance of the crops, as well as in obviating their tendency to the curl, which is ſo greatly injurious to them.

The potatoe is an annual plant, which leaves offsets, tubers, or roots, for its future propagation and increaſe.

All the varieties may be cultivated with ſucceſs in any open ſituation. They delight in a moderately light rather dry ſoil and open ſituation, which ſhould be rendered light with dung. The plants are increaſed by the root, either whole or cut in pieces, each cutting forming a proper ſet or plant. This is their general method of cultivation; but they may likewiſe be raiſed from ſeed to gain new varieties.

In moſt places the general ſeaſon for planting this root is from about the middle or the latter end of February to the middle of April; the early ſorts, for forward crops, being planted in the latter end of February or early in March; but for the general crops, March, and the firſt fortnight in April, is the moſt proper planting ſeaſon, eſpecially in moiſt land; as, if planted earlier, and much wet ſhould ſucceed, it would rot the ſets, more particularly if cuttings; though in caſes of neceſſity, where the ground is not ready before, they may be planted any time in April, or even in May, and yield tolerable crops by October. And the ground for this purpoſe ſhould always be dug over for the reception of the plants to one full ſpade deep.

But as to the planting, it may be performed by means of a dibble, by holeing in with a ſpade, or drilling in with a hoe, bedding in, &c. in rows at two feet aſunder, eight, twelve, or fifteen inches diſtant in each row, and not more than four or five inches deep at the moſt.

Dibble-planting.—This is performed either with a common large garden dibble, blunted at the bottom, making holes four or five inches deep, at the diſtance before mentioned, dropping one ſet into each hole as you go on, and ſtriking the earth in over them, or raking it afterwards, which is a better method.

The ſurface of the ground ſhould, ſome time afterwards, be further raked, and left perfectly even and level.

Drill-planting.—In this mode the drills may be formed either with a large hoe, two feet aſunder, and four or five inches deep, in which drop the ſets a foot aſunder, and cover them in with the earth equally the depth of the drill; or the drills may be made with a ſpade, and the ſets covered in by means of a rake, the ground being left quite even on the ſurface.

Furrow-planting.—This is performed by the ſpade, by turning over or taking out a ſpit of earth all along, putting in the dung, and then dropping the ſets in the furrow immediately upon it, and with the next ſpit turning the earth in upon the ſets of the firſt; and in another furrow, two feet from this, putting in the dung and dropping another row of ſets, which are covered in as above, and ſo on till the whole is finiſhed.

Holeing-in planting.—This is performed with a ſpade. A man having a light handy ſpade, and beginning at one end of the line, takes out a ſpit of earth, forms a ſmall aperture four or five inches deep, another perſon directly following after drops a ſet in the hole, the earth of the next ſpit immediately covers it up, and ſo on to the end of the work.

Trenching-in planting.—This is ſometimes practiſed in light ground, and is effected as the perſon proceeds in digging or trenching the ground, being trenched in the common way, each trench two ſpades wide, and one ſpade deep, placing one row of potatoes in each trench: beginning at one end of the ground, opening a trench the proper width and depth, as above, then paring in the top of the next trench deeply, putting it with ſome good dung in the bottom of the firſt, levelling it evenly, then digging along about half the width of the next or ſecond trench, turning the earth into the firſt upon the dung, only two or three inches in depth, and upon which lay the potatoe-ſets in a row along the middle eight or ten inches or a foot or more aſunder; then digging along the reſt or whole width of the ſaid ſecond trench a moderate ſpade deep, turning the earth of it into the firſt trench, over the ſets, three or four inches deep; this done, dung the bottom of the open trench, and proceed with the digging and planting as before; and continue trench and trench to the end of the work.

Bedding-in planting.—This is ſometimes done in low wet-tiſh land, for the ſake of raiſing the beds, and ſinking the alleys deep enough to drain off the too copious moiſture, and is thus performed:—the ground is divided into four, five, or ſix-feet wide beds, with alleys two or three feet wide between bed and bed; and the beds being dug, the potatoe-ſets are placed upon a little littery dung on the ſurface in rows lengthwiſe; and then the alleys dug out a ſpade deep, caſting the earth over the ſets about three or four inches thick; or the alleys may be firſt dug out to raiſe the beds, and the ſets then planted with a dibble in the common method: thus, by either of theſe methods, in wet ground, the alleys being ſunk, and the beds raiſed, the alleys drain off the redundant moiſture, which might rot the ſets before they begin to ſprout out and grow.

And this method of planting is ſometimes performed on graſs or ſward-land, marking out beds as above, with alleys between of proportionable width; then, without digging the beds, the potatoe-ſets are placed immediately upon the ſward at proper diſtances; the alleys being then dug and the ſpits turned graſs-ſide downward upon the beds over the ſets, covering them the proper depth as above, in which, if any additional depth is wanted, it may be ſupplied from the under earth of the alleys; and thus the ſets being between two ſwards, grow, and often are productive of very good crops, if permitted to have full growth. This is a ſort of lazy-bed mode of planting, that is not to be much practiſed in gardens.

In the after-management of the crops, where weeds begin to over-run the ground, two or three hoeings ſhould be given to kill them and looſen the ſurface of the ſoil; and when the plants have ſome growth, ſome hoe up a ridge of earth cloſe to each ſide of every row of plants in the firſt or ſecond hoeing, to ſtrengthen their growth more effectually, and render them more prolific, as the bottom of the ſtalks ſo landed up generally emits roots in the earth that become productive of potatoes the ſame as the principal roots.

In October, when the potatoes are full grown, they ſhould in the general crops be wholly taken up before they are attacked by froſt, and depoſited in ſome dry apartment for keeping: ſome may however be taken up before for occaſional uſe: this buſineſs is uſually performed by a three-pronged fork, the ends of the prongs being a little blunted. The early crops are to be taken up as they are wanted for uſe, as ſeen below.

Before the potatoes are begun to be dug up, whether in the early or late crops, the haulm ſhould be cut cloſe to the ground and cleared away, in the former only to the extent of what is to be taken up at the time, but in the latter for the whole ſpace which is to be dug up in the day, or other length of time, or for the quantity there may be. It is to be turned off in heaps on to the dug land, that the ſurface of the ground to be dug for potatoes may be rendered perfectly clear and convenient for the work. This is uſually done as the workman proceeds. In forking the crop up, the labour then goes on, by firſt opening a trench along one end of the ground to the depth and width of a good ſpit, proceeding in the ſame way with the reſt, throwing the whole of the potatoes, as they are dug up, into large baſkets placed for the purpoſe, carefully digging over all the land in a regular manner ſpit by ſpit, turning each clean upſide down into the previous open trench. In this manner the whole is to be completed.

The early crops are beſt taken up as they are wanted, as they do not keep ſo good when dug up in large quantities.

The haulm is ſometimes burnt, in the heaps as they lie upon the ground, but it is probably better to make uſe of it as litter, or to employ it for ſome garden purpoſes, which it may be made to anſwer.

When become perfectly dry and well freed from dirt and other matters, the potatoes may be put up and ſecured in the houſe, when for keeping, all the cut and bruiſed ones, as well as the chats or very ſmall ones, being previouſly ſorted out and taken away. Towards the ſpring they may likewiſe be rubbed over to take off the ſprouts and make them keep better.

When it is intended to raiſe new varieties from ſeed, ſome of the firſt flowering plants ſhould be marked, the ſeed ſhould be gathered in autumn when full ripe, and in the March or April following ſown in ſome light ſoil, in an open ſituation, in ſhallow drills a foot aſunder; and when the plants come up, they ſhould be kept clear from weeds till autumn, when, about the end of October or beginning of November, the roots may be taken up, ſelecting the fineſt and largeſt, which preſerve in ſand till ſpring; then plant them in the common way, and by the autumn following they will have made proper increaſe, and attain full perfection; when their properties muſt be determined.

It is not improbable, from what has been written on the ſubject in the Tranſactions of the Horticultural Society of London, that much utility and advantage may be derived in the cultivation of the early or proper garden potatoe, from making uſe of new and more early varieties than ſuch as have been uſually employed. Formerly, the early varieties of this root were ſolely gained by accident from the ſeeds of the late ſorts, and conſequently not often produced; as the early ſorts or varieties of this plant were well known to ſeldom or never afford either bloſſoms or ſeeds in the common methods of culture, they being only capable of being increaſed by portions of their tubers or roots. But by having recourſe to ſuch methods of management with them, as tend to prevent the preternaturally early forming of their tubers or roots, it has been found that ſeeds may be readily procured from the moſt early of the beſt early ſorts, the ſeeds of which may, it is ſuggeſted, in ſucceſſive crops, at laſt afford ſtill more early and better varieties, than any which have hitherto been produced. This would be a great and important acquiſition, eſpecially in the garden culture of the potatoe. See POTATOE.

The manner of the cultivation of the potatoe in the preceding year, and the ſtate which it is in from it, would ſeem alſo to have much influence on the produce of the ſucceeding year, as great benefit has, it is ſaid, ariſen from planting ſuch potatoes as had grown late and not been fully maturated in the preceding year. And in the early ſorts it has been found, that the earlineſs likewiſe of the crops, to ſome extent, are dependent upon the ſtate of the varieties; ſo that the ſucceſs of the cultivator in raiſing an early crop of this kind, may be good or bad, according to the mode or manner of the culture, in the preceding year, of the tubers or plants. Such varieties as have the appearance of being expended, worn out, and worthleſs, may alſo be reſtored, in ſome inſtances at leaſt, to their original or primary vigour and importance by attention in this way.

Thus, by preparing proper tubers in the preceding year for planting out crops in the ſucceeding one, great utility may be produced in the garden cultivation of this root, as well as in the field.

In the ſame Tranſactions, in ſpeaking of the preventing of the curl, the able preſident remarks, that the rough and uneven ſurface of the leaf in this plant, which, in exceſs, indicates, and indeed conſtitutes, the diſeaſed ſtate known by the above name, ſeems to exiſt in, and to form an eſſential characteriſtic, of every good variety of the potatoe; as he has never met with a ſingle variety of the perfectly ſmooth poliſhed-leaved kind that poſſeſſed any degree of excellence. And it is endeavoured to be proved, that this rough and crumpled ſtate of the leaf probably originates in the preternaturally inſpiſſated or thickened ſtate of the fluid, in the firm and farinaceous potatoe. Such varieties, however, as have ſmooth and poliſhed leaves, are, it is ſaid, in general, the moſt productive, and grow in the moſt luxuriant manner, which, it is thought, partly ſhews, that the ſmooth leaf is a more perfect and efficient organ than the rough one; the latter indicating, it is ſuppoſed, ſome degree of approximation to diſeaſe.

It is ſtated, that by planting potatoes of an early variety in the ſame ſoil from which a crop of the ſame variety had been taken in the month of July, a ſecond crop was procured. But the tubers produced by thoſe laſt planted, were found to be much more ſoft and watery, when boiled, than others of the ſame variety, and conſequently greatly inferior in value for all culinary purpoſes; they were on that account kept for future planting. It was inferred, on the principles that had been laid down, that the organizable matter theſe contained, being in a leſs firm and concrete ſtate, it would prove more diſpoſeable, and that in the ſucceeding ſeaſon, plants of ſtronger growth, and more ſmooth and perfect foliage, might conſequently be expected. The reſult proved the inference to be every way true: the plants preſented the appearance of a different variety, and afforded a more abundant crop and larger tubers than had ever before been obtained from the ſame variety. This trial was, it is ſaid, confined to a ſingle very early kind, which had previouſly produced partially curled leaves; but, it is ſuppoſed, the ſame method of management will prove equally advantageous with other varieties, which ſhew ſimilar indications of incipient diſeaſe.

If this reaſoning and mode of culture ſhould turn out to be correct and well founded, they may be of great uſe in bettering and promoting the growth of this ſort of valuable root.

By other writers this diſeaſe in the potatoe plant has, however, been ſuppoſed to ariſe in other ways, and to be of a very different kind; and it is ſtated, that Mr. Dickſon, in the Tranſactions of the Caledonian Horticultural Society, conceives it to originate in debility, ariſing from the too great ripeneſs of the tubers, and in the parent plant having too much expended itſelf in affording bloſſoms and ſeeds, as well as tubers. In proof of which, the very curious fact is related, that a cutting taken from the extremity, which is moſt firm and farinaceous, of a long or kidney-ſhaped potatoe, will afford diſeaſed plants, while another cutting taken from the oppoſite end of the ſame potatoe, will produce perfectly healthy plants.

But it is thought by Mr. Knight, that this opinion cannot be acceded to, as it is not to be ſuppoſed, that a plant which is a native of ſuch a climate as the potatoe, can ever be over-ripened in ſo northern a ſituation; beſides, thoſe varieties which never afforded either bloſſoms or ſeeds, have in his garden been quite as ſubject to the diſeaſe as others. Nor is it believed that the buds of the firm farinaceous extremity have greater maturity than thoſe at the contrary end, as thoſe neareſt the parent plant are in reality the oldeſt, the tuber being formed by a branch, which has expanded itſelf in a lateral manner, inſtead of having extended itſelf in a longitudinal direction. Conſequently the buds of it are arranged as they would have been upon the elongated branch; and every tuber, in its incipient ſtate of formation, will extend itſelf into a branch, provided the plant, to which it belongs, be cut off cloſe to the ground, and the current of aſcending ſap be in conſequence diverted into, and through the tubers.

It is however found, by both the above inquirers, that a tuber, or part of one, which is ſoft and aqueous, affords a better plant than one which is firm and farinaceous, or in the mealy ſtate.

It is ſaid, in the corrected Agricultural Survey of Cornwall, that a gardener of Penzance, in that diſtrict, can aſcertain when a potatoe choſen for a ſet will produce the curl; as a healthy potatoe will always, in his opinion, be largeſt, and rounded at its noſe-end, while a diſeaſed potatoe runs ſmaller at its noſe-end than at the tail-end, and will produce the curl, if planted. It is noticed, that the form of the diſeaſed potatoe here deſcribed is very eaſily diſtinguiſhable in the kidney ſort, or in any long-ſhaped potatoe, but not ſo readily, or with ſuch facility, in the round kind; yet it is ſuppoſed to be capable of being diſtinguiſhed by attention, and a little practice, in all.

In regard to ſets, as whole potatoes do not always anſwer well for the purpoſe, and as thoſe of certain large ſizes are better than ſmall ones; the beſt mode of forming them is ſuppoſed to be that of taking off the ſprout or noſe-end, and the umbilical or tail-end of the potatoe, leaving the middle part entirely for the ſet. The worſt mode of cutting the potatoe, in this intention, is, it is ſaid, that of dividing it down the middle, from the noſe to the tail, though a method much too commonly practiſed.

The preparing the ſets beforehand, as in the preceding winter, from the faireſt and beſt potatoes, and placing them in ſuch dry ſituations, as that they may become incruſted with their juice, and thereby bleed leſs before ſprouting, than if freſh cut in the ſpring at the time of planting, is a practice adopted in Ireland with advantage. The ſet is, of courſe, ſtronger, and it puts forth a more vigorous ſhoot ſoon after being planted. The planting of ſmall whole potatoes, or ſets having more than two ſtrong eyes or buds, is with reaſon commonly avoided; and thoſe potatoes with a number of eyes, on what is termed the crown of the potatoe, are invariably rejected, with the ſmall potatoes, both being found to produce languid ſhoots, and a number of ſmall bad potatoes of no value. In all theſe ſtates they are thought to be improper for planting as ſets.

Theſe hints, ſtatements, and concluſions, may ſerve to extend and improve our knowledge of the nature of a diſeaſe which has long been ſo injurious to potatoe crops. See Curl.

Solanum *Dulcamara*, in the *Materia Medica*. See *Woody* Nightshade.

Solanum *Nigrum*. See *Garden* Nightshade.

Solanum *Pomiferum*, *Apple-bearing Nightſhade*, in *Botany*, a name given by writers to the nightſhades, and plants of ſeveral genera allied to thoſe, and bearing large fruits. See Melongena and Lycopersicon.

Solanum *Somniferum*, *Sleepy Nightſhade*, a name given by Caſpar Bauhin, and ſome others, to a ſpecies of winter-cherry, the whorled alkekengi with ſmall fruit.

SOLAR, ſomething belonging to the ſun.

Thus, we ſay *ſolar* fire in contradiſtinction to *culinary* fire.

SOLAR *Civil Month*. See MONTH.

SOLAR *Cycle*. See CYCLE.

SOLAR *Comet*. See DISCUS.

SOLAR *Eclipſe*, is a privation of the light of the ſun, by the interpoſition of the opaque body of the moon. See ECLIPSE.

SOLAR *Month, Riſing, Spots*. See the ſubſtantives.

SOLAR *Syſtem*, the order and diſpoſition of the ſeveral heavenly bodies, which revolve round the ſun as the centre of their motion; *viz.* the planets, primary and ſecondary, and the comets. For a ſcheme of the ſolar ſyſtem, ſee SYSTEM.

SOLAR *Year*. See YEAR.

SOLARI, ANDREA, in *Biography*, a native of Milan, called alſo del Gobbo. Vaſari ſays he flouriſhed in the time of Correggio; and praiſes him as a pleaſing colouriſt, and a graceful deſigner. He is one of thoſe artiſts whoſe figures of the Virgin, &c. are conſtantly ſold as Lionardo da Vinci's productions. He died about 1530.

SOLAROSA, in *Geography*, a town of the iſland of Sardinia; 9 miles N.E. of Oriſtagni.

SOLARS, three ſmall iſlands in the Eaſt Indian ſea, ſubject to the Dutch, furniſhed with every kind of proviſions: the middlemoſt is ſaid to have a good harbour for ſhipping, ſituated to the E. of Ende iſland.

SOLATRUM, in *Botany*. See NIGHTSHADE.

SOLCI, in *Ancient Geography*, a port on the ſouthern coaſt of the iſle of Sardinia, between Cherſonneſus and Populum. Ptol.

SOLCK, in *Geography*, a town of the duchy of Stiria; 16 miles W.N.W. of Oberwoltz.

SOLDAN. See SULTAN.

SOLDANELLA, in *Botany*, from *ſolidus*, a piece of money, a name given to the Sea Bindweed, (ſee CONVOLVULUS,) and to the plant of which we are about to ſpeak, becauſe of the thick orbicular form of their leaves. In like manner *Nummularia* was named, from *nummus*, in alluſion to its round flat yellow flowers. (See LYSIMACHIA.)—Linn. Gen. 81. Schreb. 106. Willd. Sp. Pl. v. 1. 808. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 310. Juſſ. 97. Tourn. t. 16. Lamarck Illuſtr. t. 99.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Preciæ*, Linn. *Lyſimachiæ*, Juſſ. *Primulaceæ*, Ventenat, Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, erect, lanceolate, permanent ſegments. *Cor.* of one petal, bell-ſhaped, gradually dilated upwards, divided into numerous, linear, ſtraight ſegments. *Stam.* Filaments five, thread-ſhaped, very ſhort; anthers ſimple, arrow-ſhaped, pointed, converging, ſhorter than the corolla. *Piſt.* Germen ſuperior, roundiſh; ſtyle thread-ſhaped, about the length of the corolla, permanent; ſtigma obtuſe, notched, downy. *Peric.* Capſule nearly cylindrical, ſlightly curved, obliquely ſtriated, of one cell, opening with five abrupt notched teeth at the ſummit. *Seeds* numerous, minute, pointed, attached to a central, columnar, unconnected *receptacle*.

Eſſ. Ch. Corolla bell-ſhaped, in many linear ſegments. Anthers beaked. Capſule cylindrical, of one cell, with ſeveral teeth at the ſummit.

1. S. *alpina*. Alpine Soldanella. Linn. Sp. Pl. 206. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 49. Jacq. Auſtr. t. 13. Camer. Epit. 254. (S. alpina, major et minor; Cluſ. Hiſt. v. 1. 308, 309. Ger. Em. 838, 839.)—Native of the alps of Auſtria and Switzerland, and the Pyrenean mountains, flowering in ſpring. With us it is uſually reckoned a hardy perennial, but ſucceeds beſt in a pot, ſheltered in a frame in winter. Few, even of its alpine companions, are more ſingularly elegant. The *root* is fibrous. *Stem* none. *Leaves* ſeveral, ſtalked, ſpreading, round, ſmooth, convex, nearly or quite entire; ſomewhat heart-ſhaped at the baſe; paler underneath. *Flower-ſtalks* ſeveral, radical, erect, four or five inches high, ſmooth, each bearing one, two, or three drooping *flowers*, of a delicate purpliſh blue, occaſionally white, with a red *calyx*, and two or three lanceolate *bracteas* at the baſe of the partial ſtalks. *Capſule* near an inch long. *Style* various in length.

SOLDANELLA, in *Gardening*, contains a plant of the low, herbaceous, perennial kind, of which the ſpecies cultivated is the alpine ſoldanella (S. alpina).

In this ſort there is a variety which has all the parts ſmaller; the petiole is ſhorter and more ſlender, and the leaves are not ſo much rounded, but gradually widen from the petiole.

Method of Culture.—This is increaſed by parting the roots in autumn, about September, planting them in pots, or in a cool ſhady ſituation, where the ſoil is of a moiſt loamy kind, being frequently watered when the ſeaſon is dry, and kept from the ſun.

The ſeeds, ſoon after they become ripe, may alſo be ſown in pots or boxes, filled with the above ſort of mould, being placed in the ſhade, and frequently watered. The plants riſe in the ſpring, and in the autumn following ſhould be removed into ſeparate pots, to have the protection of a frame in winter. They ſucceed beſt in a northern aſpect.

Theſe plants afford variety among other potted plants, in different ſituations about the houſe.

SOLDAU, or DZIADORF, in *Geography*, a town of Pruſſia, in the province of Oberland; 100 miles S. of Konigſberg. N. lat. 53° 2′. E. long. 20° 4′.

SOLDER, SODDER, or *Soder*, formed from the French *ſoudure*, of the Latin *ſolidare, to ſtrengthen:* is a metallic compoſition, uſed in ſoldering or joining together other metals.

For this purpoſe, it is required that ſolders melt ſooner than the metal to be ſoldered, that they adhere firmly to its ſurface, and that they approach as near as may be to the metal ſoldered in hardneſs and colour.

The different ſolders are made of gold, ſilver, copper, tin, biſmuth, and lead; uſually obſerving, that in the compoſition there be ſome of the metal to be ſoldered mixed with ſome higher and finer metals.

The ſolder for gold is compoſed of fine gold, with one-fourth or one-half its weight of fine ſilver, accurately mixed together by fuſion, and afterwards beat out into leaves, ſomewhat thinner than card-paper, and rendered as ſoft as poſſible by annealing. For the method of applying it, ſee SOLDERING.

Goldſmiths are ſaid to make four kinds of ſolder; *viz.* ſolder of eight, where, to ſeven parts of ſilver, there is one of braſs or copper; ſolder of ſix, where only a ſixth part is copper; ſolder of four, and ſolder of three. It is the mixture of copper in the ſolder that makes raiſed plate always come cheaper than flat.

As mixtures of gold with a little copper are found to melt with leſs heat than pure gold itſelf, theſe mixtures ſerve as ſolders for gold; two pieces of fine gold are ſoldered by gold that has a ſmall admixture of copper; and gold alloyed with copper is ſoldered by ſuch as is alloyed with more copper: the workmen add a little ſilver as well as copper, and vary the proportions of the two to one another, ſo as to make the colour of the ſolder correſpond, as nearly as may be, to that of the piece. A mixture of gold and copper is alſo a ſolder for fine copper as well as for fine gold.

Gold being particularly diſpoſed to unite with iron, this metal, with a high alloy of copper, proves an excellent ſolder for the finer kinds of ſteel inſtruments.

For larger works in iron and ſteel, copper, or an alloy compoſed of equal parts of tin and iron, is employed.

The ſolder uſed by plumbers is made of two pounds of lead to one of block-tin. Its goodneſs is tried by melting it, and pouring the bigneſs of a crown-piece on a table; for, if good, there will ariſe little, bright, ſhining ſtars in it.

For ſilver, two kinds of ſolder, *viz.* the hard and ſoft, are uſed and applied like the gold ſolder. The hard ſolder is compoſed of equal parts of ſilver and fine braſs, and the ſoft is prepared by fuſing the hard ſolder with $\frac{1}{15}$th its weight of pure zinc. Another ſolder for ſilver may be formed of two parts of fine ſilver and one part of braſs, taking care that theſe are not long kept in fuſion, leſt the braſs fly off in fumes. For coarſer ſilver, a ſolder is prepared by melting four parts of fine ſilver and three of braſs, throwing in a little borax, and pouring it out as ſoon as it is melted.

The ſolder for copper is made like that of the plumbers; only with copper and tin; and for very nice works, inſtead of tin, they ſometimes uſe a quantity of ſilver.

For copper, braſs, and the hard alloys of copper, the beſt hard ſolder, ſays Aikin (Dict.), is compoſed of braſs and zinc, in the proportion of from eight to ſixteen of the former to one of the latter, according to the required hardneſs. The ſoft ſolder is compoſed of three parts of zinc and one of lead, and is applied by means of a common ſoldering iron, made red-hot.

Solder for tin is made of two-thirds of tin and one of lead, or of equal parts of each; but where the work is any thing delicate, as in organ-pipes, where the juncture is ſcarcely diſcernible, it is made of one part of biſmuth, and three parts of pewter.

The pewterers uſe a kind of ſolder made with two parts of tin and one of biſmuth: this compoſition melts with the leaſt heat of any of the ſolders.

The ſolder for tin, pewter, and lead (or the plumber's ſolder), ſays Aikin (ubi ſupra), is of two kinds: the leaſt fuſible is compoſed of equal parts of tin and lead; the more fuſible contains, beſides, biſmuth in various proportions. A very good ſoft ſolder is prepared by melting together ſixteen parts of tin, eight of lead, and four of biſmuth.

Spelter ſolder is made of one part of braſs and two of ſpelter, and is uſed by the braziers and copper-ſmiths for ſoldering braſs, copper, and iron. This ſolder is improved by adding to each ounce of it one pennyweight of ſilver. But as this ſolder does not melt without a conſiderable degree of heat, it cannot be uſed when it is inconvenient to heat the work red-hot; and therefore, in this caſe, copper and braſs are ſoldered with ſilver.

Though ſpelter ſolder be much cheaper than ſilver ſolder, yet workmen in many caſes prefer the latter. And Mr. Boyle informs us, that he has found it run with ſo moderate a heat, as not much to endanger the melting of the delicate parts of the work to be ſoldered; and if well made, this ſilver ſolder will lie even upon the ordinary kind itſelf; and ſo fill up thoſe little cavities that may chance to be left in the firſt operation, which is not eaſily done without a ſolder more eaſily fuſible than the firſt made uſe of. Works Abridged, vol. i. p. 135.

As to iron, it is ſufficient that it be heated red-hot, and the two extremities, in this ſtate, be hammered together. By this means they become incorporated one with the other: when it is ſoldered it is uſually done with braſs; good tough braſs, with borax applied, mixed with water to the conſiſtence of paſte.

The duke of Florence's nail, anciently ſo much admired, as being half iron and half gold, whereas thoſe two metals were deemed irreconcileable, was joined by a kind of ſolder made by Turneiſſer, an ingenious chemiſt of Venice; the ſecret of which was never diſcovered till publiſhed by Tachenius. This ſolder is nothing but a little copper, or cyprus vitriol, put between the gold and the iron. For, naturally, the great acidity of the gold reduces the iron into a ſcoria or ruſt, when the two are applied over one another; but this inconvenience is removed, by the interpoſition of a little copper, be it in the ſmalleſt quantity imaginable. See the next article.

SOLDERING, or **Soddering**, among *Mechanics*, the joining and faſtening together of two pieces of the ſame metal, or of two different metals, by the fuſion and application of ſome metallic compoſition on the extremities of the metals to be joined.

In ſoldering, ſome artifice is neceſſary to make the ſolder and metals adhere. All the metals, except ſilver and gold, upon melting, or before, are covered with droſs: and all the ſolders have ſome of theſe metals in them: this droſs hinders the ſolder and metal from uniting, and it is neceſſary to remove it. This is not performed in every kind of ſoldering by the ſame materials. The plumbers effect this by greaſing the lead, laying on the ſolder, and melting it with a hot iron, and thus the droſs, generated in fuſion, unites with the greaſe, and flows away from the melted metal. The glaziers and tin-men uſe roſin in powder for the ſame purpoſe; for all inflammable ſubſtances that will melt are equally conducive to this uſe. When copper and braſs are ſoldered with pewter, the work is firſt waſhed with a ſolution of ſal ammoniac in water, then heated juſt hot enough to melt the pewter, and the pewter applied to the joint to be ſoldered. In ſoldering that requires a greater heat, borax is uſed.

Thus, in ſoldering gold, and alſo ſilver, take a piece of ſolder of the proper ſize and ſhape, and lay it on the part to be cemented, and ſprinkle it over with pulverized borax; then apply the flame of a blow-pipe, which will cauſe both the borax and ſolder to fuſe, the latter incorporating with, and adhering firmly to, the gold. When the juncture is complete, the piece is left to cool, and the borax is removed by boiling water, or, what is ſtill better, a little dilute ſulphuric or muriatic acid. It is obſerved, that the ſolder will, in this caſe, appear conſiderably paler than the other part, both on account of the ſilver with which it is alloyed, and of the borax, which always lowers the colour of the gold. This defect, however, may be remedied by melting on the ſurface of the ſolder a mixture of two parts of nitre and one of burnt alum, and afterwards waſhing it off with a ſoft bruſh and hot water; by which the natural colour of the gold will be reſtored, and even heightened. Others direct this operation to be performed by joining together the pieces propoſed to be united with fine ſoft iron wire, and touching the joint to be ſoldered with a camel's hair pencil, dipped in borax finely powdered, and well moiſtened with water; and then placing a little ſolder upon the joint, and applying upon it a large piece of charcoal, and, with a blow-pipe and lamp, blowing upon it through the flame, until it melts the ſolder; and thus the work is finiſhed. In order to cleanſe ſilver or gold, after it is ſoldered, make it juſt red-hot, and let it cool; then boil it in alum-water, in an earthen veſſel, and it will be as clean as when new. If it be gold, boil it in urine and ſal ammoniac.

For a method of ſoldering, particularly uſeful to optical and mathematical inſtrument-makers, ſee GRINDING *of Metallic Specula*.

SOLDIDO, a name given to the tamoata.

SOLDIER, a military man, liſted to ſerve a prince or ſtate, in conſideration of a certain daily pay.

The word is formed from the Italian, *ſoldato*, and that from the Latin, *ſolida*, or *ſolidata*, of *ſolidus*, the *ſolde* or *pay;* though Paſquier chooſes to derive it from the old Gauliſh *ſoldoyer*, a ſoldier; and Nicod from *ſoldurius*.

The ſoldier is a perſon who takes pay; the vaſſal is one who is obliged to ſerve at his own expence: the volunteer ſerves at his own expence, and of his own accord.

Du-Cange obſerves, that the ancient ſoldiers were not to be ſhort of five feet and a half; and that this meaſure was called *incoma* or *incomma*.

Every member of a ſociety, capable of bearing arms, is obliged to ſerve and defend the ſtate; and, therefore, ſhould be diſpoſed to take them up, at the firſt order of him who has the power of making war. In England this is the prerogative of the king, for to him belongs the right of granting commiſſions for raiſing troops; but he cannot compel any perſon to enliſt, nor, without the concurrence of the parliament, keep an army on foot. In ancient times, eſpecially in ſmall ſtates, every member, on a declaration of war, was a ſoldier: the whole community took up arms, and followed to the war. Soon after a choice was made, and armies formed of ſelect men, whilſt the reſt of the people purſued their common occupations. At preſent the uſe of regular troops is almoſt every where adopted, eſpecially in powerful ſtates. The public authority raiſes ſoldiers, diſtributes them into different bodies, under the command of generals and other officers, and keeps them on foot as long as it thinks neceſſary. As every citizen or ſubject is obliged to ſerve the ſtate, the ſovereign has a right, in caſe of neceſſity, to enliſt whom he pleaſes; but he ſhould chooſe only ſuch as are proper for the occupation of war: and it is highly proper to take, as far as poſſible, only volunteers, who enliſt chearfully without compulſion. See ENLISTING, IMPRESSING, and VOLUNTEERS.

No perſon is naturally exempt from taking up arms in defence of the ſtate; the obligation of every member of the ſociety being the ſame. Thoſe only are excepted, who are incapable of handling arms, and ſupporting the fatigues of war. This is the reaſon why old men, children, and women, are excepted. Nevertheleſs, unleſs government is compelled by neceſſity, it ſhould exempt from military ſervice all who are employed in ſtations uſeful or neceſſary to ſociety. Magiſtrates are, therefore, uſually excepted; their whole time not being too much for the adminiſtration of juſtice, and the maintenance of order. The clergy, ſays Vattel, cannot naturally, and by any right, arrogate to themſelves a particular exemption. To defend one's country is an action not unworthy of the moſt ſacred hands. However, the reaſons alleged in favour of magiſtrates may be urged alſo in behalf of that part of the clergy who are truly uſeful; ſuch as teach religion, govern the church, and celebrate the public worſhip. But as for thoſe immenſe multitudes of uſeleſs religious, who, under pretence of dedicating themſelves to God, in effect ſpend their lives in an effeminate idleneſs, they have no right to claim a privilege that is pernicious to the ſtate; and whilſt the prince exempts them from military ſervice, he injures the other members of the community, by throwing on them the whole burden. "I do not pretend," ſays Vattel, "to adviſe a prince to fill his armies with monks, but gradually to diminiſh a uſeleſs claſs of men, by taking from it injurious and ill-grounded privileges." There is another claſs of idle perſons, the exemption of whom is ſtill more culpable; that uſeleſs claſs of footmen, who fill the houſes of the great and wealthy: a claſs who by their calling corrupt themſelves, by diſplaying the luxury of their maſter.

Among the Romans, while all the people ſerved alternately in war, their ſervice was gratuitous; but when a choice is made, and ſtanding armies are formed, the ſtate is to pay them; no man owing more than his quota of the public ſervice: and if the ordinary revenues are not ſufficient, it muſt be provided for by impoſts. It is juſt that they who do not ſerve ſhould pay their defenders. When the ſoldier is not in the field, there is a neceſſity of quartering him; and this burden naturally falls on houſekeepers: but as it is attended with many inconveniencies to the people, it becomes a good prince, or a wiſe and equitable government, to eaſe them of it as far as poſſible. Moreover, the aſylums prepared for ſoldiers and reduced officers, who are grown old in the ſervice, or whom fatigues or the enemy have rendered incapable of providing ſubſiſtence for themſelves, may be conſidered as part of the military pay. The eaſe of theſe unfortunate victims of war is the indiſpenſible duty of every ſtate, in proportion to its ability. It is contrary, not only to humanity, but to the ſtricteſt juſtice, that generous citizens, heroes who have ſhed their blood for the ſafety of their country, ſhould be left to periſh with want, or unworthily forced to beg for ſubſiſtence.

Mercenary ſoldiers are foreigners voluntarily engaging to ſerve the ſtate for money, or a ſtipulated pay. As they owe no ſervice to a ſovereign, whoſe ſubjects they are not, the proſpect of advantage is their ſole motive. It has been a queſtion, however, whether the profeſſion of a mercenary ſoldier be lawful, or not? or whether individuals may for money, or any other reward, engage to ſerve a foreign prince in his wars? This queſtion, ſays Vattel, does not to me appear very difficult to be ſolved. They who enter into ſuch engagements, without the expreſs or tacit conſent of their ſovereigns, offend againſt their duty as ſubjects. But if their ſovereign leaves them at liberty to follow their inclination for a military life, they are abſolutely free. Now, every free man may join himſelf to whatever ſociety he pleaſes, and which to him appears moſt advantageous. He may make its cauſe his own, and eſpouſe its quarrels. He becomes in ſome meaſure, at leaſt for a time, a member of the ſtate in the ſervice of which he engages: and as an officer is commonly at liberty to quit the ſervice when he thinks proper, and the ſoldier at the term of his engagement; if, therefore, this ſtate embark in a war, manifeſtly unjuſt, the foreigners may quit its ſervice. And this mercenary ſoldier having now learnt the art of war, has rendered himſelf capable of ſerving his country, whenever it requires his aſſiſtance. The laſt conſideration will furniſh us with an anſwer to a queſtion propoſed on this head: whether the ſovereign may, with equity and decency, permit his ſubjects to ſerve foreign powers indiſcriminately for money? He may, becauſe his ſubjects will by this means learn an art, the thorough knowledge of which is both uſeful and neceſſary. The tranquillity, the profound peace, which Switzerland has ſo long enjoyed, in the midſt of all the commotions and wars which have agitated Europe; this long repoſe, it is ſaid, would ſoon become fatal to it, did not the citizens, by ſerving foreign princes, qualify themſelves for the operations of war, and ſupport their martial ſpirit.

Mercenary ſoldiers engage themſelves, and enliſt voluntarily. The ſovereign has no right to compel foreigners;

he is not even to make uſe of artifice or ſurpriſe, for inducing them to engage in a contract, which, like all others, ſhould be founded on candour and probity.

As the right of levying ſoldiers belongs ſolely to the nation, ſo no perſon is to enliſt ſoldiers in a foreign country, without the permiſſion of the ſovereign; and even with this permiſſion, none but volunteers are to be enliſted: for the ſervice of their country is out of the queſtion here, and no ſovereign has a right to give or ſell his ſubjects to another. They who undertake to enliſt ſoldiers in a foreign country, without the ſovereign's permiſſion; and, in general, whoever alienates the ſubjects of another, violates one of the moſt ſacred rights both of the prince and the ſtate. It is the crime diſtinguiſhed by the name of *plagiat*, or manſtealing, and accordingly is puniſhed with the utmoſt ſeverity in every policied ſtate.

All ſoldiers, natives or foreigners, are to take an oath to act faithfully, and not deſert the ſervice. This is no more than what they are already obliged to, the one as ſubjects, the other by their engagement; but their fidelity is of ſo great importance to the ſtate, that too many precautions cannot be taken for rendering it ſecure. Deſerters ſhould be ſeverely puniſhed, and the ſovereign, where he judges it neceſſary, may inflict capital puniſhment on them. The emiſſaries, who ſolicit them to deſert, are far more guilty than the recruiters above mentioned.

Good order and ſubordination, ſo uſeful in all places, are no where ſo neceſſary as in an army. The ſovereign ſhould exactly ſpecify and determine the functions, duties, and rights of military perſons, as ſoldiers, officers, commanders of parties, and generals. He ſhould regulate and fix the authority of commanders of all degrees, the puniſhments to be inflicted on offences, the form of trials, &c. The laws and orders relative to theſe ſeveral particulars form the military code.

Theſe regulations, the particular end of which is to maintain order in the troops, and to render them capable of performing the beſt ſervice, conſtitute what is called military diſcipline.

Judge Blackſtone obſerves, that in a land of liberty it is extremely dangerous to make a diſtinct order of the profeſſion of arms. In abſolute monarchies this is neceſſary for the ſafety of the prince, and ariſes from the main principle of their conſtitution, which is that of governing by fear; but in free ſtates, the profeſſion of a ſoldier, taken ſingly and merely as a profeſſion, is juſtly an object of jealouſy. In theſe no man ſhould take up arms but with a view to defend his country and its laws: he puts not off the citizen when he enters the camp; but it is becauſe he is a citizen, and would wiſh to continue ſo, that he makes himſelf for a while a ſoldier. The laws, therefore, and conſtitution of theſe kingdoms, know no ſuch ſtate as that of a perpetual ſtanding ſoldier, bred up to no other profeſſion than that of war; and it was not till the reign of Henry VII. that the kings of England had ſo much as a guard about their perſons.

The preſent regulations concerning the regular military force of our country, as contradiſtinguiſhed from the militia, &c. and for regulating the royal marine forces when on ſhore, are chiefly contained in the yearly acts againſt mutiny and deſertion. Theſe comprehend the articles of war, enliſting of ſoldiers, including foreign ſoldiers, the number of whom allowed to be at one time in the united kingdom is extended by 46 Geo. III. c. 23. to 16,000, muſter, the proviſion of carriages, billeting of ſoldiers, or quartering them by conſtables or other magiſtrates of cities, towns, villages, &c. in livery ſtables, ale-houſes, victualling houſes, the houſes of ſellers of wine by retail, and all houſes of perſons ſelling brandy, ſtrong waters, cyder, or metheglin, by retail; but in no private houſes whatſoever; and the rates of ſubſiſtence to be paid to innkeepers, &c. for ſoldiers' quarters; the removal of ſoldiers in times of election of members of parliament; the mode of apprehending and puniſhing of deſerters; maintenance and ſetting up trades after their diſcharge; the probate of their wills, &c. &c. Moſt of theſe particulars occur under their reſpective heads; and for others our limits require us to refer to the acts themſelves.

As ſoldiers, by the annual act of mutiny, are put in a worſe condition than any other ſubjects, ſo, by the humanity of our ſtanding laws, they are in ſome caſes put in a much better. By ſtat. 43 Eliz. cap. 3. a weekly allowance is to be raiſed in every county for the relief of ſoldiers that are ſick, hurt, and maimed; and beſides, the royal hoſpital at Chelſea is eſtabliſhed for ſuch as are worn out in their duty. Moreover, officers and ſoldiers, that have been in the king's ſervice, are by ſeveral ſtatutes, enacted at the cloſe of ſeveral wars, at liberty to uſe any trade or occupation they are fit for in any town in the kingdom, (except the two univerſities,) notwithſtanding any ſtatute, cuſtom, or charter to the contrary. And ſoldiers in actual military ſervice, may make noncupative wills, and diſpoſe of their goods, wages, and other perſonal chattels, without thoſe forms, ſolemnities, and expences, which the law requires in other caſes. Blackſt. Comm. book i. cap. 13.

The profits attending the profeſſion of a ſoldier, among the Romans, were very conſiderable. 1. Booty and plunder, with which they frequently returned home loaded, eſpecially after taking any cities or towns; for theſe were generally given up to be plundered. 2. The ſubdued countries, which were often divided among the ſoldiers. 3. Their pay. 4. Clothes. 5. Proviſions. 6. Farms and houſes in provinces were alſo given them. 7. Many privileges and immunities, as that none could touch his goods in his abſence in the camp. 8. Legacies, which the emperors left to be diſtributed among them. 9. Donatives. 10. Promotions to military honours lay open to every brave man, though of the meaneſt birth.

Not only humanity but intereſt require that great care ſhould be taken of the health of ſoldiers. Much inſtruction may be drawn for this purpoſe from Dr. Pringle's excellent treatiſe, called "Obſervations on the Diſeaſes of the Army." He there remarks, that the circumſtances of ſoldiers in time of war differ from thoſe of other people, in that they are more expoſed to the injuries of the weather, and always crowded together, whether in camp, barracks, or hoſpitals: wherefore the moſt general diviſion of theſe diſtempers may be into ſuch as ariſe from the intemperature of the weather, and thoſe from infection.

Military diſeaſes depending on the weather, are reducible to two ſorts, *viz.* to thoſe of ſummer, and to thoſe of winter. However, as expoſitions to cold are unavoidable upon the firſt encampment, as alſo for ſome time before the army uſually goes into winter-quarters, the winter diſorders, beginning about the end of autumn, will not entirely ceaſe before the ſummer is well advanced; and, on the other hand, as the heats of ſummer and damps of autumn diſpoſe the body to ſickneſs, the camp-diſtempers are never quite over with the campaign, but continue ſome time after the troops retire into winter-quarters.

The ſummer diſeaſes are all of a bilious or putrid nature, as thoſe of winter are inflammatory. See FEVER, and the articles referred to under that ſubject.

SOLDIERS, *Exerciſe of.* See EXERCISE.

SOLDIERS, *Liſting* or *Enliſting of.* See LISTING.

Soldiers, *Puniſhment of*. See *Military* Execution.

For other particulars relating to ſoldiers, ſee Deserter, *Royal* Hospital, *Camp* Hospitals, Court-*Martial*, Martial *Law*, Mutiny, &c.

Soldiers, *Band of*. See Band.

Soldiers, *Freſh-water*, in *Botany*, a name given in ſeveral parts of England to the ſtratiotes, a diſtinct genus of plants, called by Boerhaave *aloides*.

Soldier-*Wood*. See Mimosa.

Soldier's *Gut*, in *Geography*, a cove on the north-eaſt coaſt of the iſland of St. Chriſtopher.

SOLDIN, a town of Brandenburg, the capital of a circle, and formerly the capital of the New Mark, ſituated on a lake of the ſame name, about ſix miles long, noted for its lampreys. The town contains about 200 houſes, and two churches, and has ſome manufactures of cloth; 32 miles N. of Francfort on the Oder. N. lat. 53° 2′. E. long. 14° 59′.

SOLDO, in *Commerce*, a money of account and copper coin in Italy. Ferrara keeps accounts in lire of 20 ſoldi, or 240 denari correnti. The lira alſo contains 2 giuli or paoli; and the ſoldo, 6 quattrini. The ſcudo di Cambio is reckoned at 4 lire, or 80 ſoldi. At Florence, accounts are kept in ſcudo d'oro, ducati, or lire; each of theſe is divided into 20 ſoldi, or 240 denari, and diſtinguiſhed by the names of ſoldi d'oro, ſoldi di ducato, ſoldi di lira; alſo in paoli of $13\frac{1}{3}$ ſoldi di lira. Accounts of certain ſales of goods are likewiſe kept in Pezze da otto reali, or livornine of $5\frac{3}{4}$ lire, which are likewiſe divided into 20 ſoldi, or 240 denari di Pezza. The copper coins at Florence are ſoldi, dueti or pieces of quattrini, ſingle quattrini, and denari or piccioli. At Bologna, accounts are kept in lire of 20 ſoldi; the ſoldo, alſo called Bajocco or Bolognino, is divided into 12 denari, or 5 quattrini. At Rome, the ſcudo di ſtampa d'oro is divided into 20 ſoldi, or 240 denari. The coins at Bologna are of the ſame denomination, weight, and value, as thoſe at Rome. The bolognini in ſilver is a ſingle ſoldi; the copper ſoldi is its half, and quattrini the fifth part of a ſoldo. Kelly's Cambiſt.

SOLDURII, in *Antiquity*, a kind of military clients, or retainers to the great men in Gaul, particularly in Aquitania, mentioned by Cæſar.

The ſoldurii were people that ſhared all the good and ill fortune of their patrons; to whom, if any diſaſter happened, they either underwent the very ſame, or killed themſelves: and Cæſar aſſures us, that no one had ever been known to refuſe the alternative. Lib. iii. de Bell. Gall.

Vigenere takes them to have been more than common ſoldiers; and even gentlemen in penſion, or appointment. Athenæus calls them συναποθνησκοντες, *q. d.* dying together, or with their maſters.

SOLE, in *Geography*, a town of Norway; 6 miles S. of Stavanger.

Sole, in *Ship-Building*, a ſort of lining, to prevent wearing or tearing away the main part to which it may be attached; as to the rudder, bilgeways, &c.

Sole is alſo a name ſometimes given to the lower ſide of a gun-port, which, however, is more properly called the port-ſill.

Sole *of a Horſe*, that plate of horn which, encompaſſing the fleſhy ſole, covers the whole bottom of the foot. The ſole ought to be thick and ſtrong, and the ſhoe of a horſe ſo ſet upon the hoof as not to bear upon it, for otherwiſe the ſole would be hurt, and not only make the horſe lame, but deſtroy the fleſh that ſeparates it from the coffin-bone. It has been an abſurd practice with ſome to take out the ſole. It is done without touching the outſide of the hoof, as taking off the cruſt makes a *hoof-caſt*. And a horſe that has been unſoled, it is ſaid, will recover in a few weeks. But this cuſtom of *drawing* horſes' ſoles, in order to relieve the inflammation of the part, and to promote a free perſpiration, is not in the leaſt beneficial, as it leaves ſuch a weakneſs and tenderneſs behind, that the poor creatures moſtly ever afterwards labour under an incurable lameneſs. And La Foſſe, though he has recommended the practice, has not produced a ſingle inſtance of its ſucceſs. In lieu, therefore, of tearing the ſole up by the roots, Mr. Wood adviſes the following method; in the firſt place, to take off from the tenſion of the veſſels and leſſen the inflammation, to draw away blood at the toe and above the hoof; after which, a poultice, compoſed as below, may be applied. This conſiſts of linſeed boiled in water to a pulp, then adding gooſe-greaſe, tar, and cow-dung to it; boiling them all together to the proper conſiſtence.

The compoſition may be put to the foot, and all round the hoof; and a cold charge applied above the coronet. Where there is no great inflammation, the addition of a little ſoap to the poultice, may aſſiſt much in removing any coagulation of blood in that quarter.

When the foot is ſhaped like the back part of an oyſter-ſhell, and the ſole higher than the hoof, ſo that the whole foot is quite filled up on the lower part, it is called a *crowned ſole*.

Sole *Corporation*. See Corporation.

SOLEA, in *Geography*, a town of Italy, in the department of Panaro; 8 miles N. of Modena.

Solea, or *Soli*, a town of the iſland of Cyprus, formerly the ſee of a biſhop, and in more ancient times called "Epea;" 30 miles N.N.E. of Baffa.

Solea, in *Ichthyology*, the *ſole-fiſh*, a well-known fiſh, and much eſteemed at table. See Soal.

SOLEÆ, among the Romans, were a kind of ſandals or ſlippers, which covered only the ſole of the feet, and were bound on with thongs of leather; inſtead of which the women, and effeminate perſons of the other ſex, tied them on with purple-coloured ribbands, or ſuch as were variouſly adorned with gold and ſilver.

SOLEBAY, in *Geography*. See Southwold.

SOLEBURY, a townſhip of Pennſylvania, in the county of Bucks, containing 1669 inhabitants; 30 miles N. of Philadelphia.

SOLECISM, Soloecismus, in *Grammar*, a groſs impropriety in ſpeech, contrary to the uſe of language, and the rules of grammar, either in reſpect of declenſion, conjugation, or ſyntax. See Purity.

The word is Greek, σολοικισμος, derived from the *Soli*, a people of Attica, who, being tranſplanted to Cilicia, loſt the purity of their ancient tongue, and became ridiculous to the Athenians for their improprieties in it.

An actor on the Roman theatre having made a falſe geſture, the audience immediately cried out, he had committed a ſoleciſm with his hand.

Cicero, ad Herenn. lib. iv. cap. 12. diſtinguiſhes in the following manner between *barbariſm* and *ſoleciſm*. "Latinitas eſt quæ ſermonem purum conſervat, ab omni vitio remotum. Vitia in ſermone, quominus is latinus ſit, duo poſſunt eſſe; ſoleciſmus et barbariſmus. Soleciſmus eſt, cum verbis plurimis conſequens verbum ſuperiori non accommodatur. Barbariſmus eſt, cum verbum aliquod vitioſe effertur."

Soleciſm is accounted by grammarians a much greater fault than barbariſm, (ſee Purity,) as it diſplays a greater ignorance of the fundamental rules of the language. However, when ſoleciſms are not very glaring, where they do not darken the ſenſe, or ſuggeſt ſome ridiculous idea, the rhetorician regards them as much more excuſable than barbariſms; becauſe the former is accounted ſolely the effect of negligence, the latter of affectation. Negligence in expreſſion, often the conſequence of a noble ardour in regard to the ſentiments, is, at the worſt, a venial treſpaſs; ſometimes it is not even without energy; affectation is always a deadly ſin againſt the laws of rhetoric. It ought alſo to be obſerved, that in the article of ſoleciſms, much greater indulgence is given to the ſpeaker than to the writer; and to the writer, who propoſes to perſuade or move, greater allowances are made, than to him who propoſes barely to inſtruct or pleaſe. The more vehemence is required by the nature of the ſubject, the leſs correctneſs is exacted in the manner of treating it. Nay, a remarkable deficiency in this reſpect is not nearly ſo prejudicial to the ſcope of the orator, as a ſcrupulous accuracy, which bears in it the ſymptoms of ſtudy and art. Æſchines is ſaid to have remarked, that the orations of his rival and antagoniſt, Demoſthenes, ſmelled of the lamp, thereby intimating that their ſtyle and compoſition were too elaborate. If this remark be juſt, it conveys the greateſt cenſure that was ever paſſed on that eminent orator. But, as the intermediate degrees between the two extremes are innumerable, both doubtleſs ought to be avoided. Grammatical inaccuracies ought to be avoided by a writer, for two reaſons; one is, that a reader will much ſooner diſcover them than a hearer, however attentive he may be; the other is, as writing implies more leiſure and greater coolneſs than is implied in ſpeaking, defects of this kind, when diſcovered in the former, will be leſs excuſed than they would be in the latter. To enumerate all the kinds of ſoleciſm to which writers and ſpeakers are ſubject, would be both an uſeleſs and endleſs taſk. The tranſgreſſion of any of the rules of ſyntax is a ſoleciſm; and almoſt every rule may be tranſgreſſed in a variety of ways. Some of the more flagrant ſoleciſms are thoſe which betray an ignorance of the rudiments of the tongue; and others, which are more the effects of inattention, may be diſtinguiſhed by the ſofter name of inaccuracies. For examples of both kinds we refer to Lowth, Prieſtley, Murray, and other grammarians. See alſo Campbell's Philoſophy of Rhetoric, vol. i. b. 2. ch. 3.

SOLEDA, in *Geography,* a town of the iſland of Cuba; 56 miles S.S.E. of Havanna.

SOLEFTA, a town of Sweden, in Angermanland; 40 miles N.N.W. of Hernoſand.

SOLEIL. *Ombre de Soleil.* See OMBRE.

SOLEIL *de Mer*, in *Ichthyology*, a name given by the French writers, and by Rondeletius, to a peculiar ſpecies of ſtarfiſh, of a ſmall ſize, the legs of which reſemble very much the tails of lizards, and are very brittle.

Geſner deſcribes alſo a ſpecies under the name of the ſea-moon, *luna marina,* which, he ſays, is remarkably fragile, and which, from what elſe he has ſaid of it in its deſcription, appears alſo to be the ſame creature. The great character, however, of the creature's legs reſembling, both in colour and figure, the end of the common brown land-newt's tail, is ſo expreſſive, that it cannot but be always known by it.

Theſe rays are ſo extremely friable, that it is ſcarcely poſſible to touch them without their breaking, and they are not beſet with points in the manner of the common rays of the creatures of this kind.

The other rays of ſtar-fiſhes being furniſhed with many hundred legs, and theſe wanting them entirely, it follows, that in this ſpecies the rays themſelves muſt ſupply the place of legs, and aſſiſt the creature in walking; and thence its manner of walking muſt neceſſarily be different from that of any other kind. Theſe rays are five in number, and are inſerted very near the mouth of the creature, which is always placed in the centre of the ſtar: the part where this aperture is ſituated, and which may be called the body of the animal, is of a roundiſh figure; the diameter of it is about a third part of the length of the rays; its under ſurface is flat, and its upper convex; and it is covered, both above and below, with ſcales, but they are arranged in different manners.

The common habitations of the ſea-ſtars, on the rough ſhores of the ſea, is no place for theſe tender creatures, every daſh of a wave againſt a ſtone, if they were in the way, would break off their limbs; they have the caution, therefore, to fix their reſidence only in calm places, and where the ſhore is covered entirely with a deep ſmooth ſand. When the water has forſaken them, they are often ſeen walking ſlowly on the ſhore; and in this caſe they uſe their rays as ſo many legs. As they divide the body of the fiſh into two equal parts, there is no ray before or behind any where, ſo that the creature goes with equal eaſe to any ſide that it likes. The beſt motion they are able to make is, however, very ſlow, and the ground on which they march ought to be very even; for if they attempt to haſten their pace, or if they find any thing uneven in their paſſage, one or more of their legs uſually breaks; and this is the reaſon why this ſpecies is ſeldom found with its rays perfect. They never bury themſelves deep in the ſand, but juſt get under it, ſo as to be covered; and this they do by advancing two of the rays together, and burrowing carefully with them, and then following them with the reſt of the rays and the body. Mem. Acad. Par. 1712.

SOLEISSEL, JAMES DE, in *Biography*, a celebrated maſter of horſemanſhip, was born in 1617, in the province of Forez. He was educated among the Jeſuits, but followed, during his ſtudies, a propenſity which he had felt when very young, of attending to the manege, with which, when he arrived at man's eſtate, he joined the ſtudy of the diſeaſes of horſes. When he had made himſelf tolerably perfect in both branches of the ſcience, he commenced teacher of horſemanſhip to the young nobleſſe of his province. The reputation which he ſoon acquired cauſed him to be invited to aſſiſt in the academy for the manege in Paris, where he publiſhed a work, entitled "Le Parfait Marechal," which became very popular, and was tranſlated into ſeveral languages. He was likewiſe author of a treatiſe entitled "Le Marechal methodique," and of a Dictionary of the terms of horſemanſhip. He was a man of a very reſpectable private character, and poſſeſſed all the accompliſhments that were neceſſary to his profeſſion. He died in 1680.

SOLEK, in *Geography*, a town of Auſtrian Poland, in the palatinate of Sandomirs; 30 miles N. of Sandomirs.

SOLEMCO, a town of Hungary; 13 miles E.N.E. of Gros Wardein.

SOLEMN, SOLENNIS, ſomething performed with much pomp, ceremony, and expence. Thus we ſay, ſolemn feaſts, ſolemn funerals, ſolemn games, &c.

SOLEMN, in *Law*, ſignifies ſomething authentic, or that is clothed in all its formalities.

SOLEMN *Acceptance*. See ACCEPTANCE.

SOLEMN *Teſtament*, in the *Civil Law*, is to be atteſted by ſeven perſons, and ſealed with their ſeals.

SOLEMN *Marriage*, is that performed in one's own pariſh-church, after publication of the banns, and in preſence of witneſſes.

SOLEN, or *Razor-Sheath*, in *Natural Hiſtory*, a genus of the Vermes Teſtacea claſs and order, of which the generic character is as follows. The animal is an aſcidia; its ſhield is bivalve, oblong and open at both ends; the hinge has a ſubulate reflected tooth; it is often double, and not inſerted in the oppoſite valve. It had its name, *ſolen*, from the Greek, in which language that word expreſſes a pipe or tube; this fiſh, when the ſhells are cloſed, very aptly reſembling a tube. The Latin writers have called it *unguis*, from its reſemblance in colour and conſiſtence to the human nail. The common people in many parts of France call it *coutelier*, and in Italy it is commonly called *cannolichio*. (See SHELLS.) There are twenty-three ſpecies enumerated by Gmelin, which are as follow.

Species.

* VAGINA. The ſpecific character of this is, that the ſhell is linear, ſtraight, roundiſh, one end emarginated; the hinge is marked with a ſingle oppoſite tooth in each valve. There is a variety that inhabits the European and Indian ſeas: it is ſix or ſeven inches broad, and only one inch long. The ſhell is yellowiſh, divided diagonally into two triangles, one of which is ſtriate longitudinally, the other tranſverſely, and marked with curved bands. This ſpecies, and all the others that are found in this genus belonging to this country, are figured by Barbut, Liſter, Donovan, and other naturaliſts.

* SILIQUA. The ſhell of this ſpecies is linear, and ſtraight; it has one hinge, which is two-toothed. There is a variety with roſy lunules. The former is found in moſt European ſeas, and on our own coaſts. The latter is to be met with in the Indian ſeas. It is ſeven or eight inches broad, and not more than one and a half inch long. The ſhell is equally broad and compreſſed, with a double tooth at the hinge, receiving another oppoſite, and on one ſide there is another ſharp tooth directed downwards: the colour is of an olive-brown, with a limpid aſh-coloured mark dividing the ſhells diagonally: one part is ſtriate longitudinally, the other tranſverſely.

* ENSIS. Shell linear, a little bowed, like a ſcymitar: it has one hinge, which is two-toothed. It inhabits European ſeas. The ſhell is coloured, and marked like that of the ſiliqua; it is rounded at both ends; the two teeth of one valve are inſerted into a triangular hollow of the other.

* PELLUCIDUS. Shell ſub-arched, ſub-oval, pellucid; one hinge two-toothed. This is found on the ſhores of Angleſea; the ſhell is thin and pellucid, about an inch broad, with a double ſharp tooth in one valve, receiving a ſingle one from the oppoſite, with a proceſs in each ſhell pointing towards the cartilage of the hinge.

* LEGUMEN. Shell linear, oval, ſtraight; hinges placed in the middle, and two-toothed; one of them bifid. It is found in the European and the Atlantic ſeas; is two inches and a half broad. The ſhell is ſub-pellucid, radiate, from the hinge to the margin; it is rounded at both ends.

* CULTELLUS. The ſhell of this ſpecies is ſhaped ſomething like a kidney, with a ſingle tooth in one valve and two in the other. It inhabits European and Indian ſeas, and is more than two inches broad. The ſhell is fragile, covered with a rough cuticle, under which it is dirty-white, with tawny marks; both ends are rounded.

RADIATUS. Shell oval, ſtraight and ſmooth, with a tranſverſe depreſſed rib growing on one ſide. This is found in India, and is very thin and brittle. The ſhell is of a violet colour, with four tranſverſe white rays, growing larger towards the thinner margin; the depreſſed rib running nearly the length of the ſhell; the hinge is callous on each ſide; both valves are two-toothed.

STRIGILATUS. Shell oval, obliquely ſtriate. There is a variety which inhabits the Mediterranean, Atlantic, and Indian ſeas. The ſhell is roſy, with two white rays, ſtrong and ventricoſe; the hinge is a little prominent at the margin, with a thin reflected tooth.

ANATINUS. The ſhell of this is ovate, membranaceous, and hairy, with a falcate rib at the hinge. It inhabits the Indian ocean, on a ſandy bottom. The ſhell is pellucid, white, thin, like paper; one end rounded and cloſed, the other gaping, like the beak of a bird: there is a tooth in each valve reſembling an ear-picker.

MACHA. Shell oval, oblong, truncate before; one hinge is two-toothed. It is found in the Pacific ocean. It is about ſix or ſeven inches long; in colour it is brown, varied with blue; it produces pearl.

BULLATUS. Shell roundiſh, inflated, ſub-ſtriate; the fore-part is gaping, in conſequence of its crenatures. This is found in the American and Indian ſeas; brittle, white ſpotted or clouded with purple, longitudinally ſtriate, ſub-pellucid; hinge with a ſingle tooth, marginal ones remote, compreſſed, and inſerted in a hollow of the other valve.

MINUTUS. Shell oval, angles of the valves ſerrate. It is found in the northern parts of Europe, among zoophytes; is the ſize of a cucumber-ſeed; longitudinally ſtriate, truncate at the top, with acute ſerrate ridges, diverging from the hinge towards the top.

VIRENS. The ſhell of this is ovate-oblong, with tumid boſſes. It inhabits Java; is very brittle, diaphanous, white, outwardly greeniſh, valves unequal, reſembling in its ſhape the Mya pictorum; the tip and baſe hardly cloſed, with two approximate teeth in one hinge, and none in the oppoſite.

DIPHOS. Shell oval, ſtraight, ſmooth, with prominent membranes. It inhabits the Indian ocean, and reſembles the S. radiatus. It is two inches and a half long, and five broad; covered with a greeniſh cuticle, under which it is violet, with numerous rays; two of theſe are more diſtinct. The hinge has two teeth in one valve, and one in another.

MINIMUS. Shell linear-oval, ſtraight; the hinges are lateral and two-toothed; one of them is bifid. It inhabits Tranquebar; reſembles the S. legumen, but is much leſs; the cuticle is yellowiſh, under which it is clear white; the inner rib runs down the whole ſhell.

MAXIMUS. Shell linear, oval, ſtraight, with arched ſtriæ; hinges lateral, two-toothed. It inhabits the ſhores of Nicobar; it is a very rare ſpecies. The ſhell is thin and pellucid, white, covered with a yellowiſh cuticle; it is four inches broad, one and a half long, gaping at both ends; the teeth of the hinge not receiving one another.

COARCTATUS. The ſhell of this is tranſverſely wrinkled, contracted in the middle, rounded at both ends; hinge in the middle, with ſometimes one, and ſometimes two teeth in either valve. This is found on the ſhores of Nicobar, is about three-fourths of an inch long, and two and a half broad. The ſhell is of a dirty white, and gaping at both ends.

ROSEUS. Shell roſy, equivalve; the tooth of the hinge is ſub-bifid, and inſerted in a hollow of the oppoſite valve. It inhabits the Red ſea, reſembles the Telina radiata, but is open at both ends.

SANGUINOLENTUS. Shell oval, quite ſmooth; the hinge is callous, and two-toothed. It inhabits Jamaica; the beaks are roſy without and within.

STRIATUS. Shell equivalve, tranſverſely ſtriate; hinge with a ſingle tooth. It is alſo found near the ſhores of Nicobar,

Nicobar, and is middle-ſized. The ſhell is thin, roſy, with white rays.

Occidens. The ſhell of this ſpecies is tranſverſely ſtriate, ſmooth at the protuberant parts, radiate with white and reddiſh; both the hinges are two-toothed, with a hollow in the middle. Its reſidence is not known. The ſhell is marked with white and reddiſh ſpots ſcattered about; is more than four inches broad, and two long; both ends are gaping; the hinge is lateral.

* Crispus. The ſhell, in this ſpecies, is partly ſmooth, partly rough with undulate crimped lines; the hinge has a long narrow tooth. It is found in the river Tees, and reſembles the S. anatinus, though it is thought by ſome naturaliſts not to be a diſtinct ſpecies.

Spengleri. Protuberances or beaks of the ſhell two-parted; primary tooth of the hinge rounded, acceſſory ones long and narrow; one of them is curved. The ſhell is hardly an inch long, but two and a half broad; it is rounded at both ends.

Rondeletius obſerves, that there are, among the ſolens of the ſame ſpecies, males and females, which are eaſily diſtinguiſhable from one another; and that the females are larger, have no variegations on the ſhells, and are much better taſted than the males. Rumphius has deſcribed a very remarkable ſpecies of ſolen, which always remains buried in ſand, and which is not properly a bivalve, conſiſting only of one piece, though of the ſhape of the ſolen; he calls this *ſolen arenarius*. Liſter has called the crooked ſpecies *ſolènes curvi*, and ſome call them the *ſcymitar* ſolens.

We have ſeveral ſpecies of the ſtraight ſolens, though but few of the crooked ones.

Of the crooked ſolens, two are the only known ſpecies. 1. The ſcymitar ſolen. 2. The *ſolen arenarius*, always found in ſand.

The ſhell of this fiſh is compoſed of two pieces, which are the two halves of a hollowed cylinder, with an elliptic baſe, divided in a longitudinal direction. Theſe two pieces are faſtened together near one end by a ligament, like that which joins the ſhells of the muſcle or the oyſter. From the place where this ligament is fixed, quite to the other end of the ſhell, there is a membrane faſtened to each edge of the ſhell, and this increaſes in breadth in proportion to its diſtance from the place of its origin; ſo that, viewed externally, it forms a ſort of iſoſceles triangle, the baſe of which was about two lines in breadth. The colour and conſiſtence of this membrane give it very much the appearance of a piece of parchment; it has a conſiderable ſpring in it, and ſerves on occaſion to open, or draw together, the two ſides of the ſhell.

There is another membrane, of the ſame kind with this, faſtened to the other ſide of the fiſh, there adhering to each ſhell, but this is of an equal breadth all the way down: this ſerves alſo to ſhut or open the edges of the ſhell. When the ſolen ſhuts its ſhell, it folds itſelf into ſeveral longitudinal wrinkles, which open again when the ſides of the ſhells ſeparate.

Hence it is to be obſerved, that though this ſhell has a power of opening and ſhutting, yet the body of the fiſh is always ſecured, and is no more expoſed to ſight at one time than at another, and there is no part where the fiſh can be ſeen but at the ends.

This fiſh lives in the ſand on the ſea-ſhore, where it buries itſelf often a foot and a half, or two feet deep; the length of the ſhell is, at this time, nearly in a vertical poſition, and the fiſh has a power of raiſing itſelf at pleaſure up to the ſurface, and ſinking down again, while the ſhell remains all the time buried in its place. Almoſt all other animals have a horizontal motion, and the ſhell-fiſh of the ſea crawl along upon its bottom under water, as the common land animals do on dry ground; but this creature's progreſſive motion is only vertical, and that confined to a very ſmall compaſs; all that it is able to do for itſelf being only to raiſe itſelf higher or lower, and ſink deeper or riſe higher in the ſand, within the narrow compaſs of about two feet at the utmoſt, as the going beyond that muſt occaſion its deſtruction. Where theſe ſhell-fiſh are buried in the ſand, there is a hole reaching from every one of them to the ſurface, by means of which they have a free communication with the water: theſe holes generally are placed in great numbers near one another, and are eaſily diſtinguiſhed at a time when the tide has left the ſhore uncovered. They are not round, but oblong, and ſomewhat reſemble the key-hole of a lock, but that they have a roundneſs at each end, whereas that uſually is rounded only at one.

When it has occaſion to aſcend out of its hole, nothing more is required than the putting out the end of the leg, ſwelling it, and thus thruſting itſelf up to the length of that leg; then retracting it into the ſhell again, and thruſting out and inflating its end for a ſecond movement of the ſame kind. Theſe motions may be all perceived in the creature when out of the ſand, particularly that by which it buries itſelf; for if held up in the fingers, it thruſts out the leg, and performs all the motions as if in the ſand, making a fruitleſs attempt to ſave itſelf in its old way. Mem. Acad. Par. 1712. *ſ.*

Klein, and ſome others, have given the name ſolen to the ſeveral ſpecies of *tubuli marini*.

Solen, in *Geography*, a town of Weſtphalia; 6 miles S.S.W. of Magdeburg.

SOLENA, in *Botany*, ſo called by Willdenow, from σωλην, *a tube*, or *pipe*, in alluſion to the long tube of the flower. For the ſame reaſon, Schreber had named this ſame genus *Cyrtanthus*, but the latter appellation is now beſtowed on a very different one. (See Cyrtanthus.) Willd. Sp. Pl. v. 1. 961. (Cyrtanthus; Schreb. Gen. 122. Poſoqueria; Aubl. Guian. v. 1. 133. Juſſ. 201. Lamarck Illuſtr. t. 163.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, turbinate, in five acute, erect, permanent ſegments. *Cor.* of one petal; tube very long, cylindrical, recurved, dilated at the ſummit, its orifice fringed with hairs; limb in five deep, oblong, obtuſe, reflexed ſegments. *Stam.* Filaments five, capillary, very ſhort, incurved, ſomewhat unequal, inſerted into the mouth of the tube, between the ſegments of the limb; anthers oblong, acute at each end, attached by their baſe. *Piſt.* Germen inferior, elliptical; ſtyle capillary, as long as the tube; ſtigma minute, three-cleft. *Peric.* Berry elliptical, large, of one cell, full of pulp, and crowned with the calyx. *Seeds* about twelve, angular, imbedded in the pulp.

Eſſ. Ch. Calyx five-cleft, ſuperior, permanent. Corolla ſalver-ſhaped, with a very long, incurved tube, hairy at the mouth. Stamens inſerted into the rim of the tube. Style thread-ſhaped. Stigma three-cleft. Berry of one cell, with many angular ſeeds.

1. S. *longiflora*. Guiana Pipe-flower. Willd. n. 1.—(Poſoqueria longiflora; Aubl. Guian. v. 1. 134. t. 51.)—Found by Aublet, on the banks of the great rivers of Guiana, flowering in November, and bearing fruit in January. The Galibis call it *Aymara-poſoqueri*, becauſe a fiſh named *aymara* feeds on the berries. The *ſtem* is ſhrubby, five or ſix feet high, with a hard white wood, and ſlender,

knotty, ſmooth, oppoſite *branches*. *Leaves* oppoſite, ſtalked, elliptical, pointed, entire, veiny, ſmooth, about four inches long, each pair croſſing the next. *Stipulas* in pairs between the footſtalks, broad at the baſe, taper-pointed. *Flowers* about ſix, in a terminal *corymb*, white, drooping, ſlender, the tube of each about four inches long. *Fruit* yellow, ſucculent, ſweet, and pleaſant, the ſize of a guinea-hen's egg; the pulp red.

SOLENA is alſo the name of a genus, of the order of *Cucurbitaceæ*, in Loureiro's Fl. Cochinch. 514, which he thus denominates on account of the filaments forming a ſort of ſheath. The only ſpecies is *S. heterophylla*, a native of woods in China and Cochinchina, with which we are unacquainted, but which ſeems nearly related to *Bryonia;* only the *ſtamens* are monadelphous, and in the ſame flower with the *piſtil*. The *berries* are ſcarlet. *Root* tuberous, of many white, oblong, farinaceous knobs, eatable, and, according to the author we follow, uſeful in conſumptions and dyſenteries, as well as the ſeeds.

SOLENANDRIA, ſo called by Ventenat, in his Jardin de la Malmaiſon, from σωλην, *a tube*, becauſe of the union of the ſtamens. See GALAX.

SOLENHOFEN, in *Geography*, a town of Germany, in the principality of Anſpach; 29 miles S. of Anſpach.

SOLENIA, in *Botany*, a third generic name, (ſee SOLENA and SOLENANDRIA,) derived from σωλην, *a tube*, or *pipe*, is uſed in Hoffmann's *Flora Germanica*, v. 2. t. 8, for a minute genus of *Fungi*, whoſe tubular form it expreſſes. The ſpecies compoſing this ſuppoſed genus are, however, ſunk in *Peziza*, by Perſoon in his *Synopſis Fungorum*, 675, of which they conſtitute the ſeventh ſection, being in all four ſpecies. See PEZIZA.

SOLENOE, in *Geography*, a town of Ruſſia, in the government of Kolivan; 104 miles S. of Kolivan. N. lat. 52° 45′. E. long. 80° 54′.

SOLENOV, a lake of Ruſſia, 60 miles long and 20 broad, with two iſlands, between lake Aral and the Caſpian ſea. N. lat. 43° 50′ to 44° 50′. E. long. 56° 14′.

SOLES, in *Ancient Geography*, a town of Aſia, in Cilicia, on the ſea-coaſt, afterwards called Pompeiopolis.—Alſo, a town of the iſland of Cyprus, in which was a temple of Venus. See SOLOE.

SOLESMES, in *Geography*, a town of France, in the department of the North, and chief place of a canton, in the diſtrict of Cambray; 9 miles E.N.E. of Cambray. The town contains 3849, and the canton 16,419 inhabitants, on a territory of 140 kiliometres, in 17 communes.—Alſo, a town of France, in the department of the Sarte; 3 miles N. of Sable.

SOLE-TENANT, in *Law*, he or ſhe who holds lands only in his or her own right, without any other perſon joined.

E. gr. If a man and his wife hold lands for their lives, the remainder to their ſon: here, the man dying, the lord ſhall not have heriot, becauſe he dies not ſole-tenant.

SOLEURE, in *Geography*, a canton of Switzerland, holding the eleventh rank in the Helvetic confederacy, ſtretches partly through the plain, and partly along the chains of the Jura, and contains about 50,000 ſouls, including the inhabitants of the capital. The ſoil is, for the moſt part, fertile in corn; and thoſe diſtricts which lie within the Jura abound in excellent paſtures. The trade both of the town and canton is of little value, although the ſituation is commodious for an extenſive commerce. It is divided into eleven diſtricts or bailliages, called interior and exterior; the former are governed by bailifs, who are ſenators, and remain in the towns; the latter by bailifs ſelected from the members of the great council, who reſide in their bailliages. The inhabitants of the canton are Catholics, excepting thoſe in the bailliage of Buckegberg, who profeſs the reformed religion. In ſpiritual offices, the Catholics depend on three biſhops; but neither of theſe biſhops can iſſue any ordinance, or even viſit their dioceſes, without the approbation of the ſenate. In this canton are two chapters; alſo an abbey of Benedictines, four convents, and three nunneries. Its principal charitable inſtitutions are, an hoſpital at Soleure, and another at Olten, for the reception of burghers, ſubjects, and foreigners; the foundation of Thurigan, for old perſons of both ſexes belonging to the burgherſhip; a foundling hoſpital for orphans, and for children of poor burghers; and the hoſpital of St. Catharine, for the inſane and incurables. In eccleſiaſtical affairs, the inhabitants of Buckegberg, who profeſs the reformed religion, though ſubject to Soleure, are under the protection of Bern: and though formerly this complication of political and religious intereſts created frequent miſunderſtandings between the two cantons, yet matters were amicably and finally adjuſted on the 18th of November, 1618, at the treaty of Winingen. The inhabitants take the oath of fidelity, every third year, to the government of Soleure; but if aggrieved in their religious eſtabliſhment, can have recourſe to Bern. The ſenate of Bern nominates to the vacant benefices, but the prieſts are under the neceſſity of obtaining the confirmation of the chapter of Soleure. Bern alſo poſſeſſes ſupreme juriſdiction in criminal affairs. Soleure enjoys all the other rights of ſovereignty; ſuch as the power of levying taxes, appeals in the laſt reſort, and the deciſion of all matrimonial and eccleſiaſtical concerns, with this proviſo, that the deciſion ſhall be regulated according to the articles of the treaty of Winingen. With reſpect to the militia, all the males, from the age of 15 to 60, are formed into ſix regiments, conſiſting of about 8000 men, excluſive of 240 dragoons, and the corps of artillery, amounting to 600. The colonel of each regiment is always a ſenator, and the major a member, of the great council. The ſovereign power reſides in the great council, conſiſting of 102 members, choſen by the ſenate, in equal proportion, from the eleven tribes or companies into which the ancient burghers are diſtributed. The prerogatives of the great council are to enact and abrogate laws; to explain obſcure parts of the conſtitution, and make alterations in the form of government; to levy taxes, declare war, and conclude peace; to contract alliances, receive appeals in criminal caſes from the burghers of the capital, and in civil proceſſes above the ſum of two Swiſs livres, or 6*l.* 3*s.*; to confer the new burgherſhip, elect the treaſurer, or fourth chief of the republic, from the ancient eleven ſenators, nominate to the ſeven exterior bailliages, &c. &c. To be qualified for admiſſion into the great council, the candidate muſt be twenty years of age, an ancient burgher, and a member of the ſame tribe in which the vacancy happens. The great council aſſembles ordinarily once every month; and extraordinarily, when convened by the ſenate.

The ſenate, or little council, a conſtituent part of the great council, is compoſed of the two advoyers or chiefs of the public, who annually alternate; the chancellor, or ſecretary of ſtate, who has no vote; and 33 ſenators, drawn from the remaining 61 members of the great council, divided into 11 ſeniors and 22 juniors. The ſenate examines and digeſts all affairs, before they are ſubmitted to the great council; is entruſted with the executive power, and care of the police; receives all appeals in the firſt inſtance from the inferior courts of juſtice; gives judgment in all civil proceſſes, not exceeding the were uſed, during the chief part of the laſt century, by all ſinging-maſters unable to write to the wants and abilities of their ſcholars. But the paſſages in theſe, though excellent in their day, being now worn out and common, are generally ſuperſeded by the ſolfeggii of Aprile.

SOLFERINA, in *Geography*, a town of Italy, in the duchy of Mantua; 17 miles N.W. of Mantua.

SOLFWITZBURG, Solvesborg, or *Sylviſborg*, a ſeaport town of Sweden, in the province of Blekingen. This town, formerly more flouriſhing than it is at preſent, is almoſt ſurrounded by the Baltic ſea. It has a harbour, and a caſtle in a ruined ſtate. It is ſaid to be the place where the Lombards aſſembled when they left their country, and migrated in ſearch of new habitations; 35 miles W.S.W. of Carlſcrona. N. lat. 56° 9′. E. long. 14° 26′.

SOLI, or *Aſhaja Tuſla*, a town of Boſnia; 20 miles W.N.W. of Zwornick.

Soli, or *Jokari Tuſla*, a town of Boſnia; 16 miles W.N.W. of Zwornick.

SOLIANOI, a fortreſs of Ruſſia, in the government of Kolivan, on the Irtiſch. N. lat. 54° 20′. E. long. 75° 14′.—Alſo, a town of Ruſſia, in the government of Irkutſk; 20 miles N.N.W. of Selenginſk.

SOLIANSKOI Stanitz, a town of Ruſſia, in the government of Irkutſk, on the Lena; 16 miles N.E. of Olekminſk.

SOLICITATION *of Gravity*. See Paracentric.

SOLICITOR, or Sollicitor, *Solicitator*, a perſon employed to follow, and take care of, other perſons' ſuits depending in courts of law or equity; formerly allowed only to nobility, whoſe menial ſervants they were; but now regularly admitted to practiſe in the court of chancery. See Attorney.

The king has a ſolicitor-general, who holds his office by patent, during the king's pleaſure. The attorney-general and he had anciently a right to their writs of ſummons, to ſit in the lords houſe on ſpecial occaſions, till the 13 Car. II. ſince which time, they have almoſt conſtantly been choſen members of the houſe of commons.

The ſolicitor-general has the care and concern of managing the king's affairs, and hath fees for pleading, beſides other fees ariſing by patents, &c. He hath his attendance on the privy-council; and the attorney-general and he were anciently reckoned among the officers of the exchequer: they have audience, and come within the bar in all other courts.

To the queen's houſehold there belongs alſo an officer with this appellation. See Precedence.

SOLID, in *Phyſics*, a body whoſe minute parts are connected together, ſo as not to give way or ſlip from each other, upon the ſmalleſt impreſſion.

The word is uſed in this ſenſe, in contradiſtinction to *fluid*.

Solid *Bodies*, *Atmoſphere of*. See Atmosphere.

For the laws of gravitation of ſolids, immerged in fluids ſpecifically, either lighter or heavier than the ſolids, ſee Gravity and Fluid.

To find the ſpecific gravity of ſolids, and its ratio to that of fluids, ſee *Specific* Gravity.

For the laws of the reſiſtance of ſolids moving in fluids, ſee Resistance.

Solid, in *Geometry*, is a magnitude endued with three dimenſions, or extended in length, breadth, and depth. Hence, as all bodies have theſe three dimenſions, and nothing but bodies, ſolid and body are frequently uſed indiſcriminately.

A ſolid is terminated, or contained, under one or more planes or ſurfaces, as a ſurface is under one or more lines. From the circumſtances of the terminating lines, ſolids become divided into *regular* and *irregular*.

Solids, *Regular*, are thoſe terminated by regular and equal planes.

Under this claſs come the tetraëdron, hexaëdron or cube, octaëdron, dodecaëdron, and icoſaëdron. See Tetraedron, Cube, &c.; and for the meaſure of theſe bodies, ſee Mensuration.

Solids, *Irregular*, are all ſuch as do not come under the definition of regular ones. Such are the ſphere, cylinder, cone, parallelogram, priſm, pyramid, parallelepiped, &c.

For the ratio of geometrical ſolids, all priſms, parallelepipeds, cylinders, pyramids, and cones, are in a compound ratio of their baſes and altitudes; ſo that if the baſes be equal, they are in the ſimple ratio of the altitudes; or, if the altitudes be equal, they are as their baſes: and as the baſes of cylinders and cones are circles, and circles are in the duplicate ratio of their diameters, it follows that all cones and cylinders are in a ratio compounded of the direct ratio of their altitudes, and the duplicate ratio of their diameters.

The geneſes, properties, ratios, conſtructions, dimenſions, &c. of the ſeveral ſolids, regular and irregular, ſpherical, elliptical, conical, &c. ſee under each reſpective article. See alſo Mensuration.

Solid, *Meaſure of a*. See Measure.

Solid, *Cubature* or *Cubing of a*. See Cubature and Solidity.

Solids, *To find the Surfaces of*. See Area, Superficies, and Mensuration.

Solid *of the leaſt Reſiſtance*. See Resistance and Isoperimetry.

Solid *Angle*, is that formed by three or more plain angles meeting in a point. (See Angle.) Or, more ſtrictly, a ſolid angle, as B (*Plate* XIV. *Geometry*, *fig.* 1.), is the inclination of more than two lines, A B, B C, B F, which concur in the ſame point B, and are in the ſame planes.

Hence, for ſolid angles to be equal, it is neceſſary they be contained under an equal number of equal planes, diſpoſed in the ſame manner.

And as ſolid angles are only diſtinguiſhable by the planes under which they are contained, and as planes thus equal are only diſtinguiſhable by compreſence, they are ſimilar; and conſequently ſimilar ſolid angles are equal, and *vicé verſâ*.

The ſum of all the plane angles conſtituting a ſolid angle, is always leſs than 360°; otherwiſe they would conſtitute the plane of a circle, and not a ſolid.

The theory of ſolid angles is, perhaps, rather a ſubject of curioſity than utility; yet as it has given riſe to much diſcuſſion amongſt mathematicians, it may not be amiſs to beſtow a few lines in explanation of what we conſider to be the moſt ſcientific method of conſidering this ſubject.

Euclid defines a ſolid angle to be that which is made by the meeting of more than two plane angles, which are not in the ſame plane, in one point; but a more general definition is, that "a ſolid angle is the angular ſpace included between ſeveral plane ſurfaces, or one or more curve ſurfaces, meeting in the point which forms the ſummit of the angle."

According to this definition, ſolid angles bear juſt the ſame relation to the ſurfaces which compriſe them, as plane angles do to the lines by which they are included; ſo that, as in the latter, it is not the magnitude of the lines, but their mutual inclination, which determines the angle; juſt ſo, in the former, it is not the magnitude of the planes, but their mutual inclinations which determines the angles. And hence, all thoſe geometers, from the time of Euclid, who have confined their attention principally to the magnitude of the plane angles, inſtead of their relative poſitions, have never been able to develope the properties of this claſs of geometrical quantities; but have affirmed, that no ſolid angle can be ſaid to be half or double of another; and have ſpoken of the biſection, triſection, &c. of ſolid angles, even in the ſimpleſt caſes, as impoſſible problems. But all this ſuppoſed difficulty vaniſhes, and the doctrine of ſolid angles becomes ſimple and univerſal in its application, by aſſuming *ſpherical ſurfaces* for their meaſure, juſt as circular arcs are aſſumed for the meaſure of plane angles. This idea ſeems to have firſt occurred to Albert Girard, and publiſhed by him in his "Inventions Nouvelles en l'Algebra," an account of which is given at p. 7, vol. iii. Montucla's Hiſtory of Mathematics. The principle of this method, however, ſeems to have eſcaped the attention of geometers, till it was recently brought forward again in vol. iii. of Hutton's Courſe of Mathematics, the writer of which, it ſhould be obſerved, was not aware of the ſubject having been previouſly treated on the ſame principles by Girard. We ſhall, in what follows, avail ourſelves of the latter article.

Imagine, then, that from the ſummit of a ſolid angle, (formed by the meeting of three planes,) as a centre, any ſphere be deſcribed, and that thoſe planes are produced till they cut the ſurface of the ſphere; then will the ſurface of the ſpherical triangle, included between thoſe planes, be a proper meaſure of the ſolid angle, made by the planes at their common point of meeting, for no change can be conceived in the relative poſition of thoſe planes, without a correſponding and proportional mutation in the ſurface of the ſpherical triangle. If, in like manner, the three or more ſurfaces, which by their meeting conſtitute another ſolid angle, be produced till they cut the ſurface of the ſame, or an equal ſphere, whoſe centre coincides with the ſummit of the angle; the ſurface of the ſpheric triangle, or polygon, included between the planes which determine the angle, will be a correct meaſure of that angle. And the ratio which ſubſiſts between the areas of the ſpheric triangles, polygons, or other ſurfaces thus formed, will be accurately the ratio that ſubſiſts between the ſolid angles, conſtituted by the meeting of the ſeveral planes or ſurfaces at the centre of the ſphere.

Hence the compariſon of ſolid angles becomes a matter of great eaſe and ſimplicity; for, ſince the areas of ſpherical triangles are meaſured by the exceſs of the ſums of their angles, each above two right angles, and the areas of ſpherical polygons, of n ſides, by the exceſs of the ſum of their angles above $(2n - 4)$ right angles, it follows, that the magnitude of a trilateral ſolid angle will be meaſured by the exceſs of the ſum of the three angles, made reſpectively by its bounding planes above two right angles; and the magnitude of ſolid angles, formed by n bounding planes, by the exceſs of the ſum of the angles of inclination of the ſeveral planes above $(2n - 4)$ right angles.

As to ſolid angles, limited by curve ſurfaces, ſuch as the angles at the vertex of cones; they will manifeſtly be meaſured by the ſpheric ſurface, in the ſame manner as angles determined by plane ſurfaces, are meaſured by the triangles or polygons they mark out upon the ſame, or an equal ſphere. In all caſes, the maximum limit of ſolid angles will be the plane towards which various planes determining ſuch angles approach, as they diverge farther from each other about the ſame ſummit; the ſame as a right line is the maximum limit of plane angles, being formed by the two bounding-lines, when they make an angle of 180°. The maximum limit of ſolid angles is meaſured by the ſurface of the hemiſphere, in like manner as the maximum limit of plane angles is meaſured by the arc of a ſemicircle. The ſolid right angle (the angle, for example, of a cube) is $\frac{1}{4} = (\frac{1}{2})^2$ of the maximum ſolid angle; while the plane right angle is half the maximum plane angle.

The analogy between plane and ſolid angles being thus traced, we may proceed to exemplify this theory by a few inſtances; aſſuming 1000 as the numeral meaſure of the maximum ſolid angle = 4 times 90° ſolid = 360° ſolid.

1. The ſolid angles of right priſms are compared with great facility. For of the three angles made by the three planes, which by their meeting conſtitute every ſuch ſolid angle, two are right angles, and the third is the ſame as the correſponding plane angle of the polygonal baſe; on which, therefore, the meaſure of the ſolid angle depends. Thus, with reſpect to the right priſm with an equilateral triangular baſe, each ſolid angle is formed by planes, which reſpectively make angles of 90°, 90°, and 60°. Conſequently, $90° + 90° + 60° - 180° = 60°$, is the meaſure of ſuch angle, compared with 360°, the maximum angle, and is therefore one-ſixth of the maximum angle.

A right priſm, with a ſquare baſe, has, in like manner, each ſolid angle $= 90° + 90° + 90° - 180° = 90°$, which is one-fourth of the maximum angle; and thus it may be found that each ſolid angle of a right priſm, with an equilateral

triangular baſe = $\frac{1}{6}$ max. angle = $\frac{1}{6}$ .1000
ſquare baſe = $\frac{1}{4}$ - = $\frac{1}{4}$ .1000
pentagonal baſe = $\frac{3}{10}$ - = $\frac{3}{10}$ .1000
hexagonal = $\frac{1}{3}$ - = $\frac{1}{3}$ .1000
heptagonal = $\frac{5}{14}$ - = $\frac{5}{14}$ .1000
octagonal = $\frac{3}{8}$ - = $\frac{3}{8}$ .1000
nonagonal = $\frac{7}{18}$ - = $\frac{7}{18}$ .1000
decagonal = $\frac{2}{5}$ - = $\frac{2}{5}$ .1000
undecagonal = $\frac{9}{22}$ - = $\frac{9}{22}$ .1000
duodecagonal = $\frac{5}{12}$ - = $\frac{5}{12}$ .1000
m-gonal - = $\frac{m-2}{2m}$ - = $\frac{m-2}{2m}$ .1000

Hence it may be ſhewn, that each ſolid angle of a regular priſm with triangular baſe, is *half* each ſolid angle of a priſm of an hexagonal baſe. Each with regular

ſquare baſe = $\frac{2}{3}$ of each with regular octagonal baſe.
pentagonal = $\frac{3}{4}$ - - - decagonal.
hexagonal = $\frac{4}{5}$ - - - duodecagonal.
$\frac{1}{2}$ m-gonal = $\frac{m-4}{m-2}$ - - - m-gonal.

Hence, again, we may infer, that the ſum of all the ſolid angles of any priſm of triangular baſe, whether that baſe be regular or irregular, is half the ſum of the ſolid angles of a priſm of quadrangular baſe, regular or irregular; and the ſum of the ſolid angles of any priſm of

tetragonal baſe = $\frac{2}{3}$ ſum of angles of pentagonal baſe.
pentagonal baſe = $\frac{3}{4}$ - - - hexagonal.
hexagonal baſe = $\frac{4}{5}$ - - - heptagonal.
m-gonal baſe = $\frac{m-2}{m-1}$ - - - $(m+1)$-gonal.

2. Let us now compare the ſolid angles of the five regular bodies. In theſe bodies, if m be the number of ſides of each face; n the number of planes which meet at each

ſolid angle; $\pi = \frac{1}{2}$ circumference, or 180°; and A the plane angle made by two adjacent faces; then we have

$$\text{ſin.}\ \tfrac{1}{2}A = \frac{\text{coſ.}\ \dfrac{\pi}{n}}{\text{ſin.}\ \dfrac{\pi}{n}}.$$

This theorem gives for the plane angle formed by every two contiguous faces of the tetraëdron, 70° 31′ 42″; of the hexaëdron, 90°; of the octaëdron, 109° 28′ 18″; of the dodecaëdron, 116° 33′ 54″; of the icoſaëdron, 138° 11′ 23″. But in theſe polyedræ, the number of faces meeting about each ſolid angle are 3, 3, 4, 3, 5, reſpectively. Conſequently the ſolid angles will be determined by the ſubjoined proportions.

$$360^\circ : 1000 :: \begin{cases} 3\,(70^\circ 31' 42'') - 180^\circ : \ 87.736 & \text{tetraë.} \\ 3\,(90^\circ) \qquad\quad\ \ - 180^\circ : 250 & \text{hexaë.} \\ 4\,(109^\circ 28' 18'') - 180^\circ : 216.351 & \text{octaë.} \\ 3\,(116^\circ 33' 54'') - 180^\circ : 471.395 & \text{dodecaë.} \\ 5\,(138^\circ 11' 23'') - 180^\circ : 419.301 & \text{icoſaë.} \end{cases}$$

3. Solid angles at the vertices of cones, will be determined by means of the ſpheric ſegments cut off at the baſes of thoſe cones; that is, if right cones, inſtead of having plane baſes, had baſes formed of the ſegments of equal ſpheres, whoſe centres were the vertices of cones, the ſurface of thoſe ſegments would be the meaſures of the ſolid angles at the reſpective vertices. Now the ſurface of ſpheric ſegments, is to the ſurface of the hemiſphere, as the altitudes to the radius of the ſphere; and, therefore, the ſolid angle at the vertices of right cones, will be to the maximum ſolid angle, as the exceſs of the ſlant ſide above the axis of the cone, to the ſlant ſide of the cone. Thus, if we wiſh to aſcertain the ſolid angles at the vertices of the equilateral and right-angled cones; the axis of the former is $\frac{1}{2}\sqrt{3}$, and of the latter $\frac{1}{2}\sqrt{2}$, the ſlant ſide of each being unity. Hence,

$1 : 1 - \frac{1}{2}\sqrt{3} :: 1000 : 133.97$ angle at vertex equilateral cone.

$1 : 1 - \frac{1}{2}\sqrt{2} :: 1000 : 292.98$ - - right-angled.

4. From what has been ſaid, the mode of determining the ſolid angles at the vertices of pyramids will be ſufficiently obvious. If the pyramids be regular ones, and N repreſent the number of faces meeting about the vertical angle in one, and A the angle of inclination of each two of its plane faces; alſo n the number of planes meeting about the vertex of another, and a the angle of inclination of each two of its faces; then will the vertical angle of the former, be to the vertical angle of the latter, as

$$NA - (N-2)\,180^\circ, \text{ to } na - (n-2)\,180^\circ.$$

If a cube be cut by diagonal planes into ſix equal pyramids, with ſquare baſes, their vertices all meeting in the centre of the circumſcribing ſphere; then each of the ſolid angles made by the four planes meeting at each vertex, will be $\frac{1}{3}$d of the maximum ſolid angle; and each of the ſolid angles at the baſes of the pyramids will be $\frac{1}{12}$th of the maximum ſolid angle. Therefore, each ſolid angle at the baſe of ſuch pyramid is $\frac{1}{4}$th of the ſolid angle at its vertex, and if the angle at the vertex be biſected, either of the ſolid angles ariſing from the biſection will be double of either ſolid angle at the baſe; hence alſo each ſolid angle of a priſm with equilateral triangular baſe, will be half each vertical angle of theſe pyramids, and double each ſolid angle at their baſe.

Solid *Figures, Like.* See Like.

Solid *Baſtion.* See Bastion.

Solid *Place.* See Locus.

Solid *Foot.* See Foot.

Solid *Numbers*, are thoſe which ariſe from the multiplication of a plain number, by any other whatſoever.

Thus, 18 is a ſolid number made of 6 (which is plain) multiplied by 3; or of 9 multiplied by 2.

Solid *Problem*, in *Mathematics*, is one which cannot be geometrically ſolved, but by the interſection of a circle and a conic ſection; or by the interſection of two other conic ſections beſides the circle.

Thus, to deſcribe an iſoſceles triangle on a given right line, whoſe angle at the baſe ſhall be triple to that at the vertex, is a ſolid problem, reſolved by the interſection of a parabola and a circle.

Solid *Root*, among *Botaniſts*, expreſſes the whole root to be one uniform lump of matter.

Solid *Square*, in *Military Language*, a body of foot where both ranks and files are equal.

Solid *Theorem.* See Theorem.

Solid *Celery*, in *Gardening*, that ſort which is of a firm criſp nature, without any kind of opening or hollowneſs in the middle part of the ſtems. There is a ſort of this kind, which has a very ſlight reddiſh tinge, that is greatly eſteemed in ſome places. Solid celery commonly eats in a more criſp and agreeable manner than the hollow ſort, and on that account is, for the moſt part, cultivated in the gardens of thoſe who do not raiſe the plant for ſale; but in the market-gardens, where ſale is the great object, the common hollow kind is the ſort that is the moſt in cultivation, as it grows much more quickly, and of courſe becomes ſooner ready to be diſpoſed of in the market, nor does the ſolid ſort ſtand the froſt ſo well in the winter. Celery being ready at an early period is a matter of very great importance and conſideration in theſe ſituations, in conſequence of the difference in price being often ſo great, as that which is early will not unfrequently fetch double the price, and more, of that which is late. See Apium.

Neither this ſolid ſort, nor the tall or giant celery, as it is called, are commonly thought ſo fit for winter crops. This ſolid kind was not known until long after the hollow ſort had been in uſe, and the above variety is but lately known and cultivated.

SOLIDAGO, in *Botany*, from *ſolido*, to make firm, and, particularly, to heal a wound; an old name, ſynonimous with the Engliſh word Conſound, and intended to expreſs the reputed vulnerary powers of the plants which bore it.—Linn. Gen. 425. Schreb. 556. Willd. Sp. Pl. v. 3. 2053. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 64. Sm. Fl. Brit. 889. Prodr. Fl. Græc. Sibth. v. 2. 179. Purſh 535. Juſſ. 181. Lamarck Illuſtr. t. 680. Gærtn. t. 170. (Virga aurea; Tourn. t. 275.) Claſs and order, *Syngeneſia Polygamia-ſuperflua.* Nat. Ord. *Compoſitæ diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* oblong, imbricated, with oblong, narrow, pointed, ſtraight, converging ſcales. *Cor.* compound, radiated. Florets of the diſk numerous, perfect, tubular, funnel-ſhaped, with a five-cleft ſpreading limb; thoſe of the radius fewer than ten, uſually five, ligulate, lanceolate, three-toothed, female. *Stam.* in the perfect florets, Filaments five, capillary, very ſhort; anthers united into a cylindrical tube. *Piſt.* in the ſame florets, Germen oblong; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma cloven, ſpreading: in the female ones, Germen and ſtyle as in the former; ſtigmas two, revolute. *Peric.* none, the calyx remaining ſcarcely changed. *Seeds* ſolitary to each floret of the diſk, obovate-oblong. Down capillary. Thoſe of the radius much the ſame. *Recept.* flattiſh, dotted, naked.

Eſſ. Ch. Receptacle dotted, naked. Down ſimple. Calyx imbricated, with converging ſcales. Florets of the radius about five.

The ſpecies of this genus, almoſt entirely American, vie with thoſe of *Aſter* in difficulty of determination. They are all perennial, moſtly herbaceous, with ſimple undivided leaves, and panicled or ſpiked, almoſt always yellow, ſmall flowers, and are known by the name of Golden Rods. Several are cultivated for ornament, more for curioſity. The *Hortus Kewenſis*, enriched from Dr. Solander's manuſcripts, has thrown great light on the preſent genus, as well as on *Aſter*. Linnæus in Syſt. Veg. ed. 14, has only fourteen ſpecies of *Solidago;* Willdenow, profiting by Mr. Aiton's work, enumerates forty. Mr. Purſh reckons up fifty-one North American ſpecies alone. One only, ſubject to many varieties, is found in Britain.

So great a number of ſpecies now require to be added to Willdenow's catalogue, that it is neceſſary to take a compendious view of the whole, eſpecially as we are furniſhed with more authentic ſpecimens than moſt writers have had at their command.

Section 1. *Arboreſcent.*

1. S. *ſpuria.* Baſtard Tree Golden-rod. "Forſt. Comm. Gott. v. 9. 68." Willd. n. 1. (Conyza rugoſa; Ait. Hort. Kew. v. 5. 30.) — Stem arboreous. Panicle corymboſe. Leaves oblong, wedge-ſhaped, ſerrated.—Native of St. Helena. Brought by ſir Joſeph Banks, in 1772, to Kew garden, where it flowers in the greenhouſe in November. A ſpreading irregular ſmall *tree*, with thick rugged *branches*, leafy at the ends. *Leaves* ſtalked, rugoſe, bright green, from a ſpan to a foot long. *Panicles* large, level-topped. *Flowers* white, half an inch in diameter, with ten florets in the radius. *Forſter.*

2. S. *Leucadendron.* White Tree Golden-rod. "Forſt. ibid. 69." Willd. n. 2. — "Stem arboreſcent. Cymes level-topped. Leaves oblong-obovate, crenate, nearly ſeſſile."—Native of woods in St. Helena. A *tree*, two or three fathoms in height. *Branches* dark brown, tuberculated, rather level-topped; leafy at the ſummit. *Leaves* ſmooth, ſpreading, three inches long, tapering at the baſe.—*Flower-ſtalks* cymoſe, ſmooth and ſlender. *Flowers* in every part like the preceding. *Forſter.*

3. S. *arboreſcens.* New Zeeland Tree Golden-rod. Forſt. Prodr. 56. Willd. n. 3.—"Stem arboreous. Panicles corymboſe, cloſe, terminal. Leaves roundiſh-ovate, acute, wavy, ſtalked."—Native of New Zeeland. Young *branches* downy. *Leaves* bluntly and diſtantly toothed; downy beneath. *Willd.*

Section 2. *Herbaceous. Flowers unilateral. Leaves with three combined ribs.*

4. S. *canadenſis.* Canadian Golden-rod. Linn. Sp. Pl. 1233. Willd. n. 4. Ait. n. 1. Purſh n. 1. (Virga aurea anguſtifolia, paniculâ ſpecioſâ, canadenſis; Pluk. Almag. 389. t. 236. f. 1.)—Stem downy. Leaves lanceolate, ſerrated, triple-ribbed, rough. Cluſters copious, panicled, unilateral, recurved. Radius hardly exceeding the diſk.—In hedges, old fields, and along fences, from Canada to Pennſylvania, flowering from July to September. From eighteen inches to five feet high. *Purſh.* The *ſtem* is angular, terminated by an ample downy *panicle*, of innumerable very ſmall yellow *flowers*. *Leaves* ſeſſile, three inches long, ſometimes nearly entire, and occaſionally downy. Purſh and, of courſe, Willdenow, copy the erroneous reference to Plukenet; a practice which overturns all confidence in the ſynonyms of authors who uſe it, as they cannot have judged of the deſcription or figure cited.

5. S. *procera.* Great Golden-rod. Ait. n. 2. Willd. n. 5. Purſh n. 2. — "Stem villous, erect. Leaves lanceolate, ſerrated, triple-ribbed, rough; villous beneath. Cluſters ſpiked, erect, drooping before flowering. Radius ſhort."—In ſwamps, hedges, and about fences, from Canada to Virginia, flowering from July to September. From four to ſeven feet high. *Purſh.*

6. S. *ſerotina.* Upright Smooth Golden-rod. Ait. n. 3. Willd. n. 6. Purſh n. 3.—Stem erect, round, very ſmooth. Leaves linear-lanceolate, ſmooth, triple-ribbed, ſerrated, rough-edged. Cluſters panicled, unilateral. Stalks downy.—In woods and hedges, from New England to Pennſylvania, flowering in September and October. Young *leaves* edged with copious little white rigid hairs.

7. S. *gigantea.* Gigantic Golden-rod. Ait. n. 4. Willd. n. 7. Purſh n. 4.—Stem erect, ſmooth. Leaves lanceolate, ſmooth, ſerrated, rough-edged, obſcurely triple-ribbed. Cluſters paniculated, unilateral. Stalks hairy. Radius ſhort.—In open low places, on the ſides of fertile hills, from New England to Virginia, flowering from Auguſt to October. From four to ſeven feet high. *Purſh.*

8. S. *ciliaris.* Fringed Golden-rod. Willd. n. 8. Purſh n. 5.—Stem erect, ſmooth. Leaves lanceolate, ſomewhat triple-ribbed, ſmooth, rough-edged, ſlightly ſerrated. Cluſters panicled, unilateral. Stalks ſmooth. Bracteas fringed. Radius ſhort.—Sent from Pennſylvania, by the late Rev. Dr. Muhlenberg. The *ſtem* is angular. Radical *leaves* ſtalked, elliptical, pointed, veiny, ſerrated, rough, near a foot long. Branches of the *panicle* ſpreading. *Bracteas* minute. *Willd.*

9. S. *reflexa.* Hanging-leaved Golden-rod. Ait. n. 5. Willd. n. 9. Purſh n. 6. — Stem erect, villous. Leaves lanceolate, ſomewhat ſerrated, triple-ribbed, rough, reflexed. Cluſters panicled, ſlightly unilateral. — In pine woods and old fields, from New Jerſey to Carolina, flowering in Auguſt and September.

10. S. *lateriflora.* Lateral-flowered Golden-rod. Ait. n. 6. Willd. n. 10. Purſh n. 7. Linn. Sp. Pl. 1234? —Stem erect, rather hairy. Leaves lanceolate, obſcurely triple-ribbed, ſmooth, rough-edged; the lower ones ſlightly ſerrated. Cluſters panicled, unilateral, ſomewhat recurved. —In old fields and dry woods, from Canada to Carolina, flowering from Auguſt to October. The *ſtem* is from two to three feet high, ſtriated, often purpliſh, furniſhed with numerous lateral flowering branches, as well as a principal terminal one. *Leaves* very ſmooth in the diſk. *Radius* much longer than the calyx. This is probably the Linnæan plant, but ſome obſcurity attends that queſtion.

Section 3. *Cluſters unilateral. Leaves veiny.*

11. S. *aſpera.* Rough-leaved Golden-rod. Ait. n. 7. Willd. n. 11. Purſh n. 8. (Virga aurea americana aſpera, foliis brevibus ſerratis; Dill. Elth. 411. t. 305.)—Stem erect, round, hairy. Leaves ovate, rather elliptical, very rough, rugged, ſerrated, without lateral ribs. Cluſters panicled, unilateral.—In barren dry fields and woods, from New York to Carolina, flowering from September to November. *Purſh.* About a yard high. *Leaves* from one to two inches long, acute. *Cluſters* denſe, in ſome degree conical. *Flowers* ſmall, yellow, the radius twice as long as the calyx.

12. S. *altiſſima.* Tall Variable Golden-rod. Linn. Sp. Pl. 1233. Willd. n. 12. Ait. n. 8. Purſh n. 9. (Virga aurea altiſſima ſerotina, paniculâ ſpecioſâ patulâ; Mart. Cent. 14. t. 14; and probably V. aurea marilandica, ſpicis florum racemoſis, foliis integris ſcabris; ibid. 13. t. 13.)—Stem erect, hairy. Leaves lanceolate; the lower ones deeply ſerrated, very rough, rugoſe. Panicles unilateral.—

In hedges and fields of North America, common, flowering from Auguſt to October. A very variable ſpecies, ſcarcely two individuals look alike. *Purſh.* The numerous panicled *cluſters* ſpread horizontally, in a graceful manner, and all the *flowers* are turned upward. They are twice the ſize of *S. canadenſis*, with a prominent *radius*, half as long again as the *calyx*.

13. S. *rugoſa.* Wrinkle-leaved Golden-rod. Mill. Dict. ed. 8. n. 25. Willd. n. 13. Ait. n. 9. Purſh n. 10. (Virga aurea novæ angliæ, rugoſis foliis crenatis; Dill. Elth. 416. t. 308.) — Stem erect, hairy. Leaves ovato-lanceolate; the lower ones cloſely ſerrated, rugged, very rough. Cluſters panicled, compound, widely ſpreading, unilateral.—In a dry barren ſoil, from Canada to Virginia, flowering from Auguſt to October. *Purſh.* The *leaves* are ſhorter and broader than in the foregoing. *Flowers* rather ſmaller.

14. S. *villoſa.* Soft-leaved Golden-rod. Purſh n. 11. (S. altiſſima β; Ait. ed. 1. v. 3. 212. ed. 2. n. 8. Willd. n. 12. S. piloſa; Mill. Dict. ed. 8. n. 9.)—“ Stem erect, villous. Leaves lanceolate, rather ſoft, ſerrated, without lateral ribs. Cluſters panicled, unilateral.”—In fields and woods of North America frequent, flowering from Auguſt to October. From eighteen inches to three feet high. *Purſh.*

15. S. *ſcabra.* Harſh-leaved Golden-rod. Willd. n. 14. Purſh n. 12. — “ Stem erect, hairy. Leaves oblong, pointed; ſmooth above; rugged and rough beneath. Cluſters unilateral.”—In old fields and about fences, from Pennſylvania to Virginia, flowering from Auguſt to October. *Purſh.* *Stem* furrowed. *Leaves* tapering at each end, pointed, with equal, ſhort, cloſe-preſſed ſerratures about the middle.

16. S. *pyramidata.* Pyramidal Golden-rod. Purſh n. 13.—“ Stem erect, round, hairy. Leaves oblong, acute, ſeſſile, ſomewhat claſping the ſtem, ſmooth, rough-edged, ſparingly and ſlightly toothed. Panicle naked, unilateral, pyramidal; its branches reflexed. Flower-ſtalks ſmooth.”—Gathered by Mr. Enſlen, in the “ pine-barrens” of Georgia, flowering in Auguſt and September. About two feet high. The *leaves* decreaſe toward the beginning of the *panicle*, which conſiſts of lively yellow very ſmall *flowers*. *Purſh.*

17. S. *nemoralis.* Woolly-ſtalked Golden-rod. Ait. ed. 1. v. 3. 213. ed. 2. n. 10. Willd. n. 15. Purſh n. 14. — “ Stem erect, downy. Stem-leaves lanceolate, hiſpid, entire; radical ones ſomewhat wedge-ſhaped, ſerrated. Cluſters panicled, unilateral.”—In ſandy and barren fields common, from Canada to Carolina, flowering from Auguſt to October. The whole *plant* has a grey aſpect, and is about a foot, or ſometimes two, high. *Purſh.*

18. S. *patula.* Short-ſpreading-branched Golden-rod. Willd. n. 16. Purſh n. 15.—Stem erect, ſmooth, angular. Leaves elliptical, ſerrated, ſmooth; the radical ones oblong-ſpatulate. Cluſters panicled, unilateral, ſpreading. Flower-ſtalks downy.—In ſhady woods, on a fertile ſoil, from New York to Virginia, flowering in September and October. Our ſpecimen was ſent by the diſcoverer of this ſpecies, the Rev. Dr. Muhlenberg, from Lancaſter, Pennſylvania. Its *ſtems* are upright and wand-like, two feet high, angular and ſtriated. *Stem-leaves* ſeſſile, an inch long, pointed; the radical ones are ſaid by Willdenow to reſemble exactly thoſe of *Chryſanthemum Leucanthemum.* The *flowers* are larger than moſt of the foregoing, but each *cluſter* is hardly above an inch in length.

19. S. *ulmifolia.* Elm-leaved Golden-rod. Willd. n. 17. Purſh n. 16.—“ Stem erect, ſtriated, ſmooth. Leaves elliptical, pointed, deeply ſerrated; villous beneath: radical ones obovate. Cluſters panicled, unilateral. Flower-ſtalks villous. Rays ſhort.”—In ſwamps and ſhady woods, from New York to Virginia, flowering from Auguſt to October. *Purſh.* Radical *leaves* almoſt the ſame as the laſt, but more deeply ſerrated, covered with hairs on both ſides; the reſt elliptical or ovate-oblong; ſmooth above; villous about the veins beneath. *Flower-ſtalks* villous; the partial ones clothed with ſcattered hairs, and accompanied by *bracteas.*

20. S. *arguta.* Sharp-notched Golden-rod. Ait. ed. 1. v. 3. 213. ed. 2. n. 11. Willd. n. 18. Purſh n. 17.—“ Stem erect, ſmooth. Leaves ſmooth, ſharply and unequally ſerrated; thoſe of the ſtem elliptical; radical ones ovate-oblong. Cluſters panicled, unilateral. Rays elongated.”—In woods and meadows, from Canada to Virginia, flowering from September to November. *Purſh.*

21. S. *juncea.* Ruſhy-ſtalked Golden-rod. Ait. ed. 1. v. 3. 213. ed. 2. n. 12. Willd. n. 19. Purſh n. 18.—Stem erect, ſmooth. Leaves lanceolate, ſmooth, rough-edged; the lower ones ſerrated. Cluſters panicled, unilateral.—In ſandy fields and woods, from New Jerſey to Carolina, flowering from Auguſt to October. The *ſtem* is browniſh, ſomewhat angular and ſtriated, leafy, copiouſly panicled at the top, with ſpreading, recurved, denſe, oblong, compound *cluſters*, a finger's length or more, whoſe partial ſtalks are roughiſh, bearing many ſmall, lanceolate, obtuſe *bracteas.* *Florets* of the radius twice as long as the calyx.

22. S. *elliptica.* Oval-leaved Golden-rod. Ait. ed. 1. v. 3. 214. ed. 2. n. 13. Willd. n. 20. Purſh n. 19. (S. latiſſimifolia; Mill. Dict. ed. 8. n. 14. Virga aurea canadenſis, latiſſimo folio glabro; Tourn. Inſt. 485.)—Stem erect, ſmooth. Leaves elliptical, ſmooth, ſerrated. Cluſters panicled, unilateral. Rays of a middling length.—In ſhady woods among rocks, from New York to Virginia, flowering from Auguſt to October. *Purſh.*

23. S. *dubia.* Lanceolate-leaved Golden-rod. Scopoli Del. Inſubr. v. 2. 19. t. 10.—Stem erect, ſtriated, ſlightly hairy. Leaves lanceolate, ſmooth, diſtantly toothed. Cluſters panicled, unilateral, rather hairy; the lower ones axillary. Bracteas lanceolate, ſmooth.—Cultivated in the botanic garden of Pavia, from whence we obtained a ſpecimen in June, 1787. The plant was ſuppoſed by profeſſor Scopoli to be a native of North America, but we cannot refer it to any deſcribed ſpecies. The late Mr. Dryander, at that time intent on preparing the *Hortus Kewenſis* for the preſs, conſidered our ſpecimen as coming neareſt to *S. elliptica*, but its *leaves* are narrower, and *bracteas* much leſs. Moſt of the *cluſters* are axillary, compoſing a leafy *panicle*, and about as long as their correſponding leaves. *Florets* of the radius rather numerous. The *foliage* is rigid, entirely ſmooth, finely toothed, not ſerrated, ſomewhat triple-ribbed; indeed more ſo than in *lateriflora*, n. 10, next to which ſpecies, in the firſt ſection, we ſhould have placed the preſent, but for its alleged affinity to *elliptica.*

24. S. *aſperata.* File-leaved Golden-rod. “ Bankſ. MSS.” Purſh n. 20. — “ Stem panicled, corymboſe. Cluſters nearly erect. Flowers aſcending. Leaves lanceolate, ſerrated, rough.” — In Canada, according to the Bankſian herbarium. *Purſh.*

25. S. *recurvata.* Recurved Golden-rod. Willd. Enum. 889. Purſh n. 21.—Stem erect, downy. Leaves lanceolate, ſerrated, rough-edged. Cluſters elongated, unilateral, recurved, panicled. In ſhady woods, from Pennſylvania to Virginia, flowering from September to November. *Purſh.* *Leaves* lanceolate, pointed, deeply ſerrated, nearly ſmooth, except at the edges. *Willdenow.*

26. S. *ſempervirens.* Narrow-leaved Evergreen Golden-rod. Linn. Sp. Pl. 1232. Willd. n. 21. Ait. n. 14.

Purſh n. 22. (S. maxima americana; Cornut. Canad. 168. t. 169. Virga aurea, ſive Solidago procerior americana, caule multiplici; Pluk. Phyt. t. 235. f. 5.)—Stem erect, ſmooth. Leaves linear-lanceolate, rather fleſhy, ſmooth, entire, rough-edged. Cluſters panicled, unilateral. Flower-ſtalks roughiſh.—In ſwamps, and on the banks of rivers, from Canada to Pennſylvania, flowering from September to November. *Purſh.* A tall, ſmooth, purpliſh and ſomewhat glaucous ſpecies, with copious, long, narrow *leaves*, and denſe oblong *panicles*, of unilateral cluſters. Radiant *florets* long, narrow, rather numerous.

27. S. *virgata.* Slender Wand-like Golden-rod. Michaux Boreal-Amer. v. 2. 117. Purſh n. 23.—“Stem ſmooth, quite ſimple. Leaves lanceolate, ſomewhat wedge-ſhaped, obtuſe, entire, very ſmooth, cloſe-preſſed; the upper ones gradually ſmaller. Branches of the panicle elongated, with terminal cluſters. Flower-ſtalks ſmooth, unilateral.”—In ſhady wet woods of Lower Carolina and Georgia, flowering from Auguſt to October. About two feet high, extremely ſmooth and ſlender. *Purſh.*

28. S. *odora.* Sweet-ſcented Golden-rod. Ait. ed. 1. v. 3. 214. ed. 2. n. 15. Willd. n. 22. Purſh n. 24. (Virga aurea americana, tarraconis facie et ſapore, paniculâ ſpecioſiſſimâ; Pluk. Phyt. t. 116. f. 6.)—Stem erect, downy, ſtriated. Leaves linear-lanceolate, entire, ſmooth, rough-edged. Cluſters panicled, unilateral, nearly ſimple.—In dry ſunny ſituations, on fertile woodlands, from Canada to Carolina, principally throughout the Allegany mountains, flowering from Auguſt to October. This is moſt generally and principally known among the inhabitants by the name of Golden-rod, and uſed as a wholeſome tea. The flowers, gathered when fully expanded, and carefully dried, afford a moſt agreeable ſubſtitute for tea, which for ſome time has been an article of exportation to China, where it fetches a high price. *Purſh.* The upper part of the *ſtem* is regularly furrowed. *Cluſters* two or three inches long, ſpreading horizontally, each moſtly accompanied by a leaf; their *ſtalks* angular and rough. *Bracteas* oblong, ſmooth.

29. S. *retrorſa.* Reflexed Golden-rod. Michaux Boreal-Amer. v. 2. 117. Purſh n. 25.—“Stem erect, round, rough. Leaves cloſely ſeſſile, reflexed, linear-lanceolate, pointed, rough-edged; ſomewhat keeled beneath. Cluſters of the panicle recurved.”—In open ſwamps of Virginia and Carolina, flowering in Auguſt and September. *Purſh.* Said by Michaux to be akin to the laſt. We have had no opportunity of comparing them.

Section 3. *Cluſters erect.*

30. S. *paucifloſculoſa.* Starved-flowered Golden-rod. Michaux Boreal-Amer. v. 2. 116. Purſh n. 26.—“Smooth, ſomewhat ſhrubby. Leaves lanceolate, obtuſe, without ribs. Panicle compound, many-flowered; tufts of flowers erect. Calyx narrow-oblong, with five florets in the diſk, and one in the radius.”—In the “ſand-barrens” of Virginia and Carolina, flowering from Auguſt to October. *Purſh.*

31. S. *bicolor.* Two-coloured Golden-rod. Linn. Mant. 114. Willd. n. 23. Ait. n. 16. Purſh n. 27. (Virga aurea, flore albo ſpicato; Pluk. Phyt. t. 114. f. 8, not 3, as Willdenow and Purſh have it.)—Stem hairy. Leaves elliptical, hairy; the lower ones ſerrated; thoſe on the flower-branches entire, numerous, and ſmall. Cluſters erect. Scales of the calyx obtuſe.—In woods and on dry hills, from Canada to Carolina, flowering from Auguſt to October. Diſtinguiſhed by its ſhort cloſe *cluſters*, and white *rays*, which are not long, but rather numerous. The *florets* of the diſk are alſo plentiful.

32. S. *petiolaris.* Late-flowered Golden-rod. Ait. ed. 1. v. 3. 216. ed. 2. n. 17. Willd. n. 24. Purſh n. 28.—Stem erect, villous. Leaves elliptical, roughiſh, ſtalked. Cluſters erect. Rays twice the length of the calyx.—In dry ſandy ſoil, from New Jerſey to Carolina, flowering from September to November.—The *ſtem* is branched, round, hoary like the *leaves*, eſpecially their ribs. The larger *leaves* are rather above an inch in length; thoſe which plentifully clothe the flower-branches are much ſmaller; all are nearly entire. *Cluſters* numerous, erect, ſhort, of few, but rather large, *flowers*, with a conſpicuous yellow *radius*.

33. S. *ſtricta.* Willow-leaved Golden-rod. Ait. ed. 1. v. 3. 216. ed. 2. n. 18. Willd. n. 25. Purſh n. 29.—“Stem erect, ſmooth. Stem-leaves lanceolate, entire, ſmooth, rough-edged; radical ones ſerrated. Cluſters panicled, erect. Flower-ſtalks ſmooth.”—In ſandy woods, from New Jerſey to Carolina, flowering from Auguſt to November.—About two feet high, very ſmooth. *Purſh.* *Panicle* with erect, ſimple, cloſe branches. *Willd.*

34. S. *lanceolata.* Graſs-leaved Golden-rod. Linn. Mant. 114. Willd. n. 26. Ait. n. 19. Purſh n. 30. (Chryſocoma graminifolia; Linn. Sp. Pl. 1178.)—Stem ſmoothiſh, furrowed, much branched. Leaves almoſt linear, entire, roughiſh, nearly erect, with three or five rough ribs. Corymbs terminal, level-topped. Flowers capitate. Rays not longer than the diſk.—In fields and meadows, by the ſides of woods and rivers, from Canada to Pennſylvania, flowering from September to November. This plant has been found in Scotland, on the banks of the Eſk, a mile above Muſſelburgh, among willows, alders, &c. by Mr. E. J. Maughan of Edinburgh, in September 1809. Still we have not ventured to admit into the Britiſh liſt, a plant often met with in gardens, and very rapid in propagation, though many have been admitted on far leſs ſufficient grounds. The *ſtems* are four or five feet high, branched in a corymboſe manner, leafy, angular or furrowed, ſlightly rough, or quite ſmooth. *Leaves* ſeſſile, graſs-green, two inches or more in length, a quarter of an inch in breadth, roughiſh, eſpecially at the edges and ribs. *Flowers* numerous, rather ſmall, denſely corymboſe, yellow. *Calyx* ovate, ſmooth, ſhining, with tumid green-tipped ſcales.

35. S. *tenuifolia.* Narrow-leaved Golden-rod. Purſh n. 31. (S. lanceolata β, minor; Michaux Boreal-Amer. v. 2. 116.)—“Stem rough, angular, branched, corymboſe. Leaves ſpreading, linear, very narrow, ſlightly three-ribbed, rough, with axillary tufts of ſmaller ones. Corymbs terminal, level-topped. Flowers capitate. Rays ſcarcely exceeding the diſk.”—In “pine-barrens,” from New Jerſey to Carolina, flowering in September and October. Not above a foot high. *Leaves* very ſmall and narrow. *Purſh.*

36. S. *Sarothræ.* Cloſe-leaved Dwarf Golden-rod. Purſh n. 32.—“Stem angular, rough; naked in the lower part; corymboſe above. Branches with a few terminal flowers. Leaves linear, cloſe-preſſed, obſcurely three-ribbed, rough on both ſides, without axillary tufts. Rays twice the length of the diſk.”—Gathered by governor Lewis, on the plains of the Miſſouri, flowering in September.—About a ſpan high, reſembling the *Sarothra gentianoides* of Linnæus, *Hypericum Sarothra* of Purſh, very much in general habit. This and the two preceding have a great affinity to one another, but Mr. Purſh conſiders them good and permanent ſpecies, as there are no intermediate varieties, which might lead to a ſuſpicion that all belong to one genuine ſpecies. We have ſeen neither of the two laſt.

37. S. *cæſia.* Maryland Golden-rod. Linn. Sp. Pl. 1234. Willd. n. 27. Ait. n. 20. Purſh n. 33. (Virga aurea marilandica cæſia glabra; Dill. Elth. 414. t. 307. f. 395.)—Stem nearly erect, very ſmooth and even. Leaves lanceolate, ſmooth, with roughiſh edges and ribs. Cluſters erect.

Rays rather longer than the diſk.—In woods and low fields, from New England to Carolina, flowering from Auguſt to October. *Purſh.* The *ſtem* is upright, but ſomewhat zig-zag, branched, leafy, deſtitute of any furrows or other inequalities. *Leaves* about two inches long, pointed, nearly or quite entire, rather glaucous; paler beneath. *Cluſters* numerous, ſhort, with rough ſtalks, and ſmall, ſmooth, awl-ſhaped *bracteas.*

38. S. *livida.* Livid Golden-rod. Willd. Enum. 891. Purſh n. 34.—"Stem ſmooth, panicled. Leaves lanceolate, ſerrated, ſmooth, rough-edged. Branches racemoſe at the extremity. Rays elongated."—In ſandy fields and woods, from New York to Virginia, flowering in September and October. *Purſh.* *Stem* branched, dark purple, ſmooth. *Leaves* tapering at each end. Akin to *S. cæſia* in the colour of the *ſtem,* but different in having a panicled *ſtem,* whoſe *branches* are racemoſe at the ſummit. *Willdenow.* We are unacquainted with any thing anſwering to this deſcription.

39. S. *hiſpida.* Hiſpid Golden-rod. Willd. n. 28. Purſh n. 35.—"Stem erect, rough with briſtles. Leaves lanceolate, rough, entire; the radical ones ſerrated. Cluſters erect. Rays of a middling length."—In graſſy fields and woods, from New Jerſey to Virginia, flowering in October and November.—Reſembles *S. cæſia.* *Purſh.*

40. S. *hirta.* Hairy Golden-rod. Willd. Enum. 891. Purſh n. 36.—"Stem panicled, hairy. Leaves lanceolate, rough on both ſides; thoſe of the ſtem ſerrated; of the branches entire. Cluſters erect. Rays elongated."—Native of North America, according to Willdenow, on whoſe authority alone it finds a place in the work of Mr. Purſh. It is ſaid to be ſufficiently diſtinguiſhed by the hairy *ſtem,* and rough *leaves,* of which ſuch as grow on the principal ſtem are deeply and ſharply ſerrated.

41. S. *lithoſpermifolia.* Gromwell-leaved Golden-rod. Willd. Enum. 892. Purſh n. 37.—"Stem branched, downy. Leaves lanceolate, rough on both ſides, tapering, three-ribbed, entire. Cluſters erect. Rays elongated.—In ſandy barren woods, from New Jerſey to Carolina, flowering from Auguſt to October. *Purſh.* Willdenow ſays the *leaves* are much like *Lithoſpermum officinale.*

42. S. *lævigata.* Fleſhy-leaved Golden-rod. Ait. ed. 1. v. 3. 215. ed. 2. n. 21. Willd. n. 29. Purſh n. 38.—Stem erect, ſmooth. Leaves lanceolate, fleſhy, entire, ſmooth in every part. Cluſters panicled, erect. Flower-ſtalks ſcaly, hairy. Radius twice the length of the calyx.—In ſalt-marſhes, from Canada to Virginia, flowering from September to November.—A tall robuſt ſpecies, reſembling the following one very much, and probably nothing more than a variety. *Purſh.* This opinion ſeems to us very correct, there being really no difference between the two plants, except the hairineſs of the *flower-ſtalks* in the preſent, and its flowering about three months later than *S. mexicana.*

43. S. *mexicana.* Mexican Golden-rod. Linn. Sp. Pl. 1234. Willd. n. 30. Ait. n. 22. Purſh n. 39. (Virga aurea mexicana; Bauh. Pin. 517. V. aurea mexicana, limonii folio; Dodart. Mem. ed. Amſt. 629. t. 36.)—Stem oblique, ſmooth. Leaves lanceolate, ſomewhat fleſhy, entire, ſmooth in every part. Cluſters panicled, erect. Flower-ſtalks ſcaly, ſmooth. Rays longer than the calyx.—On the banks of rivers and ditches in North America, near ſalt-water, flowering from July to September.—Tall; *flowers* large. *Purſh.* This is ſmooth and even in every part, and of a rather fleſhy, ſomewhat glaucous habit, approaching to our *Aſter Tripolium,* whoſe place it occupies in America. The radical *leaves* are large, obovate, on long ſtalks. *Bracteas* numerous, lanceolate, keeled, recurved, of a thin, ſcaly, or ſquarroſe, aſpect, ſmooth, exactly like the laſt, but the *flower-ſtalks* are equally ſmooth, which in that are very rough with ſhort hairs. *Flowers* rather large.

44. S. *viminea.* Twiggy Golden-rod. Ait. ed. 1. v. 3. 215. ed. 2. n. 23. Willd. n. 31. Purſh n. 40. (S. integerrima; Mill. Dict. ed. 8. n. 24.)—Stem erect, ſlightly downy. Leaves linear-lanceolate, ſmooth, rough-edged; tapering at the baſe: the lower ones ſomewhat ſerrated. Cluſters erect. Rays elongated.—On the banks of rivers and ditches, from Canada to Virginia, flowering from Auguſt to October. *Purſh.*—Akin to the two laſt, but the *leaves* are thin or membranous, not ſucculent; their margin furniſhed with little inflexed rigid briſtles. *Flower-ſtalks* and *branches* angular and very rough. *Bracteas* lanceolate, recurved, ſmooth. *Flowers* numerous, the ſize of the preceding.

45. S. *erecta.* Erect Golden-rod. "Bankſ. MSS." Purſh n. 41.—"Stem rather villous. Leaves lanceolate, veiny, ſmooth, entire, ſomewhat ſtalked."—Native of North America. *Herb. Banks.* *Purſh.*

46. S. *macrophylla.* Long-leaved Golden-rod. "Bankſ. MSS." Purſh n. 42.—"Lower leaves ovate, pointed, tapering, unequally and ſharply ſerrated, ſmooth; thoſe of the ſtem lanceolate, tapering at each end, ſerrated, nearly ſeſſile. Cluſters axillary, ſtalked, leafy, the length of the leaves. Calyx oblong, turgid, many-flowered. Rays ſomewhat elongated."—In Canada. About three feet high. Intermediate between this genus and *Aſter.* *Purſh.*

47. S. *glomerata.* Round-headed Golden-rod. Michaux Boreal-Amer. v. 2. 117. Purſh n. 43.—"Stem low, quite ſimple. Leaves ſmooth, oblong-lanceolate, ſerrated. Cluſter ſimple, formed of round axillary heads; the uppermoſt crowded. Calyx turgid, many-flowered."—Found by Michaux on the mountains of Carolina. No other botaniſt ſeems acquainted with this ſpecies, nor is it eaſy to underſtand his definition of the leaves; ("*foliis longè latèque lanceolatis.*")

48. S. *flexicaulis.* Crooked-ſtalked Golden-rod. Linn. Sp. Pl. 1234. Willd. n. 32, α. Ait. n. 24, α. Purſh n. 44, α. (Virga aurea montana, ſcrophulariæ folio; Pluk. Phyt. t. 235. f. 3.)—Stem zig-zag, roundiſh, ſmooth. Leaves lanceolate, pointed, ſerrated, ſmooth, nearly ſeſſile. Cluſters axillary, erect.—In woods and fields, from Canada to Carolina, flowering from Auguſt to October. *Purſh.* The *ſtem* is ſlender, zig-zag, purpliſh, ſmooth and even; moſtly round; occaſionally ſomewhat angular. *Leaves* numerous, alternate, on very ſhort broad *ſtalks,* lanceolate, from one and a half to two inches long, half an inch wide, ſerrated, rough-edged, very ſmooth on both ſides; paler beneath, ſomewhat contracted and entire in their lower half; the upper ones ſometimes nearly entire. *Cluſters* much ſhorter than the leaves, oblong, with hairy *ſtalks,* and ovate, ſmooth, veiny *bracteas;* the upper ones very ſhort, and nearly capitate. *Radius* pale yellow, half as long again as the calyx.

49. S. *latifolia.* Broad-leaved Axillary Golden-rod. Linn. Sp. Pl. 1234. (S. flexicaulis β; Willd. n. 32. Ait. n. 24. Purſh n. 44. Virga aurea canadenſis aſteriſci folio; Herm. Parad. 244. t. 244.)—Stem ſomewhat zig-zag, angular, ſmooth. Leaves ovate, pointed, ſtrongly ſerrated, ſmooth; tapering into a winged footſtalk. Cluſters axillary, erect.—In woods and fields from Canada to Carolina, flowering from Auguſt to October. *Purſh.* Very different in appearance from the laſt, to which it is united by various authors, on the authority of the *Hortus Kewenſis.* But we ſuſpect the real *flexicaulis* is not much underſtood in England, what we have under that name from Kew garden, as well as the Bankſian herbarium, being really the *latifolia,* which latter ſpecies was not known, as ſuch, to the botaniſts

here, till the Linnæan herbarium came among them. How far it may be ſpecifically diſtinct, we cannot be certain. We have ſpecimens of both from the late Rev. Dr. Muhlenberg, whoſe *leaves* differ greatly. Thoſe of *latifolia* are two inches broad, with very copious, deep, acute ſerratures, and contract at the baſe, more or leſs ſuddenly, into a winged *footſtalk*, near an inch long. Their rib, and under ſide, are ſometimes hairy. Nothing like this is ſeen in *flexicaulis*. We ſuſpect Plukenet's t. 235. f. 4, as well as f. 3, may belong to this laſt; ſee the following. Hermann's plate is certainly *latifolia*. Mr. Purſh ſpeaks of theſe ſpecies collectively, as the moſt common *Solidago* in North America. We know not to which of the two this is moſt applicable.

50. S. *ambigua*. Angular-ſtalked Golden-rod. Ait. ed. 1. v. 3. 217. ed. 2. n. 25. Willd. n. 33. (Virga aurea latiſſimo folio, canadenſis, glabra; Pluk. Phyt. t. 235. f. 4?)—Stem ſlightly zig-zag, ſmooth, angular, branched. Leaves ovato-lanceolate, pointed, denſely ſerrated, rather hairy beneath; tapering into a winged footſtalk; upper ones entire. Cluſters axillary, erect; the upper ones much longer than the leaves.—Cultivated by Miller, and communicated from Kew garden to the younger Linnæus. It is ſaid to flower in July and Auguſt, but its native country is unknown, nor has Mr. Purſh met with this plant in America. It may be a variety of *latifolia*, from which it differs in having ſomewhat narrower *leaves*, and in the much greater length of the upper cluſters of *flowers*, which combine to form a cloſe panicle. Plukenet's figure, cited here with doubt, does not quite enough expreſs this, nor are ſo many of the leaves entire, though ſeveral of the upper ones are ſo in our ſpecimen.

51. S. *alpeſtris*. Alpine Golden-rod. "Waldſt. and Kitaib. Hung." Willd. n. 34.—"Stem erect, ſmooth. Leaves elliptic-lanceolate; the lower ones ſerrated. Cluſters erect, cloſe, ſhorter than the leaves. Rays elongated."—Native of the Carpathian, Auſtrian, and Bohemian alps. Very like the following, but the *ſtem-leaves* are elliptic-lanceolate, nearly entire, and the *ſtem* is ſmooth. It varies greatly by culture, becoming two feet, inſtead of one, in height, and branched, inſtead of quite ſimple. The *leaves* of the wild plant meaſure from half an inch to an inch and a half, (we preſume in length); thoſe of the garden one from one and a half to three inches. The upper *cluſters* of the former are crowded into a ſort of ſpike; thoſe of the latter are axillary, and compoſed of few *flowers*. *Willdenow*.

52. S. *Virgaurea*. Common Golden-rod. Linn. Sp. Pl. 1235. Willd. n. 35. Ait. n. 26. Purſh n. 46. Fl. Brit. n. 1. Engl. Bot. t. 301. Fl. Dan. t. 663. (S. n. 69; Hall. Hiſt. v. 1. 29. Virga aurea; Ger. Em. 430. Camer. Epit. 748, 749. Matth. Valgr. v. 2. 354.)

β. Virga aurea, longo, molli, et lanceolato folio, alpina; Bocc. Muſ. 34. t. 30.

γ. Virga aurea montana minor; Bocc. Muſ. 169. t. 118. Barrel. Ic. t. 783.

δ. Solidago cambrica; Hudſ. 367. Ait. n. 27. Willd. n. 36. (Virga aurea cambrica, floribus conglobatis; Dill. Elth. 413. t. 306. f. 393.)

ε. S. minuta; Linn. Sp. Pl. 1235. Willd. n. 38. Ait. n. 29. (Virga aurea omnium minima, floribus maximis; Herm. Parad. 245. t. 245. V. aurea montana biuncialis pumila, foliis acuminatis; Pluk. Phyt. t. 235. f. 7; and foliorum apicibus obtuſis; f. 8.)

Stem ſomewhat zig-zag, angular, hairy. Leaves more or leſs ſerrated, roughiſh; tapering at the baſe. Cluſters panicled, erect, cloſe. Rays twice the length of the calyx. —Native of buſhy, heathy, mountainous, and alpine ſituations throughout Europe, as well as at Labrador, and even China, flowering in the latter part of ſummer. The *root* is perennial, conſiſting of long ſimple fibres. *Stem* very variable in height and luxuriance, moſtly from one to three feet high, and branched in a panicled manner, more or leſs zig-zag, never quite ſtraight, leafy, angular, covered more or leſs with ſhort hairs, eſpecially the upper part; rounder, and frequently purpliſh, at the baſe. *Leaves* elliptic-lanceolate, or nearly ovate, roughiſh, firm and rather rigid; the lower ones ſtalked; the reſt variouſly elongated at the baſe; all extremely variable in ſize, and eſpecially in their ſerratures, which, though commonly cloſe and ſhallow, are ſometimes very coarſe and tooth-like, ſometimes nearly wanting; the margin is always rough with minute briſtly hairs; the ſurface ſmooth or rough; the under ſide rather paler; ſometimes the upper *leaves* are recurved, or drooping, and the uppermoſt of all gradually diminiſh into *bracteas*. *Panicle* terminal, many-flowered, attended by ſmall leaves; its lower branches often axillary; all downy, racemoſe, or corymboſe; now and then ſimple and ſingle-flowered. Scales of the *calyx* at length ſpreading, but all ſtraight, imbricated, lanceolate, fringed, membranous at the edges; ſometimes rough at the back. *Florets* of the radius from five to nine or ten, of a golden yellow, ſpreading, elliptic-oblong, toothed at the end, their limb the length of the calyx.—We ſcarcely know a plant more difficult to define or to underſtand than this, nor can we limit even the varieties ſo as to make them intelligible; much leſs elevate them to the rank of ſpecies. β, ſent from Italy by Arduino to Linnæus, is more downy, with more pliant *leaves*, than our common kind, with numerous axillary *cluſters*, and a more leafy *panicle*. The *flowers* are conſiderably larger than uſual.

γ has equally large *flowers*, but much fewer, ſo that the *pancicle* is nearly ſimply racemoſe, and the *leaves* are coarſely ſerrated. We have Swiſs ſpecimens of Haller's n. 69, which combine theſe two varieties, and whoſe herbage connects them with the common ſtate of the ſpecies.

δ is equally ſimple in its *panicle*, and its growth is more humble, but the moſt authentic ſpecimens prove it a mere variety. It is impoſſible to ſay what Willdenow had for *S. cambrica*, which he aſſerts to remain unchanged by culture; but his authority falls to the ground, ſince he perſiſts in quoting Petiver's t. 16. f. 11, which we have pointed out in Fl. Brit. as a copy of Camerarius, t. 748, done for the common *Virgaurea!*

ε is the moſt puzzling of all. The *flowers* in Hermann's plate nearly equal thoſe of our β; while in the Linnæan ſpecimen, evidently, as Linnæus judged it, a variety of *Virgaurea*, they are but half as large, and panicled. This ſpecimen was ſent by Arduino for Boccone's t. 118, (ſee variety γ,) which it very little reſembles. Plukenet's figures have the chiefly axillary infloreſcence of our β, only each ſtalk is ſimple, not racemoſe.—If any of theſe varieties are to be eſtabliſhed as ſpecies, it muſt be from far better materials than have fallen in our way, and by widely different characters than have as yet been given. We muſt obſerve that Grew's t. 59, cited by Haller, is evidently one of the garden American ſpecies, totally unlike *Virgaurea*.

53. S. *multiradiata*. Labrador Golden-rod. Ait. ed. 1. v. 3. 218. ed. 2. n. 28. Willd. n. 37. Purſh n. 47.—"Stem rather villous. Leaves ſeſſile, lanceolate, ſmooth, fringed; the lower ones ſerrated at the end. Cluſter terminal, erect. Rays numerous, elongated."—Found at Labrador and Hudſon's Bay, flowering from Auguſt to October.—*Purſh*.—*Stem* a ſpan high, downy, erect, quite ſimple. *Leaves* narrow, nearly entire. *Cluſter* denſe. *Radius* narrow, copious. *Willdenow*.

54. S. *humilis*. Humble Golden-rod. Purſh n. 48.—“Stem ſimple, erect, ſmooth. Leaves lanceolate, ſerrated, ſmooth; tapering and elongated at the baſe. Cluſter erect.”—Native of North America, according to the Bankſian herbarium. *Purſh*.

55. S. *elata*. Lofty Golden-rod. Purſh n. 49.—“Stem hairy, round. Leaves lanceolate; rather hairy beneath. Cluſters erect. Rays elongated.”—Native of North America, according to the ſame authority. *Purſh*.

56. S. *rigida*. Hard-leaved Golden-rod. Linn. Sp. Pl. 1235. Willd. n. 39. Ait. n. 30. Purſh n. 50. (Virga aurea Novæ Angliæ, lato rigido folio; Herm. Parad. 243. t. 243.)—Leaves ovate-oblong, rough, like the corymboſe ſtem, with minute rigid hairs; the lowermoſt ſerrated; upper entire. Cluſters compact. Rays twice the length of the obtuſe calyx.—In the tract of mountains from New Jerſey to Carolina, flowering from Auguſt to October. *Purſh*. The *ſtem* is four or five feet high, round, ſtriated, leafy, rough with copious rigid pubeſcence, and branched copiouſly, in a corymboſe manner, at the top. *Leaves* rough like a file, ſomewhat hoary; the radical ones ſtalked, a foot long, broad, pointed, ribbed, more or leſs ſerrated; the reſt from one to four inches long, either obtuſe or ſomewhat pointed, entire, or occaſionally crenate; thoſe on the flowering branches numerous, ſmall, and entire. *Flowers* rather large, but various in ſize. Scales of the *calyx* blunt, or rounded at the end, ribbed, membranous at the edge, variable in breadth.—A Pennſylvanian ſpecimen, ſent by the late Dr. Muhlenberg, has crenate, exactly ovate, *leaves* on the ſtem, and *flowers* about half the uſual ſize; but we dare not make it a diſtinct ſpecies.

57. S. *noveboracenſis*. New York Golden-rod. Linn. Sp. Pl. 1235. Willd. n. 40. Purſh n. 51.—Radical leaves elliptic-oblong, ſtalked, rough. Stem almoſt naked, branched, furrowed, level-topped. Rays twice as long as the taper-pointed calyx.—In ſandy fields and woods of North America, flowering in September and October. *Purſh*. The *root* is thick and ſomewhat woody. *Stem* one and a half or two feet high, ſtout, rough, round, plentifully furrowed, quite erect, bearing two or three oblong-lanceolate leaves at the origin of the flowering branches, but otherwiſe naked. *Leaves* chiefly radical, on long, erect ſtalks, elliptical, tapering at each end, three inches long, rough like a file with minute tubercles, the margin furniſhed with ſhallow ſerratures. *Flowers* large, not numerous, on corymboſe hairy ſtalks, with a few rough lanceolate *bracteas*. *Calyx-ſcales* narrow, purpliſh, downy, with long tapering points. The radiant *florets* appear to be ſometimes more than ten. The *ſeeds* are hairy; their down long, very ſlender, minutely rough. This ſpecies appears to be a ſtranger in our gardens. Its habit is that of an *Aſter*.

Solidago, in *Gardening*, contains plants of the tall, herbaceous, flowering, perennial kind, of which the ſpecies cultivated are; the common golden-rod (S. virgaurea); the Canadian golden-rod (S. canadenſis); the tall golden-rod (S. altiſſima); the Mexican golden-rod (S. mexicana); the twiggy golden-rod (S. viminea); the two-coloured golden-rod (S. bicolor); the hard-leaved golden-rod (S. rigida); the Maryland golden-rod (S. cæſia); the crooked-ſtalked golden-rod (S. flexicaulis); and the narrow-leaved evergreen golden-rod (S. ſempervirens).

The firſt ſort has ſometimes the names of Wound-wort and Aaron's rod. There are ſeveral varieties of it, as the purple-ſtalked broad-leaved, which has the ſtalks ſtiff, purpliſh-brown, two feet high: the panicles axillary and terminating; each flower on a long ſlender footſtalk, pale yellow, appearing at the beginning of Auguſt; the leaves lanceolate, almoſt four inches long, and a quarter of an inch broad, deeply ſerrate, pale green beneath.

The common golden-rod, which has the lower leaves ovate-lanceolate, two inches long and an inch broad, ſlightly ſerrate, on pretty long footſtalks; the ſtems ſlender, a foot and a half high; with ſmall, narrow, entire, ſeſſile leaves; the flowers in panicled bunches, cluſtered together, forming a thick erect ſpike, appearing in Auguſt and September. The narrow-leaved, which has the ſtalk round, ſmooth, a foot and a half high; the leaves narrow-lanceolate, an inch and a quarter long, and an eighth of an inch broad, almoſt entire, ſeſſile; the flowers in ſmall cluſtered bunches from the axils, to which they ſit very cloſe; and the ſtalk is terminated by a roundiſh bunch. The dwarf golden-rod, which has the lower leaves indented; the ſtalk ſeldom more than a foot high, branching out almoſt from the bottom; the branches terminated by ſhort, cluſtered, erect ſpikes; the leaves on the ſtem and branches very narrow, acute-pointed, and entire. The Welſh golden-rod, which has the lower leaves narrow-lanceolate, an inch and half long, and a quarter of an inch broad, ſmooth, ſlightly ſerrate, a little hoary on the under ſide; the ſtalk about ſix inches high, with the ſame ſort of leaves on it, only ſmaller; the flowers in roundiſh cluſtered terminating ſpikes, much larger than thoſe of the common ſort, and appearing five or ſix weeks earlier in the ſeaſon.

In the third ſort there are ſeveral varieties; as the talleſt golden-rod, the hairy golden-rod, the recurved golden-rod, the Virginia golden-rod.

Method of Culture.—Theſe plants are all readily increaſed by ſlipping or parting the roots, and planting them out in the autumn or winter ſoon after their ſtems decay, or very early in the ſpring before they begin to ſhoot, but the former is the better ſeaſon, in the places where they are to grow; they ſucceed in almoſt any ſoil or ſituation, and afterwards require only to be kept clean from weeds, and to have the decayed ſtems cut down when they begin to decay in the autumn. When they have increaſed conſiderably in the roots, they ſhould always be ſlipped as above.

Theſe plants are very hardy and durable in their roots, by which moſt of them ſoon become large, the ſmall ſlips not unfrequently growing into large bunches in one ſeaſon, many of them, of courſe, require to be well cut in with a ſharp ſpade all round about their roots annually, or nearly ſo, to prevent their ſpreading too greatly and having an improper appearance, as well as being injurious to other neighbouring plants of ſmall growth.

In planting out they require much room, as they ſpread conſiderably. But they afford conſiderable variety and ornament in larger borders and clumps, on all pleaſure-grounds towards the autumnal ſeaſon.

Solidago, in the *Materia Medica*. The flowers and the leaves of the common golden-rod, or virga aurea, have a ſlightly aromatic odour, and a ſubaſtringent ſomewhat aromatic taſte. Boiling water extracts the active matter. The infuſion changes ſlightly to green ſyrup of violets, and precipitates ſulphate of iron black. Golden-rod is aſtringent, and has been regarded as lithontriptic. It may be, ſays Thomſon (Diſp.), of ſome uſe in a weakened ſtate of the viſcera, and, like other tonics, beneficial in calculous habits, but it is not entitled to much notice. The doſe of the powdered leaves and flowers may be from grs. x to ʒj or more.

SOLIDAR, in *Geography*, a town of Bengal; 26 miles S.S.W. of Rogonatpour.

SOLIDITY, in *Phyſics*, a property of matter or body, by which it excludes every other body from that place which itſelf poſſeſſes.

Solidity, in this ſenſe, is a property common to all bodies, whether ſolid or fluid. It is uſually called *impenetrability;* but ſolidity expreſſes it beſt, as carrying ſomewhat more of poſitive with it than the other, which is a negative idea.

The idea of ſolidity, Mr. Locke obſerves, ariſes from the reſiſtance we find one body make to the entrance of another into its own place. Solidity, he adds, ſeems the moſt extenſive property of body, as being that by which we conceive it to fill ſpace; it is diſtinguiſhed from mere *ſpace*, by this latter not being capable of reſiſtance or motion.

It is diſtinguiſhed from *hardneſs*, which is only a firm coheſion of the ſolid parts, ſo as they may not eaſily change their ſituation.

The difficulty of changing ſituation gives no more ſolidity to the hardeſt body than to the ſofteſt; nor is a diamond properly a jot more ſolid than water. By this we diſtinguiſh the idea of the extenſion of body from that of the extenſion of ſpace: that of body is the continuity or coheſion of ſolid, ſeparable, moveable parts; that of ſpace, the continuity of unſolid, inſeparable, immoveable parts.

The Carteſians, however, will, by all means, deduce ſolidity, or, as they call it, *impenetrability*, from the nature of extenſion; they contend that the idea of the former is contained in that of the latter; and hence they argue againſt a vacuum. Thus, ſay they, one cubic foot of extenſion cannot be added to another, without having two cubic feet of extenſion; for each has in itſelf all that is required to conſtitute that magnitude. And hence they conclude, that every part of ſpace is ſolid, or impenetrable, inaſmuch as of its own nature it excludes all others. But the concluſion is falſe, and the inſtance they give follows from this, that the parts of ſpace are immoveable, not from their being impenetrable or ſolid.

For an account of a late controverſy concerning the ſolidity of matter, ſee MATTER.

SOLIDITY, in *Geometry*, the quantity of ſpace contained in a ſolid body; called alſo the *ſolid content*, and the cube of it.

The ſolidity of a cube, priſm, cylinder, or parallelepiped, is had by multiplying its baſis into its height.

The ſolidity of a pyramid or cone is had by multiplying either the whole baſe into a third part of the height, or the whole height into a third part of the baſe.

SOLIDITY *of any irregular Body, To find the.* Put the body in a hollow parallelepiped, and pour water or ſand upon it, and note the height of the water or ſand A B (*Plate* XIV. *Geometry*, *fig.* 2.); then taking out the body, obſerve at what height the water (or ſand, when levelled) ſtands, as A C. Subtract A C from A B, the remainder will be B C. Thus is the irregular body reduced to a parallelepiped, whoſe baſe is F C G E, and its altitude B C. To find the ſolidity of which, ſee PARALLELEPIPED.

Suppoſe, *e. gr.* A B to be 8, and A C, 5; then will B C be 3: ſuppoſe, again, D B, 12, D E, 4; then will the ſolidity of the irregular body be found 144.

If the body be ſuch as that it cannot be well laid in ſuch a kind of channel, *e. gr.* if it be required to meaſure the ſolidity of a ſtatue, as it ſtands; a quadrangular priſm or parallelepiped is to be framed over it; the reſt as before.

SOLIDITY *of a hollow Body, To find the.* If the body be not compriſed in the number of regular bodies, its ſolidity is found as in the preceding problem. If it be a parallelepiped, priſm, cylinder, ſphere, pyramid, or cone, the ſolidity firſt of the whole body, including the cavity, then that of the cavity, which is ſuppoſed to have the ſame figure with the body itſelf, is to be found, according to the reſpective methods delivered under PARALLELEPIPED, PRISM, &c. For the latter being ſubtracted out of the former, the remainder is the ſolidity of the hollow body required.

For the centrobaryc method of meaſuring the ſolidity of bodies, ſee CENTROBARYC *Method.*

To find the Solidity of Bodies by the Method of Fluxions. Let A B C (*Plate* XIV. *Analyſis*, *fig.* 1.) repreſent any ſolid conceived to be generated by a plane P Q, paſſing over it with a parallel motion: let H h, perpendicular to P Q, be taken to expreſs the fluxion of A H (x), or the velocity with which the generating plane is carried: alſo let the area of the part E m F n be denoted by A: then it follows, from the definition of a fluxion, that the fluxion of the ſolid A E F will be expreſſed by A $\dot{x}$. Whence, by expounding A in terms of x (according to the nature of the figure), and then taking the fluent, the contents of the ſolid, which we may repreſent by s, will be given. But, when the propoſed ſolid is that ariſing from the revolution of any given curve A E B about A H D, as an axis, the fluxion ($\dot{s}$) of the ſolidity may be exhibited in a manner more convenient for practice; for, putting the area (3.141592, &c.) of the circle, whoſe radius is unity, $= p$, and the ordinate E H $= y$, it will be $1^2 : y^2 :: p : py^2$, the area of the circle E m F n, which being ſubſtituted for A, we have $\dot{s} = py^2 \dot{x}$.

Ex. 1. *To find the Content of a Cone* A B C (*fig.* 2.) Let the given altitude A D be $= a$, and the ſemidiameter of its baſe B D $= b$, and the diſtance A F of the circle E G from the vertex A, $= x$; then we ſhall have, by ſimilar triangles, $a : b :: x :$ E F $(y) = \frac{bx}{a}$. Whence $\dot{s}\ (= py^2\dot{x}) = \frac{pb^2 x^2 \dot{x}}{a^2}$; and, conſequently, by the inverſe method of fluxions, $s = \frac{pb^2 x^3}{3a^2}$; which, when $x = a$ (= A D), gives $\frac{pb^2 a}{3} = p \times$ B D$^2 \times \frac{1}{3}$ A D for the content of the whole cone A B C; which appears, from hence, to be juſt $\frac{1}{3}$d of a cylinder of the ſame baſe and altitude. See CONE.

Ex. 2. *To find the Content of a Spheroid* A F B H (*fig.* 3.) *and alſo of a Sphere.* Let the axis A B, about which the ſolid is generated, be $= a$, and the other axis F H of the generating ellipſe $= b$; it follows, from the property of the ellipſe, that $a^2 : b^2 :: x\ (a - x)$ (A D × B D) $: y^2$ (D E^2) $= \frac{b^2}{a^2}(ax - xx)$: whence we have $s = (py^2\dot{x} =) \frac{pb^2}{a^2}(ax\dot{x} - x^2\dot{x})$, and $s = \frac{pb^2}{a^2}(\frac{1}{2}axx - \frac{1}{3}x^3)$ = the ſegment A I E. Which, when A D (x) = A B (a), becomes $\frac{pb^2}{a^2}(\frac{1}{2}a^3 - \frac{1}{3}a^3) = \frac{pb^1}{a^2} \times \frac{a^3}{6} = \frac{1}{6}pab^2$ = the content of the whole ſpheroid. Where, if b (F H) be taken $= a$ (A B), we ſhall obtain $\frac{1}{6}pa^3$ for the true content of a ſphere whoſe diameter is a. Hence, a ſphere, or a ſpheroid, is $\frac{2}{3}$ds of its circumſcribing cylinder; for the area of the circle F H being expreſſed by $\frac{pb^2}{4}$, the content of the cylinder, whoſe diameter is F H, and altitude A B, will, therefore, be $\frac{pb^2a}{4}$, of which $\frac{1}{6}pab^2$ is evidently two third parts. See SPHERE and SPHEROID.

Ex. 3. *To find the Content of a parabolic Conoid.* From the equation $a^{m-n}\,x^n = y^m$ of the generating curve, we obtain $y = a^{\frac{m-n}{m}} \times x^{\frac{n}{m}}$, and $\dot{s}\ (= py^2\dot{x}) = pa^{\frac{2m-2n}{m}} \times \dot{x}x^{\frac{2n}{m}}$; and, therefore, $s = pa^{\frac{2m-2n}{m}} \times \frac{x^{\frac{2n}{m}+1}}{\frac{2n}{m}+1} = pa^{\frac{2m-2n}{m}} \times \frac{mx^{\frac{2n}{m}+1}}{2n+m} = pa^{\frac{2m-2n}{m}} \times x^{\frac{2n}{m}} \times \frac{mx}{2n+m}$ $= py^2 \times \frac{mx}{2n+m} =$ the content of the ſolid; which, therefore, is to py^2x, the content of the circumſcribing cylinder, as m to $2n + m$. Whence the ſolid generated by the conical parabola (in which $m = 2$, and $n = 1$) appears to be juſt half of its circumſcribing cylinder. See PARABOLIC *Conoid.*

Ex. 4. *To find the Content of an hyperbolic Conoid.* From the equation $y^2 = \frac{b^2}{a^2}(ax + xx)$ of the generating hyperbola, we have $\dot{s}\ (py^2\dot{x}) = \frac{pb^2}{a^2}(ax\dot{x} + x^2\dot{x})$, and conſequently $s = \frac{pb^2}{a^2}(\frac{1}{2}ax^2 + \frac{1}{3}x^3) =$ the content of the conoid; which, therefore, is to $\left(\frac{pb^2}{a^2}(ax + x^2)x\right)$ that of a cylinder of the ſame baſe and altitude, as $\frac{1}{2}a + \frac{1}{3}x$ to $a + x$. This ratio, if x be very ſmall, will become as 1 to 2 very nearly: whence it may be inferred, that the content of a very ſmall part of any ſolid generated by a curve, whoſe radius of curvature at the vertex is a finite quantity, is half that of a cylinder of the ſame baſe and altitude very nearly; becauſe any ſuch curve, for a ſmall diſtance, will differ inſenſibly from an hyperbola, whoſe radius of curvature, at the vertex, is the ſame.

Ex. 5. *To find the Content of a parabolic Spindle, generated by the Rotation of a given Parabola* A C B (*fig.* 4.) *about its Ordinate* A B. Put C M, the abſciſſe of the given parabola, $= a$, and the ſemi-ordinate A M (or B M) $= b$; and ſuppoſing E N F to be any ſection of the ſolid parallel to D C, let its diſtance M N or E P from D C be denoted by w: then, by the property of the curve, we ſhall have $AM^2\,(b^2) : EP^2\,(w^2) :: CM\,(a) : CP = \frac{aw^2}{b^2}$: therefore $EN\ (= CM - CP) = a - \frac{aw^2}{b^2} = \frac{a(b^2 - w^2)}{b^2}$, and conſequently $p \times EN^2 = \frac{pa^2}{b^4}(b^4 - 2b^2w^2 + w^4)$ $=$ the area of the ſection E F: which, multiplied by $\dot{w}$, the fluxion of M N, gives $\frac{pa^2}{b^4}(b^4\dot{w} - 2b^2w^2\dot{w} + w^4\dot{w})$ for the fluxion of the ſolidity, whoſe fluent $\frac{pa^2}{b^4}(b^4w - \frac{2}{3}b^2w^3 + \frac{2}{5}w^5)$, when w becomes $= b$, is $\left(\frac{8pa^2b}{15}\right)$ half the content of the ſolid. See PYRAMIDOID.

For other examples of a ſimilar kind, ſee Simpſon's Fluxions, vol. i. ſect. 9, and other elementary treatiſes on that ſubject.

SOLIDITY, in *Architecture*, is applied both to the conſiſtence of the ground on which the foundation of a building is laid, and to a maſs of maſonry of extraordinary thickneſs, without any cavity within. The ſolidity of the Egyptian pyramids is inconceivable.

SOLIDS, in *Anatomy*, &c. denote all the continuous and continent parts of the body; thus called, in oppoſition to the fluids, or parts contained in them.

Of the ſolid kind, are the bones, cartilages, ligaments, membranes, fibres, muſcles, tendons, arteries, veins, nerves, glands, lympheducts, and lacteals.

SOLIDUS, in *Ancient Coinage.* (See AUREUS.) According to Pliny's account, gold was coined at Rome ſixty-two years after ſilver, *i. e.* 547 U. C. or B. C. 204; and then the ſcruple paſſed, as he informs us, for 20 ſeſterces. It was afterwards thought proper to coin 40 pieces out of the pound of gold; and, as he ſays, our princes have, by degrees, diminiſhed their weight to 45 in the pound. The pieces that now remain confirm Pliny's account. In the firſt coinage, the aurei were 48 in the pound; afterwards, as Pliny ſays, there were 40 in the pound, and the aureus was raiſed from 106 grains, the weight of the didrachm of this coinage, to 126 grains. From Pliny and the coins it appears, that in the firſt coinage, the ſcruple of gold paſſed for 20 ſeſterces; the drachm of three ſcruples was 60 ſeſtertii, or 15 ſilver denarii; and the didrachm, or aureus, the common Roman gold coin, was worth 30 ſilver denarii, equal to 1*l.* ſterling; gold being to ſilver as 17½ to 1. The aureus ſeems to have continued at 30 ſilver denarii till Sylla's time; but about the year of Rome 675, B. C. 77, the aureus fell to the rate of 40 in the pound, as Pliny informs us, and being reduced near the ſcale of the Greek χρυσος, paſſed for 20 denarii, as the later for 20 drachmas, being in currency 13*s.* 4*d.* Engliſh. This is the more probable, becauſe we know from Suetonius, that the great Cæſar brought ſo much gold from Gaul, that it ſold at 3000 nummi a pound, that is, nine times its weight in ſilver; but the Gallic gold was of a very baſe ſort. However, in the reign of Claudius, the aureus paſſed for 100 ſeſtertii, or 25 ſilver denarii; at which rate it remained. This was 16*s.* 8*d.* Engliſh in currency; but valuing gold at 4*l.* an ounce, the intrinſic value of the aureus is about 1*l.* The aureus fell by degrees, as Pliny ſays, to 45 in the pound. From the coins it is clear, that it was in the time of the civil wars of Otho and Vitellius, that the aureus fell from 40 in the pound, or about 125 troy grains at a medium, to 45 in the pound, or about 110 grains of medial weight each. It continued of this ſtandard till the time of Elagabalus, when it fell to about 92 grains at an average, or near 55 in the pound. That the aureus paſſed for 25 ſilver denarii down to Alexander Severus, is clear; and ſuppoſing that ſtandard to remain, as we have no authority for a change till the time of Conſtantine I., the double aureus will have borne 50 ſilver denarii, and the aureus 25. The "triens" muſt have had eight ſilver denarii, and two denarii aurei; and the double triens, 16 ſilver denarii or argentei, and four denarii aurei. The denarius was not then worth above 14*s.* Engliſh. The only change Aurelian made in the money, was probably reſtricted to the gold; for it is certain that under him, and his ſucceſſor Probus, the common gold piece, or aureus, is of 100 grains, a ſize confined to theſe two emperors. There are alſo halves of about 50 grains; and double aurei, commonly of very fine workmanſhip, of upward of 200 grains. Down to

Conſtantine I., the aureus ſtands at between 80 and 70 grains. This prince, who ſeems not to have altered the ſize of the coin, inſtead of the “aureus,” gave the “ſolidus” of ſix in the ounce of gold, and cauſed it to paſs for 14 of his new ſilver coins, called “Milliarenſes,” and 25 denarii, as before; gold being to ſilver as about 14 to 1. The ſolidus, or chief gold coin, continued of the ſame ſtandard to the very cloſe of the Byzantine empire; for gold was common in Conſtantinople, while ſilver became more and more ſcarce. The ſolidus was worth 12*s.* ſterling. In the days of the firſt emperors the aureus was worth 25 denarii, and gold to ſilver about 13½ to 1. The medial aureus was 110 grains, the denarius 60. That ſtandard remained the ſame till the time of Alexander Severus, after which we have no data; but it is probable that Conſtantine took the value as he found it, and that from Alexander Severus to Conſtantine, if we except the ſhort interval of the end of Aurelian's reign, and beginning of that of Probus, gold was riſing in value till it exceeded 14 to 1. The gold coins, called “Bezants” in Europe, becauſe they were ſent from Byzantium, or Conſtantinople, were ſolidi of the old ſcale, ſix to the ounce. In Byzantine writers, the ſolidus is alſo called “Nomiſma,” or *the coin;* “Cryſinos,” becauſe of gold; “Hyperperos,” from its being refined with fire, or from its being of bright gold flaming like fire. The ſolidi alſo, like the aurei formerly, received names from the princes whoſe portraits they bore; as “Michelati,” “Manuelati.” Solidus is a term uſed for the aureus by Apuleius (Met. lib. 10.) who lived in the time of Antoninus the philoſopher; nay, ſo early as in the Prætorian edicts of the time of Trajan; being thus diſtinguiſhed from the ſemiſſis or half. In the time of Valerian, when aurei of different ſizes had been introduced, it became neceſſary to diſtinguiſh the particular aurei that were meant.

In the firſt gold coinage at Rome, the aureus was divided into four inferior parts: the ſemiſſis, or half, of 60 ſeſtertii; the tremiſſis, or third, of 40; the fourth, the name of which is not known, of 30; and the ſixth, or ſcrupulum, of 20. But ſoon afterwards all theſe were dropped, except the ſemiſſis or half, which occurs in the times of the conſuls, and of ſome emperors, but is extremely ſcarce, ſo that few muſt have been ſtruck. This gold ſemiſſis, or half aureus, is termed “quinarius” by medalliſts with great propriety, and is very uncommon in all the conſular and imperial times; but continued the only diviſion of the aureus till the time of Alexander Severus. This prince, as Lampridius informs us, coined ſemiſſes and tremiſſes of gold; but none have yet been found. It is likely they were all recoined by his immediate ſucceſſors, who again raiſed the tributes. He alſo propoſed to iſſue quartarii, but did not live to accompliſh his purpoſe. Trientes, or tremiſſes, of gold are, however, mentioned in reſcripts of Valerian I., and actually exiſt, both of him and of his ſon Gallienus, weighing about 30 grains. The gold tremiſſis was the pattern of the early French and Spaniſh gold coins; as the ſilver denarius, in its diminiſhed ſtate, was that of the Gothic and Saxon penny. Pinkerton's Medals, vol. i.

SOLIEK ELSEID, in *Geography*, a town of Egypt, on the left bank of the Nile; 10 miles S. of Girgé.

SOLIFO, a town of Naples, in the province of Otranto; 9 miles E. of Nardo.

SOLIGNAC-*ſur-Loire*, a town of France, in the department of the Upper Loire, and chief place of a canton, in the diſtrict of Le Puy; 13 miles S. of Le Puy. The town contains 880, and the canton 4455 inhabitants, on a territory of 150 kiliometres, in 6 communes.

SOLIGNY, a town of France, in the department of the Orne; 6 miles N. of Mortagne.

SOLIGO, a town of Italy, in the Treviſan; 6 miles S.W. of Trevigio.

SOLIHULL, commonly pronounced *Silhill*, is ſituated in the diviſion of the ſame name, in the hundred of Hemlingford, and county of Warwick, England. It is conſidered as a market-town, but the market is now in abſolute diſuſe. Its diſtance from Birmingham is 7 miles, and from London 108 miles. Dugdale conjectures that the chief parts of the diſtrict, now included in the pariſh of Solihull, were known by the name of Ulverlei, at the time of the Norman ſurvey. Here was formerly the principal ſeat of the barony of Limeſie; and the reſidence of the barons he ſuppoſes to have occupied a ſpot at preſent called Olton, a ſmall village about two miles north-weſt from Solihull. From the ruins of this baronial reſidence, and its dependent habitations, the town of Solihull is conjectured to have ariſen. Grants for an annual fair and a weekly market were ſpeedily procured; but the town does not appear to have obtained much diſtinction at any period. It bears the tranquil appearance of a large village, and contains little to attract the notice of travellers, except the church, which is a ſpacious edifice of the cruciform deſcription. In the population return of the year 1811, the pariſh is ſtated to contain 528 houſes, occupied by 2581 perſons.

On an elevated ſcite in the vicinity of Solihull, ſurrounded by ſpacious grounds, is Malvern-Hall, the manſion of Henry Greſwold Lewis, eſq. Dugdale's Antiquities of Warwickſhire. Beauties of England and Wales, vol. xv. Warwickſhire, by J. N. Brewer.

SOLIKAMSK, a town of Ruſſia, in the government of Perm, on the Kama, famous for its ſalt-works; 112 miles N. of Perm. N. lat. 59° 36′. E. long. 56° 13′.

SOLILOQUY, SOLILOQUIUM, a reaſoning, or diſcourſe, which a man holds with himſelf.

Papias ſays, that ſoliloquy is properly a diſcourſe by way of anſwer to a queſtion that a man has propoſed to himſelf.

Soliloquies are become very common things on the modern ſtage; yet can nothing be more inartificial, or more unnatural, than an actor's making long ſpeeches to himſelf, to convey his intentions, &c. to the audience.

Where ſuch diſcoveries are neceſſary to be made, the poet ſhould rather take care to give the dramatic perſons ſuch confidants, as may neceſſarily ſhare their inmoſt thoughts; by which means, they will be more naturally conveyed to the audience. Yet is even this a ſhift an accurate poet would not be found to have occaſion for.

The uſe and abuſe of ſoliloquies is well delivered by the duke of Buckingham, in the following lines:

> “Soliloquies had need be very few,
> Extremely ſhort, and ſpoke in paſſion too.
> Our lovers talking to themſelves, for want
> Of others, make the pit their confidant:
> Nor is the matter mended yet, if thus
> They truſt a friend, only to tell it us.”——

SOLIMAGUE, in *Geography*, a ſmall iſland near the weſt coaſt of Luçon. N. lat. 18° 3′. E. long. 120° 36′.

SOLIMAN, a country of Africa, near the ſource of the Gambia.—Alſo, a town of Tunis, the environs of which are inhabited by the deſcendants of the Moors, driven out of Spain, who preſerve their ancient manners and language, and are more honeſt than other Africans; 20 miles E.S.E. of Tunis.

SOLIMAN, *Bay of*, a bay on the weſt coaſt of Africa, in the ſtrait of Babel-Mandeb. N. lat. 12° 3′.

SOLIMENE, Francesco, called alſo *L'Abate Ciccio*, in *Biography*, was born at Nocera de Pagani, near Naples, in 1637. He was the ſon of a painter, Angelo Solimene, who at firſt educated him in literary purſuits, in which he was exceedingly aſſiduous, and made conſiderable progreſs; whilſt at the ſame time he indulged himſelf in cultivating an inherent taſte for deſign. By the advice of cardinal Orſini, Franceſco was permitted by his father to change the object of his principal purſuit, and, inſtead of the law, to adopt the pencil, as the ground-work of his future fame. He became the diſciple of Franceſco Maria, and afterwards of Giacomo del Po; but ſoon left Naples, to go to Rome, where the freedom and brilliancy of Pietro da Cortona's execution and deſign attracted his admiration, and fixed his attention. To what he acquired of Cortona, he attempted to add the ſweetneſs of Guido Rheni; and thus framed for himſelf a ſtyle remarkable for its eaſe and ſuavity, more than for its grace or truth. A very beautiful production of his is at Hampton Court, of the pool of Betheſda; but his moſt celebrated works are the ſacriſty of S. Paulo Maggiore, and the Laſt Supper, in the refectory of the conventuali at Aſſiſi. Solimene poſſeſſed a vivid invention, and conſequently a ready pencil; ſo much ſo, that his execution is always ſpirited and maſterly, equally adapted to almoſt all kinds of ſubjects; and his colouring unites brilliancy and force. He died at Naples in 1747, aged 90.

SOLINGEN, in *Geography*, a town of the duchy of Berg, on the Wipper; 12 miles E.S.E. of Duſſeldorf. N. lat. 51° 8′. E. long. 7° 2′.

SOLINUS, Caius Julius, in *Biography*, a Latin grammarian, but of what particular period is not known, though he is generally referred to the third century. He appears to have reſided chiefly at Rome, but is known only as the author of a work, which he firſt entitled "Collectanea Rerum Memorabilium," afterwards "Polyhiſtor." This is a collection of the remarkable things in different countries, partly tranſcribed, without acknowledgment, from Pliny's Natural Hiſtory; whence the author has been called the ape of Pliny. The work, however, of Solinus contains ſome things not to be found in Pliny, and it contains likewiſe an elucidation of ſome difficulties in the original; and on theſe accounts it has been deemed worthy of the notice of critics. Salmaſius publiſhed an edition of it in two vols. folio, in which, however, the original is almoſt buried in the learning of the commentator. Solinus was author likewiſe of a poem, entitled "Ponticon," of which only a few verſes remain. There have been many editions of the "Polyhiſtor," which were adapted to the taſte of ages fond of wonders. The beſt modern ones are ſaid to be the octavo of Salmaſius, 2 vols. 1689; and Geſner's, printed at Leipſic in 1777.

SOLIO, in *Geography*, a river of Calabria, which runs into the Mediterranean, N. lat. 39° 40′. E. long. 16° 6′.

SOLIPUGA, or Solifuga, in *Natural Hiſtory*, the name given by the Romans to a ſmall venomous inſect of the ſpider-kind, called by the Greeks *heliocentros;* both words ſignifying an animal which ſtings moſt in the country, and ſeaſons, where the ſun is moſt hot.

Solinus makes this creature peculiar to Sardinia; but this is contrary to all the accounts given us by the ancients. It is common in Africa, and ſome parts of Europe.

Almoſt all the hot countries produce this venomous little creature. It lies under the ſand, to ſeize other inſects as they go by; and if it can meet with any uncovered part of a man, will bite him, and the wound will prove very painful and envenomed. It is ſaid that the bite is abſolutely mortal, but probably this is not true. Solinus writes the word *ſolifuga*, and ſo do many others, erroneouſly deriving the name from its flying from the ſun's rays, and burying itſelf in the ſand.

SOLIS, Antonio de, in *Biography*, a celebrated Spaniſh hiſtorian and poet, was born at Alcala de Henares. While he was very young, and a ſtudent, he wrote a comedy, which was extremely well received. It was followed by others, as well as by poems on different ſubjects, by which he raiſed a very high reputation. He was employed in the ſecretary of ſtate's office, and the king, Philip IV., made him his own private ſecretary. In 1661 the queen nominated him hiſtoriographer for the Indies; and it was in this quality that he compoſed his "Hiſtory of the Conqueſt of Mexico," a work which placed him among the moſt approved of the Spaniſh proſe writers, and was greatly applauded both at home and abroad. De Solis took prieſts' orders when he was in the 57th year of his age, after which he renounced all connection with the theatre, and adopted a regularity of life conformable to his character as a prieſt. He died in the year 1686. The comedies of De Solis, which were printed collectively in 4to. Madrid, in 1661, are ſaid by critics to be perplexed in their ſtory, and rather romantic than comic; but they have afforded the foundation of many French plays. His poems are ſaid to diſplay more imagination than correct taſte. His hiſtory is written with ſpirit and elegance, but there are occaſional diſplays of the bombaſt and falſe taſte, and frequently are to be met with great deviations from the truth. The object of De Solis is to make a perfect hero of Cortes, and on this account the hiſtory terminates with the conqueſt of Mexico, and does not touch upon ſubſequent cruelties. It has been tranſlated into the French and Engliſh languages.

Solis, *Aquæ*, in *Ancient Geography*, a town of Albion, in the 14th route of Antonine's Itinerary, between Iſca or Caerleon and Calleva or Silcheſter. Aquæ Solis was unqueſtionably Bath, which was much frequented by the Romans for its warm and medicinal ſprings.

Solis *Via*. See Via.

SOLISTEN, in *Geography*, a town of Sweden, in the province of Angermanland; 42 miles N.W. of Hernoſand.

SOLITAIRE Island, a ſmall iſland in the South Pacific ocean; 25 miles S. of Kerguelen's land. S. lat. 49° 49′. E. long. 68° 6′.

SOLITARIÆ Glandulæ, in *Anatomy*, thoſe mucous glands of the inteſtines, which are arranged ſingly. See Intestine.

SOLITARY, Solitarius, ſomething retired, or in private; remote from the company or commerce of others of the ſame ſpecies. See Hermit.

Solitaries, a denomination of the nuns of St. Peter of Alcantara, inſtituted in 1676, by cardinal Barberini, when abbot of Notre Dame de Farſa, in that city.

The deſign of their inſtitute is to imitate the ſevere, penitent life of St. Peter of Alcantara; to keep a continual ſilence; never open their mouths to any body but themſelves; employ their time wholly in ſpiritual exerciſes; and leave the temporal concerns to a number of maids, who have a particular ſuperior in a ſeparate part of the monaſtery. They always go bare-footed, without ſandals, gird themſelves with a thick cord, and wear no linen.

Solitary *Column*, is a column that ſtands alone in any public place; as the Trajan column.

Solitary *Worm*, *Solium tænia*, or *Lumbricus latus*, is a worm ſometimes found in the inteſtines, and which is always the only one of the kind there; as commencing from the pylorus, and extending thence the whole length of the inteſtines; ſo that there is no room for another. See Tænia and Worm.

Solitary *Iſland*, in *Geography*, an iſland in the South Pacific ocean, diſcovered by Mendana in the year 1595. It is low, round, and planted with trees; and the coaſt is ſurrounded with rocks. S. lat. 10° 4′. W. long. 178° 20′.

Solitary *Iſlands*, a cluſter of ſmall iſlands near the eaſt coaſt of New Holland. S. lat. 30° 8′.

SOLITAURILIA, in *Antiquity*. See Suovetaurilia.

SOLIVA, in *Botany*, a genus in the *Flora Peruviana*, page 102, dedicated to Salvator Soliva, a Spaniſh phyſician and botaniſt. *De Theis*.

SOLIVE, Fr., among *Carpenters*, a joiſt, rafter, or piece of wood, either ſlit or ſawed, with which the builders lay their cielings.

SOLJURA, in *Geography*, a town of Bengal; 28 miles S.S.E. of Curruckpour.

SOLKIEV, or Zolkiev, a town of Auſtrian Poland, in Galicia; 10 miles N. of Lemberg.

SOLLAM Moss. See Solway *Moſs*.

SOLLAPOUR, a circar of Hindooſtan, in Viſiapour, between the rivers Kiſtnah and Beema, near their junction.—Alſo, a town of Hindooſtan, and capital of the forementioned circar, on the Kiſtnah; 120 miles S.E. of Viſiapour. N. lat. 16° 22′. E. long. 77° 10′.

SOLLECITO, in *Italian Muſic*. This word has two acceptations: the one implies that a movement is to be performed with a mournful and ſorrowing expreſſion; the other means carefully, and with accuracy.

SOLLERGUNGE, in *Geography*, a town of Hindooſtan, in Oude; 9 miles E. of Lucknow.

SOLLERO, a town of Sweden, in Dalecarlia, on an iſland in lake Siljan; 48 miles N.W. of Fahlun.

SOLLIES LE PONT, a town of France, in the department of the Var; 13 miles S. of Brignole.

SOLMISATION, or naming the notes in the ſcale according to the hexachord of Guido. See Mutations and Serra.

Solmisation *of the Greeks*. The ancient Greeks had their ſolmiſation in vocal muſic, as well as the moderns; having for that purpoſe uſed four monoſyllables, ending with different vowels, for the exerciſe of the voice in ſinging; like our *mi*, *fa*, *ſol*, *la*. Theſe were, for the firſt note of each tetrachord, τᾶ; for the ſecond, τῆ; for the third, τῶ; and for the fourth, if it did not ſerve as the firſt of the adjoining and relative tetrachord, τε̃; but if it began a new tetrachord, it was called by the firſt name, τᾶ.

The repetition of theſe monoſyllables is a further proof that the *fourth*, in the ancient muſic, ſerved as a boundary to a ſyſtem of four ſounds, in the ſame manner as a hexachord did in the Guido ſcale, and as an octave does for eight ſounds in the more modern practice.

SOLMIZARE, in the *Italian Muſic*. See Solfeggiare.

SOLMS, in *Geography*, a principality of Germany, ſituated in the Wetterau. The counts of Solms are ſuppoſed to be deſcended from the houſe of Naſſau, and are divided into ſeveral branches, *viz*. Solms Braunfels, Solms Hohen-Solms, Solms Laubach, Solms Rodelheim, and Solms Lich.

Solms, *Hohen*. See Hohen-solms.

Solms, or *Burg Solms*, a town of Germany, in the principality of Solms Braunfels, having formerly a caſtle, which gave name to the county; 1 mile E. of Braunfels.

SOLMSBACH, a river of Germany, which runs into the Lahn, 2 miles N.E. of Braunfels.

SOLNAN, a river of France, which joins the Seille at Louhans, in the department of the Saone and Loire.

SOLNIZ, a town of Bohemia, in the circle of Koniggingratz; 15 miles E. of Konigingratz.

SOLO, a mountain of Naples, in Lavora; 10 miles S.W. of Ponte Corvo.—Alſo, a town of Hindooſtan, in Mewah; 30 miles N. of Dig.—Alſo, a town of South America, in the province of Cordova; 100 miles N.W. of Cordova.

Solo, in *Italian Muſic*, uſed ſubſtantively, implies a compoſition for a ſingle inſtrument, with a quiet and ſubdued accompaniment, to diſplay the talents of a great performer; as a ſolo for a violin, German flute, or violoncello. In full pieces, *concertate*, each part is informed when it becomes principal, by the word *ſolo;* and when ſubordinate, by *tutti*, which implies the chorus, or full band.

In the concertos of Corelli, Geminiani, and Handel, chiefly compoſed *à due cori*, or two orcheſtras, the principal parts are ſaid to belong to the *concertini*, or ſolo parts; as *violino primo concertino*, *violino ſecondo del concertino*, &c.: and the inferior parts, that only play in the full chorus, are called *ripieni;* as *violino primo ripieno*, *violino ſecondo ripieno*, or *del concerto groſſo*, or the great and full concert.

Solos, which uſed to afford the moſt exquiſite delight to perſons of refined taſte, when compoſed and performed by great maſters, are now wholly laid aſide; and whoever attempts to perform one, is ſubjected to a penalty inſtead of a reward; a law inſtituted at the concert of ancient muſic, where a compoſition was never thought complete by the late earl of Sandwich, without a kettle-drum, nor with, unleſs he beat it himſelf. And at the Commemoration of Handel, the double drums, double cartels, tromboni, &c. augmented his lordſhip's pleaſure, in proportion to the din and ſtenterophonic ſcreams of theſe truly ſavage inſtruments; which, in ſo wide a building as Weſtminſter Abbey, and ſoftened by ſo powerful a chorus of voices and inſtruments as were aſſembled at the Commemoration, had, occaſionally, a fine effect; but in a more confined ſpace, the almoſt inceſſant uſe of the tromboni, and perpetual roll of the double drums, annihilate all the pleaſing effects of mellifluous tones.

SOLOAYS, in *Geography*, a town of Pennſylvania; 24 miles N. of Eaſton.

SOLOE, in *Ancient Geography*, a town of the iſland of Cyprus, built, according to Strabo, by Acamas and Phalerus, both Athenians, but, as Plutarch ſays, by Demophon, on the banks of the river Clarius. It was ſituated on an eminence in a barren territory, and called "Æpira," denoting *high*, on account of its elevated poſition. Many ages afterwards, when Solon came to Cyprus and formed a league of friendſhip with Phylocyptus, one of the kings of the iſland, he adviſed him to remove the town to a neighbouring plain, on the banks of a river with a port over-againſt Cilicia. This new city was called Σολοι, and in Latin Solæ or Soli, from the name of Solon. It is now "Solin." Another town of the ſame name in Cilicia, is called by Pliny "Soloe Cilicii," by way of diſtinction from the other. This was afterwards called "Pompeiopolis."

Soloe, a cape of Africa, on the Atlantic ocean, which the Periplus of Hannon places at the diſtance of three days' journey ſouth of the promontory "Hermeum." Hannon built on the ſummit an altar conſecrated to Neptune, and it was in proceſs of time adorned with bas-relief works of art, which rendered it the moſt celebrated place on the coaſt.

SOLOEIS, a promontory of Libya, at the extremity of mount Atlas, now called Cape Cantin. It is mentioned by Herodotus.

SOLOENTIA, a promontory of interior Libya, between the mouth of the river Nunius and that of the river Malla, according to Ptolemy.

SOLOFRA, in *Geography*, a town of Naples, in Principato Ultra; 18 miles S. of Benevento.

SOLOGNE, a diſtrict of the government of Orleannois, in France, before the revolution, about 60 miles in length, and 18 in breadth, of which Romorantin was the capital.

SOLOK, a town of Lithuania, in the palatinate of Troki, on a lake; 40 miles N.N.E. of Zytomiers.

SOLOMBO, GREAT, a ſmall iſland in the Eaſt Indian ſea. S. lat. 5° 36′. E. long. 114° 45′.

SOLOMBO, *Little*, a ſmall iſland, a little N.E. of Great Solombo.

SOLOMBOL, an iſland of Ruſſia, in the government of Archangel, ſituated on the river Dwina; which has a dock-yard for building ſhips, with a fort and garriſon; 5 verſts above Archangel.

SOLOMIAC, a town of France, in the department of the Gers; 14 miles S.E. of Lectoure.

SOLOMON, in *Biography*, a king of the Jews, eminently diſtinguiſhed by his wiſdom, wealth, and extent of territory, was the ſon of David by Bathſheba, formerly the wife of Uriah, and born in the year B.C. 1033. By the influence of Bathſheba, and the recommendation of Nathan, Zadok, and other friends, who thought it neceſſary to counteract the views and meaſures of Adonijah, David's eldeſt ſon, he was proclaimed the deſtined ſucceſſor of his father before his death. When this event took place, B.C. 1015, he aſcended the throne of all Iſrael, not only without oppoſition, but amidſt the acclamations of the people. For his greater ſecurity, he ordered Adonijah, and Joab, who was attached to his intereſt, to be put to death. As ſoon as he was confirmed in his kingdom, he contracted an alliance with Pharaoh, king of Egypt, and married his daughter, whom he brought to Jeruſalem, and for whom he afterwards built a ſumptuous palace; receiving for her dowry the city of Gezer, which had been taken from the Canaanites. It was on occaſion of this marriage, as ſome have thought, that he compoſed the Canticles, as a kind of epithalamium; and the 45th Pſalm has been alſo referred to the ſame event. About this time he led his troops, and all Iſrael, to Gibeon, where he offered a thouſand burnt-offerings upon the brazen altar. In the following night he is ſaid to have been favoured with a viſion, in which God promiſed to grant him whatſoever he deſired: and as the object of his prayer was wiſdom for diſcharging the duties of his high office, his requeſt was fully granted. Upon his return to Jeruſalem, he offered a great number of ſacrifices on the altar, before the ark of the Lord, and made a great feaſt for his ſervants. As an inſtance of his wiſdom, he decided a diſpute between two mothers, who claimed the ſame child. (1 Kings, iii. 16—28.) In token of the acceptableneſs of his petition, he alſo obtained, more than he aſked for, a gratuitous donation, on the part of God, of riches and honour: which were amply diſplayed in the magnificence of his court, the amount of his revenues, the multitude of his ſubjects, the number of his civil and military eſtabliſhments, and a variety of other circumſtances, which rendered him one of the moſt celebrated monarchs of the Eaſt. His reign was peaceful and proſperous. Judah and Iſrael were united and ſecure, and his neighbours either formed an alliance with him, or paid him tribute. His dominions extended from the Euphrates to the Nile; and his reputation for wiſdom was ſpread through all nations.

As ſoon as Hiram, king of Tyre, heard of his acceſſion to the throne of Iſrael, he deputed ambaſſadors to congratulate him; and with the acknowledgment of this meſſage, he requeſted to be ſupplied with wood, and able artificers to aſſiſt in conſtructing the temple at Jeruſalem, which, in deference to his father's vow, he had undertaken to execute. The completion of this magnificent edifice conferred ſingular celebrity on the reign of Solomon. It was begun in the 4th year of his reign, and the ſecond after the death of David, B.C. 1012, and 480 years after the Exodus. In the various departments of this great work, he employed no leſs than 183,600 perſons. This wonderful ſtructure was completed in the 11th year of Solomon, or in the ſhort ſpace of ſeven years; and it was ſolemnly dedicated on Friday, Oct. 30, B.C. 1000 years. Solomon afterwards built two palaces, one for himſelf and another for his queen; and the conſtruction of the temple and palaces occupied a period of twenty years. He alſo built the walls of Jeruſalem; and he repaired and fortified a great number of cities. The great expence which he thus incurred was defrayed by a commerce which he carried on from Ezion-geber and Eloth, on the Red ſea, to Ophir; for the ſituation of which ſee OPHIR.

Solomon, however, notwithſtanding the wiſdom which rendered him ſo famous, had not ſufficient fortitude for reſiſting the temptations that accompanied his proſperity. He was betrayed, in the moſt culpable and diſgraceful manner, into the vices attendant on luxury and ſenſuality. Beſides 700 wives, he had 300 concubines; and in his declining age, though he had erected a temple to Jehovah the true God, and was thus implicitly pledged to preſerve the religion of the Jews pure and uncorrupted, their influence cauſed him to degenerate into the moſt inexcuſable idolatry, ſetting up as objects of worſhip, Aſhtoreth, goddeſs of the Sidonians, Moloch, the idol of the Ammonites, and Chemoſh, the god of the Moabites, and building for them temples on the mount of Olives, over-againſt, and eaſt, of Jeruſalem. As a juſt puniſhment of his culpable conduct, the ſovereigns of Edom and Syria were excited againſt him, and he ſaw, before his death, the commencement of that revolt which terminated in the diviſion of the kingdom.

Solomon cloſed his life and reign in the year B.C. 975, having reigned 40 years, at the age of 58. Such is the Scripture account, but Joſephus aſſigns to him a reign of 80 years, and a life of 94 years. He was buried in the city of David, and ſucceeded by his ſon Rehoboam, who reigned only over part of the divided kingdom of Iſrael. Tradition aſcribes to him a great number of books; but thoſe only under his name admitted into the canon of Scriptures, are the "Proverbs," "Eccleſiaſtes," and the "Canticles." See each in its proper place.

SOLOMON'S *Seal*, in *Botany*, a plant called by authors *polygonatum*; which ſee. See alſo CONVALLARIA.

SOLOMON'S *Iſlands*, in *Geography*, a group of iſlands in the Pacific ocean, diſcovered by Mendana in 1565; and afterwards by M. Surville, in 1767, who called them Arſacides, or Aſſaſſins; they were paſſed by Lieut. Shortland in 1788, and called by him New Georgia. See ARSACIDÆ and GEORGIA.

SOLON, in *Biography*, one of the ſages of Greece, and the celebrated law-giver of the Athenians, was born in the ſeventh century before Chriſt. He was of a family deſcended from the ancient kings of Athens, but which, in the revolutions of time, had fallen into indigence, for he paſſed his early years in travelling on mercantile buſineſs. He ſhewed an early diſpoſition for poetry, which he firſt exerciſed on the following occaſion. The Athenians, in a war with the Megarenſians, had been expelled from the iſle of Salamis, and their efforts to recover it were attended with ſo much loſs, that a law paſſed to make it a capital offence for any one to propoſe a renewal of the attempt. Solon, feeling mortified at the diſgrace attached to this decree, compoſed an elegy adapted to rouſe the ſpirits of the people, and feigning himſelf to be under the influence of a temporary inſanity, ran into the market-place, mounted the cryer's ſtool, and pronounced his verſes with great vehemence. The crowd gathered round felt a riſing ardour; which was farther excited by an harangue of Piſiſtratus, and they, without heſitation, decreed a war againſt the Megarenſians. Salamis was recovered, and, according to a tradition which has been generally received, by a ſtratagem of Solon's. He afterwards increaſed his reputation by adviſing a war with the people of Cirrha, who had ravaged the ſacred territory of Delphi, and contributed to the reduction of their city. Athens at this time was in a very unquiet ſtate, ariſing as well from the contentions of different political factions, as from the oppreſſions of the ſuperior claſſes, who had reduced a great part of the common people to ſlavery, in conſequence of their debts. Solon, in this emergency, was looked up to by the citizens in general as the man who, by his wiſdom and virtue, was beſt qualified to reſtore public tranquillity, and a large party was deſirous of raiſing him to the ſovereignty. This, however, he poſitively declined; but being choſen archon by acclamation in the year B.C. 594, he ſet himſelf to compoſe the diſſentions by moderate meaſures. At firſt his plans were not well received, but reflection convinced all parties that his object was good, and they unanimouſly inveſted him with the high truſt of new-modelling their laws and conſtitution. He abrogated the ſanguinary laws of Draco, excepting ſuch as related to homicide. Democracy being the form of government to which the Athenians were attached, he regarded it as the baſe of his new conſtitution, but ſtudied to give it due checks and counterbalances. Hence he divided the citizens into four claſſes, three of which were formed upon different ſcales of property: the fourth included thoſe of the loweſt order, who were deſtitute of all property. Theſe were excluded from public offices, but admitted to vote in the general aſſembly of the people. As this body was in poſſeſſion of the ſupreme power, and judged cauſes in the laſt reſort, the conſequence, or at leaſt the ſafety, of the meaneſt members of the ſtate was ſufficiently ſecured. To prevent inconſiderate reſolutions in the democratic aſſembly, he inſtituted a ſenate of 400, which was to have a prior deliberation upon every propoſal to be ſubmitted to the general aſſembly. Solon revived the ancient Areopagus, and ordained that it ſhould be compoſed only of thoſe who had paſſed through the office of archon, the higheſt magiſtracy of the ſtate; which conferred on it a ſplendour that rendered its decrees revered through the whole of Greece. The laws of Solon have been ranged under various heads, but it would not comport with our plan to enter at large into their nature. Their general ſpirit is mild and equitable. One of them has been the ſubject of much political diſcuſſion: this was, that in any caſe of civil conteſt, in which oppoſite parties take up arms, the citizen who remains neuter ſhall be puniſhed with exile and confiſcation of goods: another regulation, very ſalutary in its effects, and well adapted to a ſmall ſtate, was, that the Areopagus ſhould have full power to enquire how every citizen ſupported himſelf, with the view of inflicting penalties on the idle.

As an apology for any imperfection that might be found in his code, Solon was accuſtomed to ſay, "I have given to the Athenians not the beſt poſſible laws, but the beſt they were capable of receiving." The code given by Solon was intended by the author to be in force a century, and then to be reviſed and amended, as occaſion might ſeem to demand. After the promulgation of his code, Solon was continually moleſted by perſons who came to him, either for explanation of obſcure paſſages, or with propoſals for improvements of which they imagined it capable. To avoid their importunities he reſolved to travel; and having obtained leave of abſence for ten years, and exacted an oath from the citizens, that nothing ſhould be altered till his return, he ſailed to Egypt. He there procured inſtructions in philoſophy from the prieſts of Heliopolis and Sais, one of whom, it is ſaid, in the pride of Egyptian antiquity, ſaid to him, "Solon, Solon, you Greeks are children, you have not a grey-headed man among you." From Egypt he went to Cyprus, where he ſuggeſted to one of the petty princes the erection of a new city, which was called after his name. About this time alſo he held a conference with Thales, the Mileſian, recorded by Plutarch, and it was about this period that he viſited the court of Crœſus, king of Lydia.

On his return to Athens, he found the ſtate in great confuſion from the conteſts of different factions. Piſiſtratus had placed himſelf at the head of the popular party, and was aiming, through its favour, at the ſovereignty. Solon attempted to oppoſe the current, but in vain: he appeared with his arms in the aſſembly, and harangued the people, but he had loſt his influence, and being wholly unable to rouſe the people, he withdrew from Athens never more to return. The place and time of his death have never been accurately aſcertained, but it is generally believed that he died at Cyprus, at the age of eighty. The Athenians held his memory in ſuch high reverence, that they erected a ſtatue of braſs to his memory in the forum: the opinion of mankind at large has, however, ſurvived the brazen memorial, and he is ſtill regarded as among the greateſt benefactors of mankind.

Solon was one of thoſe early Greek philoſophers who were diſtinguiſhed by the appellation of the ſeven wiſe men. Philoſophy had in that age attained to no ſyſtematic cultivation, and the only monuments of the wiſdom of moſt of thoſe ancient ſages which have come down to us, are ſome ſhort moral and prudential maxims, which ſeem to require for their diſcovery little depth of penetration or extent of obſervation. They have, however, been conſecrated to perpetual remembrance by the gratitude and admiration of Greece. That the laws of Solon might be open to the inſpection of the people, they were inſcribed on wooden tablets, turning on axes, and ſaid to have been of different forms, according as the laws which they contained related to private or public affairs. The mode of writing is that which is termed in the Greek language βουστροφηδον, that is, from the right to the left, and then from left to right; the term is taken from the method uſed in ploughing, which was always done in ancient times by means of oxen. The fragments of Solon's laws have been collected by various writers, but with very great care by Samuel Petit, in a learned work, which is, however, not free from inaccuracies, and conjectures that will not bear the teſt of criticiſm. This work was publiſhed at Paris, in folio, in the year 1635, under the title of "Leges Atticæ." It was republiſhed by Weſſeling, with many improvements, and the additions of his own remarks and thoſe of other critics, in 1742. Diogenes Laertius has annexed to his life of Solon four epiſtles, which he aſcribes to that philoſopher, addreſſed to Periander, Epimenides, Piſiſtratus, and Crœſus. Of his ſayings or maxims, the following have come down to us. "Laws are like cobwebs, that entangle the weak, but are broken through by the ſtrong:" "He who has learned to obey, will know how to command:" "In every thing you do, conſider the object and end:" "In all things let reaſon be your guide:" "Diligently contemplate excellent things." Of the poetical talents of Solon, time has left us little opportunity of judging. Thirty-one fragments, collected from Stobæus and other writers, have been printed by Brunk. They are written in various meaſures, but chiefly in the elegiac. Many of them, in a ſtyle reſembling that of Theognis, the poet of Megara, are employed in the illuſtration of uſeful maxims relative to the conduct of life and formation of manners. The ſcanty fragments of the Salaminian elegy, to which we have already referred, manifeſt conſiderable animation, ſo that we can eaſily give credit to what is ſaid of the effect which it produced.

Solon, in *Geography*, a military townſhip of America, in the ſtate of New York and county of Cortland, bounded N. by Troxton, E. by Chenango county, S. by Cincinnatus, and W. by Homer; 10 miles E. of Homer, and 132 miles W. of Albany. It is 12 miles ſquare, and an excellent tract of land. The timber in this townſhip is maple, beech, elm, aſh, butternut, baſs, together with ſome pine and hemlock. The ſoil is principally a warm gravelly loam, well adapted for farming, and the inhabitants are farmers. The population in 1810 conſiſted of 1270 perſons. The roads in this townſhip are in good order; and great numbers of lean cattle are driven from hence every year to Philadelphia, Weſt Cheſter and Ducheſs counties.—Alſo, a town of Maine, in the county of Somerſet, containing 312 inhabitants.

SOLONIUM, in *Ancient Geography*, a town of Italy, in Etruria, according to Dionyſius Halicarnaſſus.

SOLOOKUPA, in *Geography*, a town of Bengal; 15 miles N.N.E. of Nuldingah.

SOLOON, a ſmall iſland in the Eaſt Indian ſea; 25 miles from Samar. N. lat. 10° 55′. E. long. 125° 42′.

SOLOR, an iſland in the Eaſt Indian ſea, S. of Celebes, about 70 miles in circuit, ſeparated from the E. coaſt of the iſland of Flores by a narrow channel, called the Straits of Flores. S. lat. 8° 33′. E. long. 125° 42′.

SOLOS, Σολος, in *Antiquity*, an inſtrument with which the exerciſe of the quoit was performed, which ſome will have to be diſtinguiſhed from the diſcus, becauſe that was of iron, this of ſtone; but others, with more reaſon, report that the difference conſiſted in this, *viz.* that the σολος was of a ſpherical figure, and the diſcus broad.

SOLOT, in *Geography*, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 12° 8′.

SOLOTHURN. See Soleure.

SOLOTKOVA, a town of Ruſſia, in the government of Irkutſk, on the Ilmin; 60 miles S.W of Orlenga.

SOLOTNICK, in *Commerce*, a weight in Ruſſia, which expreſſes the fineneſs both of gold and ſilver; the pound or other weight being divided into 96 ſuch parts: ſo that the ſolotnick is alſo the $\frac{1}{96}$th part of a Ruſſian pound weight. According to the mint regulations eſtabliſhed in the reign of the emperor Paul, and confirmed by an edict of the emperor Alexander, in 1801, $22\frac{3}{4}$ rubles are to contain a Ruſſian pound of fine ſilver; and they are to be $83\frac{1}{5}$ ſolotnicks (or 10 oz. 8 dwts.) fine; ſo that each ruble ſhould weigh $320\frac{1}{4}$ Engliſh grains, and contain $277\frac{1}{2}$ grains of fine ſilver. It was declared that no gold coin ſhould be hereafter ſtruck in Ruſſia, except the imperial and half-imperial, the ſtandard of which was raiſed to $94\frac{1}{2}$ ſolotnicks, or $188\frac{1}{4}$ Engliſh grains. Accordingly,

	£	s.	d.	
The imperial is worth	1	12	$9\frac{1}{2}$	valued in Engliſh gold.
The ducat	0	9	1	
The ruble of 1763	0	3	3	valued in Engliſh ſilver.
——— of 1801	0	3	$2\frac{1}{2}$	

By an aſſay lately made on a number of rubles at the London Mint, by order of the Bank of England:—

Rubles of 1763, weight from 14 dwts. 21 grs. to 15 dwts. 20 grs.; average 15 dwts. $8\frac{1}{2}$ grs.; fineneſs 44 dwts. worſe than Engliſh, that is, 8 oz. 18 dwts.

Rubles of 1801, weight from 13 dwts. 2 grs. to 13 dwts. 12 grs.; average 13 dwts. 7 grs.; fineneſs 14 dwts. worſe than Engliſh, that is, 10 oz. 8 dwts. Thus we have the value of the old ruble 3*s.* 2*d.* ſterling, and of the new, 3*s.* $2\frac{1}{2}$*d.*

The Ruſſian weights are as follow, *viz.* the berquet or berkowitz contains 10 poods; the pood, 40 lbs.; the pound, 32 loths; and the loth, 3 ſolotnicks. The Ruſſian pound weighs 28 loths, Cologne weight, or 6314 troy grains. Hence 500 lbs. Ruſſian = 451 lbs. avoirdupois. The ordinary computation among merchants is, that 36 lbs. avoirdupois = the pood of 40 lbs. Ruſſian; and that 63 poods = 1 ton avoirdupois. Kelly's Cambiſt.

SOLOVETZKOI, in *Geography*, a ſmall iſland of Ruſſia, in the White ſea. N. lat. 64° 55′. E. long. 30° 14′.

SOLRE-LIBRE (*Le Chateau*), a town of France, in the department of the North, and chief place of a canton, in the diſtrict of Aveſnes; 6 miles N.E. of Aveſnes. The place contains 1525, and the canton 7134 inhabitants, on a territory of $212\frac{1}{2}$ kiliometres, in 23 communes.

SOLSEQUIUM, a word uſed by ſome chemical writers as a name for ſulphur.

SOLSOGAN Bay, in *Geography*, a bay on the S. coaſt of the iſland of Luçon. N. lat. 13° 12′. E. long. 123° 50′.

SOLSONA, or Salsona, a town of Spain, in Catalonia, the ſee of a biſhop, ſuffragan of Tarragona; 97 miles E. of Saragoſſa. N. lat. 42° 2′. E. long. 1° 22′.

SOLSTICE, Solstitium, in *Aſtronomy*, the time when the ſun is in one of the ſolſtitial points; that is, when he is at his greateſt diſtance from the equator, which is 23° 28′: thus called, becauſe he then appears to *ſtand ſtill*, and not to change his place in the degrees of the zodiac, any way: an appearance owing to the obliquity of our ſphere, and to which thoſe who live under the equator are ſtrangers.

The ſolſtices are two in each year; the *æſtival* or *ſummer* ſolſtice, and the *hyemal* or *winter* ſolſtice.

The ſummer ſolſtice is when the ſun is in the tropic of Cancer; which is on the 21ſt of June; when he makes the longeſt day.

The winter ſolſtice is when he enters the firſt degree of Capricorn; which is on the 22d of December; when he begins to return towards us, and makes the ſhorteſt day.

This is to be underſtood as in our northern hemiſphere; for in the ſouthern, the ſun's entrance into Capricorn makes the ſummer ſolſtice, and that into Cancer the winter ſolſtice.

Mr. Pond, the aſtronomer royal, from obſervations made on the ſummer and winter ſolſtice, deduces the mean obliquity of the ecliptic for January 1, 1813, as 23° 27′ 51″.50 from the former, and from the latter 23° 27′ 47″.35.

SOLSTITIAL Points, are thoſe points of the ecliptic, by which the ſun's aſcent above the equator, and his deſcent below it, are terminated.

The firſt point, which is in the beginning of the firſt degree of Cancer, is called the *æſtival* or *ſummer* point; and the latter, which is in the beginning of the firſt point of Capricorn, the *winter* point. The ſolſtitial points are diametrically oppoſite to each other.

SOLSTITIAL *Colure*, is that which paſſes through the ſolſtitial points. See COLURE.

SOLTAU, in *Geography*, a town of Weſtphalia, in the principality of Luneburg Zelle. The inhabitants are for the moſt part clothiers; 29 miles N.N.W. of Zell. N. lat. 53° 4′. E. long. 9° 55′.

SOLTCAMP, a town of Holland; 13 miles N.W. of Groningen.

SOLTE, a river of Germany, which runs near Kloppenburg in Munſter, and joining the Vehne, takes the name of Soeſt, on the borders of Frieſland.

SOLTENHAGEN, a town of Hinder Pomerania; 8 miles E. of Zachan.

SOLTKOTT, a town of Weſtphalia, in the biſhopric of Paderborn, famous for its ſalt-works; 6 miles S.W. of Paderborn.

SOLTZ, a town of Germany, in the county of Henneberg; 4 miles N.W. of Meinungen.

SOLVA, a river of South Wales, in the county of Pembroke, northward of Milford Haven, which forms the port and harbour of the little town of the ſame name. This ſmall town is ſituated in a deep valley, pervaded by the above-mentioned river. Moſt of the houſes are of modern erection, and exhibit a neat appearance. They lie principally on the weſtern ſide of the vale, forming one ſtreet in the direction of the river, but ſcattered without plan or order on the ſteep acclivity above. Solva is a ſea-port, and carries on a ſmall commercial intercourſe with the adjacent parts of the coaſt, chiefly with Milford. Its rapid increaſe in ſize, of late years, is an evidence of its proſperity.

SOLVACH BAY, a creek of South Wales, on the N. ſide of St. Bride's bay; 3 miles E. of St. David's.

SOLUBILITY *of Salts*, in *Chemiſtry*, denotes their capacity to unite with, and remain ſuſpended in water; and the different ſalts poſſeſs different degrees of ſolubility, requiring more or leſs of this fluid for their ſolution. See SALTS.

SOLUBLE, in *Medicine*, looſe, or apt to go to ſtool. In chemiſtry it ſignifies eaſily diſſolvable.

SOLUBLE *Tartar*. See TARTAR, and *Tartrate of Potaſh*, under SALTS.

SOLUBLE *Matter of Plants*, in *Agriculture*, the ſoluble parts of them, or the portion of vegetable matter which they contain, and which is capable of ſolution and of being employed as the food and nouriſhment of man and animals. The quantities or proportions of this matter, which different plants or vegetable ſubſtances poſſeſs, is very different. It is conſequently not improbable, but that the difference in the nutrient powers of different plants and ſubſtances of the vegetable kind may, in a great meaſure, depend upon this difference in the quantities or relative proportions of the ſoluble matter which they may contain, but their utility and importance as food do not appear to be wholly dependent upon this circumſtance.

SOLUBLE *Matter of Soils*, the reſolvable matter in them, or the quantity and proportion of this ſort of matter which they contain in different caſes, and which is capable of being converted to uſe as food for the ſupport and growth of plants as crops. Some ſoils abound much with materials of this nature, while others are almoſt wholly deficient of them. This, in ſome degree, conſtitutes the difference of fertility in lands, though it is influenced by a great variety of other cauſes. See SOIL.

The rich black ſoils are, for the moſt part, the moſt abundantly provided with this kind of matter, though many others poſſeſs it in a conſiderable proportion.

SOLUE, in *Geography*, a town of Africa, in the country of Barca; 10 miles S.W. of Curen.

SOLVENT, the ſame with *diſſolvent*. See SOLUTION.

SOLVENT, *Univerſal*, in *Alchemy*. See ALKAHEST.

SOLVESBORG, in *Geography*. See SOLFWITZBURG.

SOLUMBERE, a town of Hindooſtan, in the circar of Oudipour; 35 miles S. of Aſawully.

SOLUMBERGA, a town of Italy, in Friuli; 7 miles N. of Aviano.

SOLUS, in *Ancient Geography*, a town of Sicily, according to Pliny; marked in the Itinerary of Antonine as the route from the Lilybæan promontory to the Tyndaris, between Panormus and Thermæ.—Alſo, a promontory of Libya, on the coaſt of the Atlantic ſea, according to the Periplus of Scylax. A temple, dedicated to Vengeance and Neptune, was erected on the ſummit of this promontory.

SOLUSAPRA, a town of Sicily, on the route from Tyndaris to the Lilybæan promontory, according to the Itinerary of Antonine.

SOLUTIO CONTINUI, or *Solution of Continuity*, a term uſed by phyſicians, &c. to expreſs a diſorder common to the ſolid parts of the body, in which their natural coheſion is ſeparated: as by a wound, or other cauſe.

If this happen to a ſimple, ſimilar part of the body, it is called ſimply *ſolutio continui:* if to a compound or organical part, it acquires a particular denomination, from the nature of the part, the difference of the cauſe, or the manner of application; as a *wound, rupture, fracture, puncture, fiſſure, contuſion, ulcer, corroſion, dilaceration, exfoliation, caries*, &c.

SOLUTION, SOLUTIO, in *Algebra* and *Geometry*, is the anſwering of a queſtion; or reſolving any problem propoſed. See RESOLUTION and REDUCTION *of Equations*.

The ſolution of the problem of the quadrature of the circle, and that of the duplicature of the cube, by right lines, are held impoſſible.

SOLUTION *of Continuity*, in *Surgery*. See SOLUTIO *Continui*.

SOLUTION, in *Phyſics*, the reduction of a ſolid or firm body into a fluid ſtate, by means of ſome menſtruum.

Solution is frequently confounded with what we otherwiſe call *diſſolution*, but there is a difference.

SOLUTION, in *Chemiſtry*, is ſometimes uſed for the analyſis, or reduction, of a natural body into its chemical principles.

In this ſenſe, ſolution is the ſame with what we otherwiſe call reſolution.

Solution, as the term is commonly uſed by chemical writers, conſiſts in an union formed by the integrant parts of one body with thoſe of another body of a different nature; and this cannot be effected till the aggregation of one, at leaſt, of the two bodies is broken. And as bodies, whoſe aggregation is broken, are neceſſarily in a ſtate of fluidity, or of vapours, an axiom has been formed, *corpora non agunt niſi ſint fluida, i. e.* bodies do not act unleſs they be fluid.

The two bodies which unite in ſolution, are commonly diſtinguiſhed by two different names. That body is generally called the *ſolvent*, which, by its fluidity or acrimony, appears to be active; and the body which, from its want of taſte, or from its ſolidity, appears to be altogether paſſive, is ſaid to be *diſſolved. E. g.* When metal or marble is diſſolved in aqua fortis, the ſolid bodies are conſidered as being diſſolved, and aqua fortis as the ſolvent. Nevertheleſs, it muſt be remembered, that two bodies, which unite together in ſolution, act reciprocally upon one another, and their union is the effect of their mutual affinity or tendency to each other: and thus the marble and metal act as much upon the nitrous acid as this does upon them.

That a ſolid may be diſſolved in a fluid, it is neceſſary that the force of affinity between the two ſhould be ſufficient to overcome the force of coheſion between the particles of the ſolid; and hence it is, that heat ſo much aſſiſts ſolution by leſſening the force of coheſion between all particles of matter.

M. Gellert, however, repreſents as ſolvents, the bodies which are generally conſidered as diſſolved, and hence, he ſays, that ſand diſſolves alkali. If, indeed, we allow the action of the combining bodies to be mutual, it ſignifies little which we call the ſolvent, and which the body diſſolved; though it ſeems more clear and accurate to call that body the ſolvent, whoſe integrant parts are already ſeparated before the ſolution, and that the body diſſolved, whoſe integrant parts are only diſunited during the act of ſolution. The ſolution of bodies may be effected either by the humid, or by the dry way; of the former kind are thoſe ſolutions, in which the integrant parts of one or both of the two bodies are diſtributed in an aqueous fluid, *e. g.* of acids; and thoſe ſolutions, in which one or both bodies are rendered fluid by fire, as in vitrification, and in alloys of metals with each other, are of the latter kind. A perfect ſolution requires, that each of the integrant parts of one body be united to one of the integrant parts of another: hence, if one of them be tranſparent, we ought to have, after the mutual ſolution, a tranſparent compound, ſuch as occurs in the ſolutions of calcareous ſtones and acids, and thoſe of earths by alkalies: whereas the ſolution of ſoap in water is incomplete; and the ſame may be ſaid of glaſſes that are not perfectly tranſparent.

As the ſolution of two bodies can only be effected by the mutual attraction of their parts to each other, theſe parts, after the ſolution, are found to adhere together: ſo that heavy bodies, *e. g.* corroſive ſublimate, may be ſuſpended in the thinneſt and lighteſt liquids, *e. g.* ſpirit of wine, when they are truly diſſolved by each other.

In all caſes of ſolution at a common temperature, it generally happens, that the mixture in the act of ſolution becomes either warmer or colder than the ingredients were before the mixture. This is owing to an evolution or abſorption of free caloric, from the mixtures having a leſs or greater capacity for caloric, than the mean capacity of the two ſubſtances taken ſeparately. See CALORIC.

It happens alſo, in the greater number of caſes of ſolution, that the mixture has a greater ſpecific gravity than the mean gravity of the ingredients, relatively to their reſpective quantities. Hence they occupy leſs ſpace than before, which may be ſeen by putting into a bottle any ſoluble ſalt (*e. g.* ſulphate of ſoda), and filling it to the brim with water; after the ſolution is effected, the liquor will appear to have ſunk through a certain interval below the firſt level, without any loſs of the ingredients. See AFFINITY.

When ſolutions of ſalts are congealed, the ice often affords very pretty figures; but it is to be obſerved, that the ſame ſalt does not always give the ſame figures. Thus, the ſame ſolution of verdigris, frozen by means of ſnow and ſalt, affords a different figure, from what is produced by the natural cold of the air. And the former ice being thawed, and left to freeze in the ſame phial, did not give the ſame figures as at firſt. See Boyle's Works Abridged, p. 168.

SOLUTION, in *Metallurgy*, is diſtinguiſhed into dry and moiſt. The dry ſolution is the blending imperceptibly a ſmall quantity of a metal or mineral, with a very large one of ſome other body, dry, hard, and not fluid when cold. The moiſt ſolution is the diſtributing a body through the very minuteſt parts of an aqueous, or in great part aqueous fluid, in ſuch manner, that both may turn into a fluid, to appearance homogeneous, which goes through all filters, without being detained or ſeparated by them, and the ſmalleſt part of which contains in it a proportionable quantity of both the menſtruum or diſſolvent, and of the diſſolved body. The ſolution of gold in aqua regia, and of ſilver in aqua fortis, as alſo that of any of the ſalts in water, are ſolutions of this kind. Cramer's Art of Aſſaying, p. 194.

In the making of the ſeveral metallic reſolutions, for the neceſſary proceſſes in chemiſtry, the operator is ſubject to great danger in his health, from the noxious vapours. This has been an accident complained of indeed by many, but ſcarcely attempted to be remedied or obviated by any, in a rational way, till M. Geoffroy, whoſe experiments ſubjected him greatly to the miſchief, employed his thoughts, for his own ſake, as well as that of the world in general, to the effectual prevention of it.

The diſſolution of the metals in the corroſive acid ſpirits are thoſe, which ſend out the moſt copious and moſt dangerous vapours. The exhalation of quickſilver, of antimony, and of lead and copper, are all in themſelves greatly hurtful, as well as the fiery vapours of ſpirit of nitre, ſea-ſalt, or vitriol; and if either of theſe is ſingly ſo, how pernicious muſt they need be in thoſe caſes, where two of them are joined together in ſuch a manner, as that this union ſends up infinitely more vapours than would otherwiſe ariſe; in this caſe the utmoſt care is neceſſary to prevent the chemiſt from falling a ſacrifice to his zeal for his diſcoveries.

The common way of avoiding this danger, is by making the ſolution either abroad in the open air, or in a chimney; but ſometimes theſe cautions cannot be uſed, and under ſome circumſtances they are ineffectual. This gave occaſion to M. Geoffroy to uſe a method, which he afterwards propoſed to the public, of ſtopping the riſe of the vapours entirely, or at leaſt of diminiſhing them ſo greatly, that they ſhall be harmleſs and unperceived. All that was neceſſary to this, ſeemed to him to be the contriving to cover the ſurface of the fluid with ſome body, capable of retaining thoſe vapours, yet not capable of diſturbing the operation of the menſtruum on the metal; and the common expreſſed oils of fruits, as the oil of olives, almonds, or the like, were found capable of happily performing this effect; and that particularly, as they would eaſily receive into themſelves the acid ſalts which ariſe in the conflict. The thing which gave this gentleman the hint of the diſcovery was, that in the boiling of ſugars, honey, or the like ſubſtances, when there is any danger of their boiling over the veſſel, the pouring in a little oil ſtops the ſwelling. In the metallic ſolutions it has the ſame effect; and that heightened by this good conſequence, that by keeping in the fiery vapours of the acid, it returns them back upon the metal, and by this means does, in effect, add greatly to the power of the menſtruum.

This method of uſing oil has indeed three advantages. 1. The preſerving the operator from the injuries of the vapours. 2. The greatly moderating of that violent rarefaction, which is often of ill conſequence. And 3. The ſame quantity of the menſtruum, by this means, diſſolves more of the metal. The beſt method of making ſolutions with this advantage is this: firſt, wet the ſurface of the metal to be diſſolved with water, or ſpirit of wine; then pour a little water, or ſpirit of wine, into the glaſs in which the ſolution is to be made, this will prevent the oil from ſticking to the ſurfaces of either; then put the metal into the glaſs, and pour in the oil upon it; laſt of all, pour on the menſtruum: this, being greatly heavier than the oil, will ſink to the bottom and work upon the metal, while the oil perfectly covers the whole ſurface. There is no need to be exact as to the quantity of the oil, but more or leſs is to be uſed, in proportion to the greater or leſs ebullition which the mixture is expected to make.

The air-bubbles, which ariſe to the ſurface with great impetuoſity in the making of theſe ſolutions, are here ſeen to break by degrees as they enter the covering of oil, and generally are quite diſſipated before they ariſe to the ſurface of it. The few of them which retain their figure till they arrive at the ſurface, there burſt and give a ſlight exhalation; and one may continually ſee the drops of the menſtruum falling back again out of the oil into it, after being deſerted by the bubbles of the air which had raiſed them ſo far. On the contrary, in the common way of making ſolutions, the air-bubbles puſh one another up to the ſurface, where they form a ſort of ſcum, which continually thickens by their freſh riſing and ſupporting one another, till it often riſes over the top of the veſſel. Theſe bubbles of air ſeem to be formed of ſmall particles of air extremely condenſed in the pores of the metal, which, when the particles of it are ſeparated for ſolution, find themſelves at liberty to dilate and expand, and ariſe to the ſurface in their proper form.

If it be thought neceſſary, in any ſolution which raiſes a more than ordinary quantity of vapours, to prevent the flying off of that ſmall quantity which may eſcape through the oil, there is nothing more neceſſary than to pour a little ſpirit of wine upon the oil; for the acid vapours which paſs the oil will then be received in the ſpirit, and will be dulcified in it, and inſtead of a diſagreeable odour, will yield only a very ſweet and ſafe one. Spirit of wine alone, uſed inſtead of oil, and poured gently on the ſolution, has very great effects; inſomuch, that if uſed to the ſolutions in ſpirit of nitre, which uſually ſend up very noxious and coarſe red vapours, they by this means are made to ſend up only very fine light white ones, and theſe of a very agreeable ſmell: the bubbles raiſed in this caſe are very ſmall, and uſually burſt before they arrive at the ſurface of the ſpirit. The only objection to this method is, that the ſpirit of wine ſoon mixes itſelf with the menſtruum, and there are ſome caſes in which this may be of ill conſequence to the proceſs. Mem. Acad. Par. 1719.

SOLUTIVE, Loosening, or *Laxative.* See Laxative.

SOLWAY Frith, in *Geography*, an arm of the ſea, branching off from the Iriſh ſea, and forming a conſiderable part of the boundary between England and North Britain. Reckoning it to commence at Salterneſs Point, the S.E. corner of Galloway, its breadth to the neareſt land in Cumberland is about eight miles, and its length, inland, to the eaſt, 22 miles. As its outline, however, is rather irregular, it may be conſidered as comprehending an extent of 80 miles of ſea-coaſt, of which 36 miles are on the Scottiſh ſhore and the remainder on the Engliſh ſide. This frith opens to the weſt, and is rather a troubleſome navigation, as it abounds with ſhoals. The tides here are extremely regular, ſpring tides riſing 20 feet above low water-mark, and ordinary tides about 10 or 12. Numerous rivers pour their waters into the Solway, of which the principal are the Nith, the Annan, the Eſk, and the Levin, in Scotland, and the Eden and Wampool, in England. The Solway abounds with fiſh of various kinds, but particularly with ſalmon, which are caught in great quantities, and either ſold in the neighbourhood, or ſent pickled to London and other parts of England. The modes of taking this valuable fiſh here are ſo ſingular as to deſerve a particular detail. They are four in number, firſt with leiſters, a kind of four-pronged fork, with the prongs turned a little to one ſide, having a ſhaft from 20 to 24 feet long; theſe the fiſhermen run along the ſand on the edge, or throw them when they ſee any fiſh; in this manner they kill or wound great numbers. Some of the people are very dexterous at this exerciſe; inſomuch that, according to Mr. Pennant, they will on horſeback, at full gallop, throw a leiſter, and kill at a great diſtance. 2. By *heaving* and *hauling*, that is, by ſtanding in the current of the tide with ſmall hand-nets. 3. By fixing ſmall pock-nets to ſtakes in the currents. Theſe nets are made with wide meſhes, and the fiſh that come rapidly down with the ſtream, inſtantly run their heads into the meſhes, from whence they are unable to diſengage themſelves. The other method is the common one uſed in other parts for catching ſalmon. Sinclair's Statiſtical Account of Scotland, 8vo. 1796. General Report of Scotland, 8vo. 1814. Hiſtory and Antiquities of the Counties of Weſtmoreland and Cumberland, 4to. by Joſeph Nicholſon, eſq. and Richard Burn, LL.D.

Solway *Moſs*, a tract of land in Cumberland, England, is entitled to ſome notice in this place on account of the extraordinary effects of its eruption in the year 1771. Mr. Gilpin, in his "Obſervations on the Mountains and Lakes of Cumberland," &c. two vols. 1781, thus deſcribes the nature of the place and the particulars of the inundation. "Solway Moſs is a flat area, about ſeven miles in circumference. The ſubſtance of it is a groſs fluid, compoſed of mud, and the putrid fibres of heath, diluted by internal ſprings, which ariſe in every part. The ſurface is a dry cruſt, covered with moſs and ruſhes; offering a fair appearance over an unſound bottom, ſhaking with the leaſt preſſure. Cattle, by inſtinct, know and avoid it. Where ruſhes grow the bottom is ſoundeſt: the adventurous paſſenger, therefore, who ſometimes, in dry ſeaſons, traverſes this perilous waſte, to ſave a few miles, picks his cautious way over the ruſhy tuſſocks, as they appear before him. If his foot ſlips, or if he ventures to deſert this mark of ſecurity, it is poſſible he may never more be heard of. On the ſouth, Solway Moſs is bounded by a cultivated plain, which declines gently through the ſpace of a mile to the river Eſk. This plain is lower than the moſs, being ſeparated from it by a breaſt-work formed by digging peat, which makes an irregular though perpendicular line of low black boundary. It was the burſting of the moſs through this peat breaſt-work, over the plain between it and the Eſk, that occaſioned the dreadful inundation which deſtroyed ſo large a diſtrict. The more remarkable circumſtances relating to this calamitous event were theſe: On the 13th of November, 1771, in a dark tempeſtuous night, the inhabitants of the plain were alarmed with a dreadful craſh, which they could no way account for: many of them were then in the fields watching their cattle, leſt the Eſk, which was then riſing violently in the ſtorm, ſhould carry them off. In the mean time, the enormous maſs of fluid ſubſtance, which had burſt from the moſs, moved ſlowly on, ſpreading itſelf more and more, as it got poſſeſſion of the plain. Some of the inhabitants, through the terror of the night, could plainly diſcover it advancing like a moving hill. This was in fact the caſe; for the guſh of mud carried before it through the firſt two or three hundred yards of its courſe a part of the breaſt-work; which, though low, was yet ſeveral feet in perpendicular height; but it ſoon depoſited this ſolid maſs, and became a heavy fluid. One houſe after another it ſpread round, filled and cruſhed into ruin, juſt giving time to the terrified inhabitants to eſcape. Scarcely any thing was ſaved except their lives; nothing of their furniture, few of their cattle. Some people were even ſurpriſed in their beds, and had the additional diſtreſs of flying naked from the ruin. The morning light explained the cauſe of this amazing ſcene of terror, and ſhewed the calamity in its full extent: and yet, among all the conjectures of that dreadful night, the miſchief which really happened had never been ſuppoſed. Lands which in the evening would have let for twenty ſhillings an acre, in the morning were not worth ſixpence. On this well-cultivated plain twenty-eight families had their dwellings and little farms; every one of which, except perhaps a few who lived near the ſkirts of it, had the world totally to begin again. Who could have imagined, that a breaſt-work, which had ſtood for ages, ſhould at length give way? or that thoſe ſubterranean floods which had been bedded in darkneſs ſince the memory of man, ſhould have ever burſt from their black abode? This dreadful inundation, though the firſt ſhock of it was moſt tremendous, continued ſtill ſpreading for many weeks, till it covered the whole plain, an area of five hundred acres; and, like molten lead poured into a mould, filled all the hollows of it, lying in ſome parts thirty or forty feet deep, reducing the whole to one level ſurface." The plain that was covered with this Stygian torrent, has, however, ſince been reſtored to fertility by the exertions of a Yorkſhireman named Wilſon, whoſe ſelf-taught genius at once conceived a novel plan, and directed its execution.

This plan was ſimple and eaſily executed. Wilſon had two large reſervoirs formed in the higher grounds, filled them with water, and directed the whole body and force of it, firſt againſt a large knoll in front of Netherby houſe, and afterwards againſt the maſſes of accumulated moſs, all of which were progreſſively carried away into the channel of the river Eſk. Further particulars may be ſeen in Gilpin's work, already referred to. Pennant's Tour to Scotland.

The vicinity of Solway Moſs became celebrated from the defeat of the Scottiſh army under the command of Oliver Sinclair, in the reign of Henry VIII. The whole army was either taken or diſperſed; and a few fugitives are ſaid to have periſhed in the moſs, into which they had plunged to eſcape the ſword.

SOLYHULL. See SOLIHULL.

SOLYMA, in *Ancient Geography*, a name ſometimes given to *Jeruſalem;* which ſee.

SOLYMAN, in *Geography*. See SOLIMAN.

SOLYMANIA, a diſtrict of that portion of the pachalic of Bagdad beyond the Tigris, which comprehends almoſt the whole of ancient Aſſyria proper, and is now denominated the Lower Kurdiſtan; extending from Armenia and the territories of the chief of Julamerick to the diſtrict of Mendeli, which is its frontier, towards Kuziſtan or Chuſiſtan. Each of the eight diſtricts into which this province is divided has a ſeparate hakem, or governor; but he who reſides at Solymania rules over the greateſt portion of territory; and as he muſt, by birth, be a Kurd, he uſually aſſumes the title of paſha of Kurdiſtan. The town of "Solymania a Shehr e Zour," deſignated in the retreat of Heraclius by the appellation of Siazuros, is diſtant 18 leagues E. of Kerkook. It is the reſidence of Solyman, paſha of Kurdiſtan, a diſtinguiſhed warrior, who, in 1810, at the inſtigation of the Porte, took arms againſt his maſter, the paſha of Bagdad, whom he defeated and put to death. Shehr e Zour, having fallen into decay, was ſome years ago rebuilt by Solyman, paſha of Bagdad, and ſince that time has aſſumed his name. It is ſituated in a delightful country, cloſe to the foot of mount Zagros, and contains about 6000 inhabitants. Not far from Solymania was the city of Holwan, the retreat of Yezdejird, after the battle of Cadeſia, and to which the caliphs of Bagdad were accuſtomed to retire during the heats of ſummer. It was ruined by Holaku, and has never ſince recovered its conſequence.

SOLYME, in *Ancient Geography*, a town beyond Jordan, in the diſtrict of Gaulon. Joſephus.

SOLYMI, an ancient and venerable people, mentioned by Homer, and the poet Chœrilus, who ſpoke Phœnician, cut their hair round, and inhabited the Solymean mountains, near a large lake. Theſe marks, according to Joſephus and Tacitus, agree with the Jews, called Solymi, on account of their capital city Jeruſalem:—a nation remarkable for the ſingularity of their laws and of their actions, ſpeaking Phœnician or Hebrew, dwelling in a mountainous country near Jeruſalem, ſituated in the mountains and near the Aſphaltite lake. Theſe tokens, according to other learned men, do not deſignate Jews. Hence ſome think, that they were Moabites, or Midianites, bordering on the Aſphaltite lake, and reckoned among the Arabians, who cut their hair round in a circle. Others think that the Solymean mountains were in Piſidia, near Lycia; and that we muſt here ſeek the Solymi of Homer and Chœrilus.

SOMA, in *Commerce*, a corn meaſure at Bergamo in Italy, which is divided into 8 ſetari, and contains $4\frac{2}{3}$ buſhels, Engliſh meaſure. In the iſland of Corſica, it is a wine meaſure; the barile being = 2 ſome = 12 zucchi = 108 pinte = 432 quarti.

SOMA, in *Hindoo Mythology*, is the regent of the moon, being in India a male deity, like the Mona of the Saxons, and the Lunus among ſome of the nations who ſettled in Italy. The Hindoos have however a female moon, as the conſort of Soma or Chandra: ſhe is named Chandri, being, in their ſtyle of perſonification, the ſakti, or energy of her lord. (See SAKTI.) Chandra is a name as often uſed as Soma, perhaps oftener, and is the common name of the moon in ſeveral dialects of India. Chandri is ſometimes identified with the goddeſs Parvati, conſort of Siva, and in pictures of that god ſhe is often ſeen in the form of a creſcent ornamenting his head; he is thence named Chandraſekra, or moon-crowned. In the Hindoo theogonies, Soma is ſtated to be the ſon of a Riſhi named Atri, ſon of Brahma: and Boodh, or Mercury, is the ſon of Chandra; Boodh, or Budha, was married to Ila, daughter of the ſeventh Menu, named Satyavrata. Soma is ſometimes ſaid to be the ſon of Surya, or the ſun, having ſprung from a ray of that glorious luminary. According to another legend, it was a flaſh of light from the eye of Atri that impregnated a goddeſs, who is found to be a perſonification of the via lactea, or ſpace, who thence bore Soma. So that the Hindoo Soma is both huſband, wife, and offspring of the ſun. See ILA.

Soma is often invoked in the religious ceremonies of the Brahmans, and receives a ſhare in the offerings with which ſuch ceremonies often are accompanied. He is ſometimes ſtyled lord of plants, eſpecially of medicinal plants. We may notice here, as connected with ſome ſuppoſed coincidences in Iriſh and Indian mythology, that *Som* in the former is the deity preſiding over plants, the ſame as in India; for the Sanſcrit has merely a grammatical termination: the names are radically alike. (See SURYA and TRIVENI). One very myſterious vegetable is peculiarly ſacred to the Hindoo Soma: it is called *Somalata*. Soma, like the moon of weſtern mythologiſts, preſides in India over Monday, which day is called Somvar in many dialects. See ZODIAC.

The lunar deity of the Eaſt is uſually pourtrayed in a car drawn by a pied antelope, his head encircled by a ſilver creſcent, and ſometimes with a rabbit on his banner. He is commonly ſeen four-handed, ſometimes holding a lotos, a club, a diſcus, and ſhell, the uſual attributes of Viſhnu; though he ſeems in a greater degree connected with *Siva*, which ſee. He is alſo frequently ſeen with Chandra's emblem, the antelope, in his hand, which emblem is called Saſin. (See SASIN.) A creſcent on his forehead, and on the foreheads of his conſort and offspring, is alſo a Sivean family diſtinction. The idea of a male and female moon has given birth to many poetical fancies and allegories. Iſa and Iſi, under their names of Chandra and Chandri, undergo ſeveral ſexual and other metamorphoſes. Chandra, or Deus Lunus, is the moon when in oppoſition to the ſun; and Chandri, or Dea Luna, when in conjunction.

In the ſol-lunar legends of the Hindoos, the ſun is, as we have ſhewn, ſometimes male, ſometimes female; and both wife and huſband of Lunus and Luna, under their ſeveral names of Surya, Savitri, Chandra and Chandri.

Chandri, who concealing herſelf in Somagiri, or the mountain of the moon, was there viſited by Surya, the ſun; from which conjunction aroſe a numerous family called Pulinda. See ILA and ROHINI.

The Hindoos have a fable that the moon is a vaſe of nectar, and draw many pleaſing figures from this poetical ſource: hence nectar-beaming is an epithet or name of Soma. (See SASIN.) Other names or titles of Soma are Himanſu, Indu, Saganka, Saſanka, and Suſhumna. A ſimilar idea of deriving ambroſia, or inſpiration from the moon, is traceable in the poetics of Greece. The Hindoos call this immortal beverage *Umrita;* which ſee.

Images of Chandra are not often ſeen. He has been noticed among the ſculptures in the cavern temple on Elephanta, and pictures of him are not rare. He is repreſented young and handſome; and it is very common for poets, both Hindoo and Mahometan, to compare their miſtreſſes to the full moon; this is perhaps common to almoſt all nations.

In Hindoo hiſtories and theogonies, mention is made of numerous races, offspring of the ſun and moon, and ſeverally called Suryavanſa and Chandra-vanſa. (See SURYAVANSA.) It is common in works of antiquity to ſee it noticed whether the heroes be of the ſolar or lunar race, but ſuch diſtinctions are little regarded in modern times. Auſterities are common to Hindoo devotees, in expiation of offences, or as ſecurity from evil. (See TAPAS.) One ſpecies of it is named Chandrayana, or the lunar penance. It conſiſts in the ſinner or devotee "eating for a whole month no more than thrice eighty mouthfuls of wild grains, as he happen to meet with them, keeping his organs in ſubjection." The reward, according to Menu, is attaining the ſame abode as the regent of the moon; and it abſolves a Brahman from the ſin of ſlaughtering a thouſand ſmall animals which have bones, or of boneleſs animals as many as will fill a cart: and it is alſo the expiation for killing a Sudra, an individual of the fourth or ſervile claſs. See SUDRA.

SOMADEVA, a name of the Hindoo regent of the moon, who is called alſo Chandra, Soma, and by ſeveral other names. (See the preceding article.) It is likewiſe the poetical appellation of a celebrated Indian writer, mention of whom is briefly made under the article TRIVENI.

SOMAINPOUR, in *Geography*, a town of Hindooſtan, in the circar of Gohud; 25 miles S.E. of Calpy.

SOMAISSON, a town of Hindooſtan, in Myſore; 22 miles W. of Bangalore.

SOMALATA, in *Botany*, is the Sanſcrit name of the aſclepias acida, or cynanchum viminale, of our ſyſtems; a vegetable highly venerated by the Hindoos. The name means *moon-plant:* it is ſacred to Soma, or the moon, and is of ſuch profound and myſterious alluſion, that none but Brahmans may preſume to taſte its juice. It is gathered, expreſſed, and drank, with many ſuperſtitious ceremonies; and alluſions to it are frequent in the writings of the Hindoos, who are ſaid to conſider it as typical of the umrita or ambroſia, obtained in ſo poetical a manner by the gods, and quaffed by them as the beverage of immortality. (See UMRITA.) "O thou who quaff the invigorating juice of the ſomalata," is an invocation to Brahmans, met with in Sanſcrit books; a farther examination of which would perhaps lead to a ſurmiſe, if not to a concluſion, that the myſteries connected with this holy vegetable in India are nearly ſimilar to thoſe related of our druids with their myſterious miſtletoe. It is noticed under the article SOMA, that the Hindoos believe the moon to have great influence on vegetation in general, eſpecially on the ſomalata, or moon-plant, of which he is the particular lord; as well as generally of all vegetables.

SOMALPET, in *Geography*, a town of Hindooſtan, in Berar; 55 miles N.N.E. of Mahur.

SOMANAPILLY, a town of Hindooſtan, in Myſore; 18 miles S. of Bangalore.

SOMANOOR, a town of Hindooſtan, in Coimbetore; 15 miles N.E. of Coimbetore.

SOMASQUO, *Fathers of*. See FATHERS.

SOMBAR, in *Geography*, a town of Perſia, in the province of Irak; 114 miles S.W. of Hamadan.

SOMBERNON, a town of France, in the department of the Cote d'Or, and chief place of a canton, in the diſtrict of Dijon; 13 miles W. of Dijon. The place contains 755, and the canton 7770 inhabitants, on a territory of 235 kiliometres, in 28 communes.

SOMBOR, a town of Auſtrian Poland, in Galicia; 6 miles W. of Halicz.

SOMBRERA, a ſmall iſland in the Weſt Indies, about 13 miles N. of Anguilla, dependent on Barbuda. N. lat. 18° 40′. W. long. 63° 25′.

SOMBRERE CHANNEL, a channel between the Nicobar iſlands. N. lat. 7° 32′ to 7° 50′. E. long. 94°.

SOMBRERETE, a town of Mexico, in the province of Zacatecas; 55 miles N. of Zacatecas. N. lat. 23° 40′. W. long. 4° 2′.

SOMBRERO, a river of Africa, which runs into the Atlantic, N. lat. 4° 40′. E. long. 5° 52′.—Alſo, a rock in the ſea of Mindoro. N. lat. 10° 49′. E. long. 121° 27′.

SOM-CHAN, a town of Chineſe Tartary. N. lat. 41° 2′. E. long. 120° 42′.

SOMEBODY KNOWS WHAT, a name given to the extremity of the arm of Duſky bay, which captain Cook calls "Nobody knows what." This name was given by captain Vancouver, who examined and found two inlets, or at leaſt a large branch, divided by a ridge of land through its whole length.

SOMEER, a town of Hindooſtan, in the circar of Gohud; 10 miles S.E. of Lahaar.

SOMEGILL, a river of Wales, which runs into the Lug below Preſteign, in Radnorſhire.

SOMENSHAR, a town of Little Bucharia; 15 miles N.W. of Hami.

SOMERA, a town of Sweden, in Tavaſtland; 33 miles S.W. of Tavaſthus.

SOMERFELT, a town of Pruſſia, in Oberland, W. of Liebſtadt.

SOMERGEM, or SOMMERGEM, a town of France, in the department of the Scheldt, and chief place of a canton, in the diſtrict of Gand or Ghent; 9 miles N.W. of Ghent. The place contains 6221, and the canton 18,800 inhabitants, on a territory of 125 kiliometres, in 7 communes.

SOMERS, John, *Lord*, in *Biography*, a diſtinguiſhed lawyer and ſtateſman, born at Worceſter, in 1652, was the ſon of a reſpectable attorney of that city. He received his early education at the public ſchool of his native city; and, at a proper age, he was entered a gentleman-commoner of Trinity college, Oxford. He quitted the univerſity without a degree, but he had attained a good taſte for polite literature, and being deſtined by his father for the legal profeſſion, he ſpent ſome time as a clerk to ſir Francis Winnington, an eminent lawyer, after which he removed to the Middle Temple. When called to the bar, he diſplayed thoſe talents which enſured his arriving at profeſſional diſtinction: at the ſame time, though extremely diligent in his legal ſtudies, he did not abandon his claſſical purſuits, but tranſlated the hiſtory of the life of Alcibiades, and Ovid's Epiſtle of Ariadne to Theſeus.

He was an ardent friend of liberty, and in the latter part of the reign of Charles II. he wrote ſome political tracts; which, though they appeared without his name, were aſcertained to be from his pen.

A piece entitled "The Security of Engliſhmen's Lives; or the Truſt, Power, and Duty of the Grand Juries of England, explained according to the Fundamentals of the Engliſh Government," was attributed to him by Mr. Walpole, and is thought to be the ſame with one alluded to by biſhop Burnet, written in conſequence of the grand juries return of *ignoramus* to the bill againſt lord Shafteſbury. He was moreover the reputed author of "A brief Hiſtory of the Succeſſion of the Crown of England, collected out of the Records," the object of which was to prove the right of parliament to regulate the deſcent of the crown, with the view of ſupporting the intended excluſion of the duke of York, on account of his religion. In 1681 he took part in publiſhing "A juſt and modeſt Vindication of the Proceedings of the two laſt Parliaments," originally written by Algernon Sidney, but new-modelled by him. He was counſel, in 1683, for the ſheriffs of London, and for other perſons who were proſecuted for a riot in the city at the election of ſheriffs. After the acceſſion of James II. he continued the firm oppoſer of the arbitrary meaſures of the court, and obtained great credit as one of the counſel for the ſeven biſhops. He moſt heartily concurred in the event of the revolution, and was one of the confidential adviſers of the meaſure for bringing over the prince of Orange. He ſat as repreſentative of his native city in the convention-parliament, and was appointed one of the managers for the houſe of commons, in the conference held with the lords concerning the word *abdicate*, and his acute and ſenſible obſervations on the ſubject were greatly admired. In 1689 he was knighted, and made ſolicitor-general, and while he held that high poſt, delivered a ſpirited and ſeaſonable ſpeech in favour of the act of convention for recognizing William and Mary, the legality of which had been called in queſtion by a member of the houſe of commons. In 1692, the office of attorney-general was conferred upon him, and in the following year that of lord-keeper of the great ſeal. When advanced to the bench, his behaviour was that of an able and upright magiſtrate, whoſe love of juſtice was tempered with ſingular mildneſs and condeſcenſion. At the ſame time he was in the higheſt credit with the ſovereign, and he made uſe of his influence to ſerve perſons of merit. He was a patron to Mr. Addiſon, and obtained for him an allowance to enable him to make that tour in Italy, of which he has printed an account. In 1695 he was advanced to the lord chancellorſhip of England, and was raiſed to the peerage by the title of lord Somers, baron Eveſham. At the ſame time he obtained certain grants from the crown, a circumſtance which has drawn upon him ſome cenſure; though, without this addition, his advancement to the peerage would have been a puniſhment inſtead of reward, inaſmuch as it would have been impoſſible for him to have maintained his rank in the peerage.

Lord Somers was now regarded as the head of the Whigs, and it was his aim to moderate the heat and jealouſy of that party, and conciliate to it both the king and nation; hence it has been averred that he was too compliant in ſome points to the royal pleaſure; which, however, did not prevent his being made a ſacrifice when the Tories came into power. His acquieſcence in the firſt partition treaty in 1699, with other miniſterial meaſures, produced great complaints againſt him in parliament, and an addreſs was moved in the houſe of commons, praying the king that lord Somers might for ever be removed from his majeſty's preſence and council. This motion was, however, defeated by a large majority; but the king, ſoon after, to quiet the diſcontents, deſired him voluntarily to reſign his ſeals. This he refuſed; and he was accordingly diſmiſſed from his office. In 1701 the houſe of commons ſent up to the lords an impeachment of lord Somers, which, however, was diſmiſſed by the peers, and the proſecution was not reſumed. Very ſhortly after this the king died, and the new reign not being favourable to the principles of lord Somers, he ſpent his time in literary retirement, and during this period of leiſure he was elected preſident of the Royal Society. He was not, however, inattentive to public concerns, and vigorouſly oppoſed the bill brought into parliament by the high church party, to prevent occaſional conformity. In 1706 he drew up a plan for effecting an union between England and Scotland, which was ſo much approved, that queen Anne nominated him one of the managers for carrying that meaſure into execution. He is alſo ſaid to have had a conſiderable ſhare in the bill of regency, by which the Proteſtant ſucceſſion to the crown was extended and ſecured. Upon a change of miniſtry in 1708, lord Somers was nominated to the poſt of preſident of the council, from which he was diſmiſſed in 1710; and though he continued for ſome time to take an active part in the buſineſs of the houſe of peers, it was not very long before a decline in the ſtate of his health and faculties rendered him unfit for public buſineſs. He died in 1716, at the age of 64. The memory of lord Somers is ſtill held in high veneration by the friends of conſtitutional liberty; to the eſtabliſhment of which, by means of the revolution and Proteſtant ſucceſſion, no individual contributed more than he. His abilities were very conſiderable, his manners highly ingratiating, and, notwithſtanding the oppoſition which he had occaſionally to encounter, few ſtateſmen have paſſed through life with a purer character. He made a large collection of ſcarce and curious pamphlets, of which there has been publiſhed a ſelection in four parts, each conſiſting of four volumes, 4to. His collection of original papers and letters was unfortunately deſtroyed by a fire, which happened in the chambers of the Hon. Charles Yorke, on the 27th of Jan. 1752. Biog. Brit.

Somers, in *Geography*, a townſhip of America, in Connecticut, and county of Tolland, containing 1210 inhabitants; 24 miles N.E. of Hartford.—Alſo, a poſt-townſhip of New York, on the N. line of Weſt Cheſter county, 50 miles N. of New York, and 120 from Albany; bounded N. by Ducheſs county, E. by North Salem and South Salem, S. by Bedford and New-Caſtle, and W. by York or Yorktown. Its name, which was formerly Stephentown, was changed in 1808.

1808. Here are four grain-mills, five or ſix ſaw-mills, two fulling-mills, a paper-mill, and ſeveral fine ſcites ſtill unoccupied. The ſoil of this townſhip is generally very good, and adapted to produce a great variety of agricultural products. Here are alſo a printing eſtabliſhment, that iſſues a weekly paper, the poſt-office, and a ſmall collection of houſes. This village is the principal market of lean ſtock of cattle and ſheep, brought hither from diſtant parts of the country, for the ſupply of the ſales of fattened cattle and ſheep to the butchers of New York. The farmers of this country carry on an extenſive traffic in this way, and droves are annually and almoſt conſtantly arriving from the inland regions, at the diſtance of 100, 200, and even 300 miles, to replace the conſumption. The whole population conſiſts of 1782 perſons.—Alſo, a townſhip of Prebble county, in the ſtate of Ohio, containing 719 inhabitants.

Somers *Iſlands*. See Bermudas.

SOMERSDORF, a town of Germany, in the margraviate of Anſpach; 5 miles S. of Anſpach.

SOMERSET, *Duke of*, in *Biography*, according to Kircher (tom. i. lib. vi. p. 486.) and Printz, in his Germ. Hiſt. Muſ. invented in 1649 a new ſpecies of violin, with eight ſtrings; which contained all the moſt excellent ſecrets of muſic, and raviſhed every hearer.

Somerset, in *Geography*, a well-cultivated county of New Jerſey, in America, on the N. ſide of the great road from New York to Philadelphia. The ſoil, eſpecially on Rariton river and its branches, is good, and produces good crops of wheat, of which great quantities are annually exported. It is divided into ſeven townſhips, and contains 14,728 inhabitants, including 1968 ſlaves. The capital of the above county is ſituated on the W. ſide of Millſtone river, and contains a court-houſe, gaol, and about 20 houſes; 13 miles N. of New Brunſwick.

Somerset, a county of Maryland, bounded E. by the ſtate of Delaware and Worceſter county, and W. by the waters of Cheſapeak bay. It contains 17,195 inhabitants, including 6975 ſlaves. Waſhington Academy, in this county, was inſtituted by law in 1779: it was founded and is ſupported by voluntary ſubſcriptions and donations, and is authoriſed to receive gifts and legacies, and to hold 2000 acres of land.

Somerset, a county of Pennſylvania, bounded N. by Huntingdon, and S. by Alleghany county, in Maryland; it is divided into 15 townſhips, and contains 11,284 inhabitants.

Somerset, a townſhip of the above county, containing 1548 inhabitants; and alſo a borough, containing 489 inhabitants.

Somerset, a county of the ſtate of Maine, containing 12,910 inhabitants.—Alſo, a townſhip of Waſhington county, in Pennſylvania, containing 1500 inhabitants.—Alſo, a townſhip of Windham county, in Vermont, containing 199 inhabitants; 10 or 12 miles N.E. of Bennington.

Somerset, or *Sommerſett*, a poſt-town of Briſtol county, in Maſſachuſetts, on Taunton river; incorporated in 1790, and containing 1199 inhabitants; 49 miles S.E. of Boſton.

SOMERSETSHIRE, one of the maritime counties of England, is ſituated in the ſouth-weſtern part of the kingdom, and is bounded by the Briſtol Channel and Glouceſterſhire on the north, by Wiltſhire on the eaſt, by Devonſhire on the ſouth-weſt, and by Dorſetſhire on the ſouth-eaſt. It is of an oblong form, and extends in length from north-eaſt to ſouth-weſt about 80 miles, and in breadth, in an oppoſite direction, about 36 miles; the circumference is ſomething more than 200 miles, and the ſuperficial contents about one million of acres.

Ancient Inhabitants, and hiſtorical Events.—This diſtrict, as well as its borders, is ſaid to have been, in early times, inhabited by the Belgæ, a people of Celtic origin, who migrated hither from Gaul about three centuries prior to the Chriſtian era. They are deſcribed as having eſtabliſhed colonies, cultivated lands, and inſtructed ſuch of the natives as choſe to aſſociate with them in the arts of induſtry. Their dominion was greatly extended about 250 years after their firſt ſettlement, when Divitiacus, king of the Sueſſones, brought over from the continent a conſiderable number of their countrymen. To appeaſe the hoſtilities which had ſubſiſted between theſe ſettlers and the native inhabitants, a treaty was now concluded, and a line or boundary made, to determine their reſpective territories. This line was perpetuated by a large and deep foſſe, called, from the circumſtances of its origin, Wanſdike; parts of which are ſtill conſpicuous in Wiltſhire, &c. It is ſaid to commence near Andover, in Hampſhire, and terminate at the Severn ſea, at Portiſhead, in this county; being an extent of about 80 miles. On Marlborough Downs this ſingular dike appears nearly in its priſtine ſtate, being exceedingly deep, and flanked by a lofty mound, or rampart, on its ſouth ſide. According to this demarcation, the Belgæ occupied a great part of this county: and of their chief cities, Ivelcheſter, Bath, and Wincheſter, the two former are within its limits. Their contentions with the people, whoſe poſſeſſions they had uſurped, laſted till the arrival of the Romans in Britain, when the oppreſſors, in their turn, became the oppreſſed. The Cangi, a tribe of thoſe Belgæ who migrated hither under Divitiacus, were nearly annihilated by the Romans, nine years after their invaſion. Many remains within this diſtrict bear teſtimony to the characteriſtic activity of the Romans, in eſtabliſhing ſtations, marking out camps, and founding colonies. Beſides their cities of Aquæ Solis or Bath, and Iſcalis or Ilcheſter, there are many places which, though their ancient names are loſt, bear evident marks of a Roman origin, in the foundation of walls, and in various remains that have from time to time been diſcovered. Their principal road through this county was the Foſſe, which extended from Bath, in a ſouth-weſterly direction, to Perry-ſtreet, on the confines of Devonſhire. In a direction nearly parallel to it another road paſſed from the foreſt of Exmoor, through Taunton, Bridgewater, and Axbridge, to Portiſhead; whence there was a trajectus acroſs the Briſtol Channel, to the city of Iſca Silurum, now Caerleon. A third road, called Via Julia, extended from Bath to Briſtol and the Severn; and a fourth communicated from the former ſtation to Portiſhead. Upwards of twenty-three Roman encampments are enumerated in this county. During the dominion of the Romans, it formed part of the province of Britannia Prima. On the decline of their power, and their evacuation of the country, in the fifth century, it became ſubject to the Saxons, who incorporated it with their kingdom of Weſſex. It is noted as being one of the diſtricts in which the Chriſtian doctrines were propagated at an early period; and, according to ancient authors, king Ina, who began his reign over the Weſt Saxons in 688, built a college at Wells. His ſucceſſor, Kenulph, converted it into an epiſcopal ſee, and built the celebrated abbey of Glaſtonbury. But in thoſe obſcure and barbarous times, the progreſs of Chriſtianity was neceſſarily ſlow and uncertain; for it was not only oppoſed by ſuperſtition, but thwarted by ſanguinary wars. The incurſions of the Danes kept the country in a ſtate of continual alarm, and threatened its total ſubjugation. In the reign of Alfred, they deſolated almoſt every province of Britain, and at length carried their ravages into the counties of Somerſet, Wilts, and Hants; which had hitherto remained ſafe againſt their encroachments. The young king was conſtrained to relinquiſh his throne, and to preſerve himſelf by diſguiſe and concealment. He retired to an obſcure part of this county, and lived in the houſe of a neatherd. During his reſidence here an incident occurred, which, though trivial in itſelf, has been thought ſufficiently intereſting to be recorded in hiſtory, and has been given in this work under ALFRED. At the general diviſion of the kingdom into ſhires and hundreds, this province retained the name of Somerſetſhire, which the Saxons had given it; and which was probably derived from Somerton, at that time the chief town.

In the Saxon times, this county was ſubject to certain officiary earls, who had authority to try and decide cauſes, and puniſh malefactors, within their juriſdiction. The firſt earl of Somerſet was a warlike chief, named Hun, who attended king Egbert in his war with Beornulf, king of Mercia, and was ſlain in the battle of Ellendune, A.D. 823. At the period of the Norman conqueſt, when the Saxon nobles were, for the moſt part, deprived of their honours and eſtates, this county was beſtowed on ſeveral chiefs who aſſiſted William in his enterpriſe, either with troops or money. In this diſtribution, ſir William Mohun obtained by far the greateſt ſhare; for, beſides the caſtle of Dunſter, he held ſixty-one lordſhips, and had forty-ſeven knights in his retinue. He likewiſe received the title of earl of Somerſet, which devolved on his deſcendant, ſir Reginald de Mohun. In the ſanguinary conteſts between the houſes of York and Lancaſter, the inhabitants of Somerſetſhire were particularly active in behalf of the latter; in conſequence of which, it is ſaid, that after Henry VII. was advanced to the throne, he encouraged and patronized the erection of ſome ſplendid towers and churches in this county. During the civil war in the reign of Charles I., Somerſetſhire had its full ſhare of diſſention and calamity. Various ſkirmiſhes were fought, but no general engagement took place, except one at Lanſdown, near Bath, between the parliament's army, under ſir William Waller, and the king's forces, under the marquis of Hertford. In this action, out of two thouſand horſe the marquis loſt fifteen hundred, by a regiment of cuiraſſiers, commanded by ſir Arthur Hazlerig, which was ſo completely armed, that they were called the regiment of lobſters. The marquis, however, drove ſir William from his poſt, and compelled him to retire into Bath. Somerſetſhire was alſo the principal theatre of the rebellion of the duke of Monmouth, in 1685.

Surface, Marſhes, Soil, &c.—The ſea-coaſt of Somerſetſhire is very irregular, in ſome places projecting into lofty and rocky promontories, and in others receding into fine bays, with flat and level ſhores. From Stert-Point northward the coaſt is flat, and compoſed of vaſt ſand-banks repelling the inundation of the ſea, which, in ancient times, waſhed over theſe ſhoals, and flowed up into the country, covering with its waters that extenſive tract of land, now called Brent-Marſh. The ſea, after its general retirement, however, frequently overflowed theſe parts; and it was found neceſſary, for the ſecurity of the country, to eſtabliſh a commiſſion of ſewers, the members of which were required to examine the ſea-banks, ditches, gutters, and ſewers, connected with the ſea, and order the requiſite cleanſings and reparations. The firſt commiſſion of this kind upon record, was in 1304; and ſimilar offices are extended to this day. For fertility of ſoil and general produce, this county ſtands eminently high in reputation. The plains are remarkable for their luxuriant herbage, which furniſhes not only a ſufficiency for home conſumption, but alſo a conſiderable ſurplus for other markets. London, Briſtol, Saliſbury, and other cities and towns of the kingdom, are annually ſupplied from Somerſetſhire, with fat oxen, ſheep, and hogs, together with cyder, cheeſe, butter, and many other articles in great abundance. Nor are the hills deficient in arable productions; yet the vicinity of the Briſtol Channel, which fills the air with watery vapours unfavourable to the ripening of corn, particularly in the weſtern parts, induces a preference of grazing and dairy huſbandry; and, in conſequence, vaſt quantities of grain are purchaſed from the adjacent counties of Wilts and Dorſet, to the amount of at leaſt one hundred thouſand quarters annually. The ſurface of the inland parts is varied by lofty hills, rich level plains, and aſpiring woods. The principal hills are the Quantock, between Taunton and the Briſtol Channel; Brendon, near Quantock; Poulden, near Bridgewater; Mendip, between Frome and the coaſt; Broadfield-Down, between Briſtol and Wrington; Leigh-Down, in the hundred of Portherry; Dundry, near Briſtol; Lanſdown, near Bath; White-Down, near Chard; and Black-Down, on the borders of Devonſhire. The reſpective ſoils of theſe may be thus ſtated: Quantock, a thin variable ſoil, covering a looſe ſhelly rock, interſperſed with occaſional limeſtone; Poulden, a ſtrong ſurface, covering a bed of clay or marle; Mendip, Broadfield, and Leigh-Down, a gravelly loam on a limeſtone rock; Lanſdown, a thin ſoil on a freeſtone grit; White-Down, variable; Black-Down, a thin ſurface of black earth on a bed of ſand or gravel. Almoſt every ſpecies of ſoil (chalk excepted, of which there is only a ſmall portion in the eaſtern diviſion) may be found in different parts of the county, and of a quality highly fertile and productive.

Foreſts and Moors.—The ancient foreſts of Somerſetſhire were, Selwood, near Frome; Mendip, between Frome and the Briſtol Channel; Exmoor, between the port of Watchet and the north-weſt part of Devonſhire; but moſt of theſe formerly wooded tracts of country are now deprived of their ancient timber-trees, and incloſed. The principal moors are, King's-Sedgemoor, near Bridgewater; Eaſt-Sedgemoor, between Wells and Glaſtonbury; Weſt-Sedgemoor, between Taunton and Langport; North-moor and Stan-moor, near the iſle of Athelney; Common-moor, near Langport; Weſt-moor, Curry and Hay-moor, near North-Curry; King's-moor, between Ilcheſter and Somerton; Ile-moor, on the river Ivel; Brent-Marſh, on the rivers Brue and Ax; Weſton-moor, near Uphill; Banwell and Smeath-moors, near Churchill; Kenn-moor, near Yatton; Nailſea-moor, north of Kenn; Clapton-moor, between Clapton and Wirton. Of theſe, many have been incloſed, drained, and improved within the courſe of the laſt forty years.

Minerals, &c.—This county produces lead, copper, iron, lapis calaminaris, manganeſe, coal, limeſtone, paving-ſtone, tiling-ſtone, freeſtone, fullers'-earth, marle, and ochre. The Mendip hills are noted for their mines, particularly of lead and lapis calaminaris. The former ſeem nearly exhauſted, or at leaſt the deep working is ſo incumbered with water, that little can be done, and in all probability millions in value may remain concealed in the bowels of this mountain. In times paſt many thouſand pounds have been paid to the ſee of Wells for the lord's ſhare (that is one-tenth) of the lead dug on the foreſt within the pariſh of Wells only.

Coal is abundant in the north-eaſtern part of the county. In the northern collieries, the ſtrata of coal form an inclination in the plane of about nine inches in the yard. In thickneſs, it varies from ten inches to upwards of three feet: if leſs than fifteen inches they are ſeldom worked. Coal is now working generally from ſeventy to eighty fathom in depth: in a few places deeper; and by the late introduction of machinery to raiſe it by the ſteam-engine, a much greater depth of working will be obtained. The coal is of prime quality; pure and durable in burning; firm, large, and of a ſtrong grain; which enſures its conveyance to almoſt any diſtance, without injury to its appearance or quality, which cannot be exceeded in any part of the kingdom. Bath is the principal market for ſale and place of conſumption; to which may be added, the weſtern parts of Wiltſhire, and the next adjacent parts of Somerſetſhire. The quantity raiſed is from fifteen hundred to two thouſand tons weekly: a much greater can be ſupplied, if an increaſed demand requires it. Men and boys, to the number of fifteen hundred, are employed in the workings, with wages ſufficiently adequate for a comfortable ſubſiſtence. The owners of the freehold whence the coal is raiſed generally receive an eighth of the groſs receipt of ſale. The average price of coal is five-pence *per* buſhel at the pit, nine gallon meaſure. The collieries in the ſouthern part of this diſtrict are on a more limited ſcale: the ſtrata of coal form an inclination of the plane from eighteen to thirty inches in the yard; in ſome the plane is annihilated, and the ſhafts deſcend in a perpendicular direction. The ſouth-weſtern parts of Wiltſhire, the northern diſtrict of Dorſetſhire, and the eaſt and ſouthern parts of Somerſetſhire, are the markets for conſumption. The quantity raiſed is from eight hundred to a thouſand tons weekly, and capable of extenſion. Men and boys are employed to the amount of from five to ſix hundred. Average price three-pence three farthings *per* buſhel. At Clapton, a village to the north-weſt of Leigh-Down, is a coal-work, which poſſeſſes the advantage of a land level of forty-four fathoms: about two hundred and forty buſhels are landed daily. The beſt coal is ſold at three-pence halfpenny *per* buſhel, and the ſmall is ſhipped at Portiſhead for Wales, where it is uſed for burning lime.

Rivers and Canals.—The principal rivers are the Avon, Ax, Brue, Parret, Yow, Cale, Chew, Tone, Frome, Ivel, Ex, and Barl. Of theſe, four only are navigable, *viz.* the Avon, from Bath to Briſtol, 16 miles; the Brue, from the Briſtol Channel to Highbridge, two miles; the Parret, from Stert-Point to Langport, about 20 miles; and the Tone, from Taunton to Boroughbridge, eight miles. The chief canals are, the Somerſetſhire coal canal, which has two branches, one commencing at Paulton, the other at Radſtock, and both communicating with that of the Kennet and Avon; the Dorſet and Somerſet canal, commencing near Nettlebridge, and extending to Frome and thence to the county of Dorſet; the Ilcheſter canal; the Grand Weſtern canal, extending 35 miles from Taunton into Dorſetſhire. For a particular account of theſe, ſee CANAL, in a former volume of this work.

Climate, &c.—Mr. Billingſley, who in the year 1795 drew up a general view of the agriculture of this county, divides it into three diſtricts, the north-eaſt, the middle, and the ſouth-weſt. The firſt comprehending the tract between the ports of Uphill and Kingroad on the weſt, and the towns of Bath and Frome on the eaſt; the ſecond embracing that portion which is bounded by the Mendip hills on the north, Bridgewater-bay on the weſt, and the town of Chard on the ſouth; the third occupying the remainder of the county. The north-eaſt diſtrict being very irregular in ſurface, and intermixed with lofty hills and rich fertile plains, the climate is in conſequence exceedingly varied. On the weſtern ſide, including the hundred of Winter-Stoke and Portbury, the ſoil is, for the moſt part, a deep and rich mixture of clay and ſand; being originally a depoſit by the ſea, which, in ancient times, flowed up a conſiderable way into that part of the country. Theſe moor-lands, as they are called, are ſubject to frequent inundation; and ſometimes in rainy ſeaſons are covered with water for four or five ſucceſſive months. The middle diſtrict of the county, which is the largeſt, poſſeſſes a climate, for the moſt part, mild and temperate; but on ſo varied a ſurface that uniformity of ſoil cannot be expected.

The ſouth-weſt diſtrict has nearly an equal portion of rough mountainous country, and rich fertile ſlopes and plains. The climate, particularly of that part which is called the Vale of Taunton-Dean, is peculiarly mild and ſerene, and the ſoil highly fertile and productive: and the eye is agreeably relieved by a judicious mixture of arable and paſture lands. There are, however, certain parts north-weſt of the vale which are mountainous, and ſubject to that mutability of weather, and moiſture of air, generally found on elevated ſituations.

Civil and Eccleſiaſtical Diviſions.—Somerſetſhire is divided into forty-three hundreds, and ſeven liberties. It contains two cities, Bath and Wells, with a part of Briſtol, ſeven boroughs, twenty-two market-towns, one biſhopric, three archdeaconries, thirteen deaneries, and four hundred and eighty-two pariſhes. Of the three archdeaconries, that of Bath contains two deaneries, Wells ſeven, and Taunton four.

Church Hiſtory.—Although the inhabitants of this county, as has been obſerved, embraced Chriſtianity in the ſeventh century, the eccleſiaſtical hiſtory commences only with the inſtallation of Athelm, a monk of Glaſtonbury, to the ſee of Wells, in the reign of Edward the Elder, in the early part of the tenth century. During this reign, pope Formoſus, for ſome unknown reaſon, excommunicated the whole kingdom, which continued under this ſentence ſeven years, by which ſeveral ſees were vacant; at length, the degraded monarch called a ſynod to conſider the ſtate of the church, and ſent archbiſhop Plegmund to procure the removal of the interdict, and have new biſhops confirmed. Having ſucceeded in his miſſion, ſeven biſhops were conſecrated in one day, among whom was Athelm, above-mentioned.

Political Economy.—Somerſetſhire is ſtated to contain 991,360 acres of land; of which 330,000 are arable, 534,500 paſture, 126,860 of commons, heaths, woods, waſtes, roads, &c. The population, according to the return to parliament in the year 1811, amounted to 303,180, of which 141,449 were males, 161,731 females; 23,732 families being ſtated to be employed in trade and manufactures, and 27,472 families chiefly in agriculture. The number of houſes were 54,787. The repreſentatives in parliament are, for the county, two; Bath, two; Bridgewater, two; Ilcheſter, two; Melborne-Port, two; Minehead, two; Taunton, two; Wells, two: in the whole ſixteen members. The county is included in the weſtern circuit; it is in the province of Canterbury; and in the dioceſe of Bath and Wells.—"The Hiſtory and Antiquities of the County of Somerſet," by Edm. Rack and the Rev. John Collinſon, 3 vols. 4to. 1791. "General View of the Agriculture of the County of Somerſet, by John Billingſley, eſq." 8vo. 1798.

SOMERSHAM, a conſiderable village and pariſh in the hundred of Hurſtingtone, and county of Huntingdon, England, is ſituated 6 miles diſtant from St. Ives, and 68 miles N. from London. It principally conſiſts of one ſtreet, about three-quarters of a mile in length from E. to W.; with a ſecond, but much ſhorter ſtreet, croſſing the former at right angles. The church is a ſpacious ſtructure, and conſiſts of a nave, chancel, and aiſles, with a ſubſtantial embattled tower at the weſt end. Near the church-yard is a free ſchool, with a large ſchool-houſe recently built, 54 feet in length. The rich rectory of Somerſham is annexed to the Regius profeſſorſhip of divinity at Cambridge, and now held by the venerable biſhop of Llandaff. Weever ſays, "William Weller (or Wolfere), parſon of Somerſham, was maſter of the rolls, ſerving Edward III. in the chancery, fortie years and more." The biſhops of Ely had formerly a palace here: the ſcite is now partly built on; but the adjacent grounds ſtill retain veſtiges of their ancient appropriation. The population of Somerſham, according to the return to parliament in the year 1811, was 1032; the number of houſes 152. A mineral ſpring was diſcovered here by the late Dr. Layard, who publiſhed a ſmall treatiſe concerning it in 1759, and whoſe experiments, with thoſe of Dr. Morris, on its waters, were printed in the fifty-ſixth volume of the Philoſophical Tranſactions: its virtues are now but little noticed.

About the year 1731, near the road leading from Somerſham to Chatteris, in a piece of fen-land belonging to William Thompſon, eſq. the plough turned up and broke a ſmall urn, containing ſeveral Roman coins: and Mr. Thompſon and the Rev. Mr. Ramſey, digging near the ſpot, found another, which contained about ſixty coins, moſtly copper, and of the late emperors. Camden's Britannia, by Gough, vol. ii. Beauties of England and Wales, vol. vii. by E. W. Brayley.

SOMERSWORTH, a townſhip of America, in Strafford county, New Hampſhire, taken from Dover, and incorporated in 1754, containing 878 inhabitants.

SOMERTON, a ſmall market-town in the hundred of the ſame name, Somerſetſhire, England, is ſituated near the centre of the county, to which it is ſaid to have originally given name, and is 125 miles W.S.W. from London. Somerton is ſaid to have been a Roman citadel: but we have no authentic account of it previous to the Heptarchy, when it appears to have been a town of conſiderable extent, and ſtrongly fortified. It was at one time a royal reſidence. Ina, and ſeveral other Weſt Saxon kings, held their courts here. In the year 877 it was plundered and laid waſte by the Danes, under the conduct of Inguar and Ubba; but was rebuilt, and recovered its importance, both for population and ſtrength. John, king of France, was confined in the caſtle of Somerton, after his removal from that of Hertford. In the time of Leland this caſtle was converted into a priſon: a part of the town-wall and a round tower ſtill remain, but in a very ruinous condition. The town now conſiſts principally of five ſtreets: it is governed by a bailiff and conſtables, elected annually by the inhabitants: a weekly market is held on Tueſdays, and four fairs annually. The church is an ancient ſtructure, conſiſting of a nave, chancel, and ſide-aiſles: at the ſouth end is an octangular embattled tower, 63 feet high. Near the church is an excellent free-ſchool; and a well-endowed alms-houſe for eight poor women. In the centre of the town is a hall for holding the petty ſeſſions. Adjoining to the town is the tything of Lower Somerton, or Somerton Erleigh; and about a mile eaſtward is the tything of Hurco: both are included in the pariſh; which, according to the population return of the year 1811, contained 338 houſes, and 1478 inhabitants. Collinſon's Hiſtory of Somerſetſhire, vol. iii.

SOMERVILLE, WILLIAM, in *Biography*, ſon of Robert Somerville, was born at his father's houſe at Edſton, in Warwickſhire. He was educated at Wincheſter ſchool, from which he was elected to New college, Oxford. Here he made a good proficiency in claſſical literature, and cultivated a talent for poetry. His firſt piece, as far as is known to the public, was an ode to the duke of Marlborough, on his diſmiſſion from his poſts in 1710. He was ſtrongly attached to the Whig party; and when Addiſon purchaſed an eſtate in Warwickſhire, Somerville addreſſed a poem to him, which includes the following couplet, alluding to the papers in the ſeveral volumes of the Spectator, to which are annexed the letters C, L, I, O.

"When panting virtue her laſt efforts made
You brought your CLIO to the Virgin's aid."

Mr. Somerville inherited a conſiderable paternal eſtate, on which he chiefly lived, acting as a magiſtrate, and purſuing with vigour the amuſements of a ſportſman, varied by the ſtudies of a man of letters. He was courteous and hoſpitable, but too much addicted to conviviality, and careleſs of economy. His mode of living threw him into embarraſſments, which ſo preyed on his mind, that for the ſake of relief, he fell into habits that ſhortened his life. He died in 1742, which Shenſtone thus notices to a friend and correſpondent.

"Our old friend Somerville is dead! I did not imagine I could have been ſo ſorry as I find myſelf on this occaſion. I can excuſe all his foibles, impute them to age and to diſtreſs of circumſtances: the laſt of theſe conſiderations wrings my very ſoul to think on. For a man of high ſpirit, conſcious of having, at leaſt in one production, generally pleaſed the world, to be plagued and threatened by wretches that are low in every ſenſe; to be forced to drink himſelf into pains of body, in order to get rid of pains of the mind, is a miſery."

Somerville is chiefly known, as a poet, by his piece entitled "The Chace," which is written in blank verſe, and which maintains a high rank in the didactic and deſcriptive claſs. It has the advantage of being compoſed by one who was perfectly acquainted with the ſports which are its ſubject, and who entered into them with all the enthuſiaſm which they are calculated to inſpire; hence his pictures, in exactneſs and animation, greatly excel the draughts of the ſame kind, attempted by poets by profeſſion. Its language is free and nervous, and its verſification generally denotes a nice and practiſed ear. He has another piece connected with this in ſubject; it is entitled "Field Sports," though it only deſcribes that of hawking. His "Hobbinol, or Rural Games," is a kind of mock heroic, in which the burleſque is managed with tolerable ſucceſs. Of his other pieces, ſerious and comic, there are few that can be ſaid to add to his fame; but they make a part of the collection of Britiſh Poets.

SOMEVOIRE, in *Geography*, a town of France, in the department of the Upper Marne; 15 miles S. of St. Dizier.

SOMGHETIA, a province in the principality of Georgia, W. of Teflis.

SOMINO, a town of Africa, in Bambarra, on the Niger. N. lat. 13° 11'. W. long. 4° 48'.

SOMLYO, a town of Hungary; 29 miles S. of Zatmar.

SOMMA, a town of Naples, in Lavora, near which are annually produced between 7000 and 8000 pounds of ſilk of the beſt quality; 10 miles E. of Naples.—Alſo, a town of Italy, in the department of the Olona; 24 miles N.W. of Milan.—Alſo, a town of the Popedom, in Umbria; 4 miles S. of Spoleto.

SOMMARIVA *del Boſco*, a town of France, in the department of the Tanaro; 5 miles S.E. of Carmagnola.

SOMMARIVA *di Perao*, a town of France, in the department of the Tanaro; 7 miles E.S.E. of Carmagnola.

SOMMARNAS, a town of Sweden, in the province of Tavaſtland; 35 miles S.S.W. of Tavaſthus.

SOMME, a river of France, which riſes near Fonſomme, in the department of the Aiſne, paſſes by or near to St. Quentin, Ham, Peronne, Bray, Corbie, Amiens, Pequigny, Abbeville, St. Valery, &c. and runs into the Engliſh Channel, about 5 miles W.N.W. of St. Valery.

SOMME, one of the eleven departments of the northern region of France, compoſed of Amienois, Ponthieu, Vimeux, and Santerre, between Calais and Oiſe, in N. lat. 49° 45′, and bounded on the N. by the department of the Straits of Calais, on the E. by the department of the Aiſne, on the S. by the department of the Oiſe, and on the W. by that of the Lower Seine, and the Engliſh Channel. Its territorial extent is 6512½ kiliometres, or in French leagues 34 in length, and 16 in breadth. It is divided into 5 circles or diſtricts, 41 cantons, and 848 communes. The circles are Abbeville, containing 114,060 inhabitants; Doullans, with 45,627; Peronne, with 91,470; Montdidier, with 62,668; and Amiens, with 151,209 inhabitants: the whole population being 465,034. According to M. Haſſenfratz, it is divided into 5 circles and 72 cantons; and its population conſiſts of 381,760 perſons. The capital is Amiens. In the year 11 of the French era, the amount of its contributions was 5,650,664 fr., and its expences and charges 395,027 fr. 69 cents. This department is fertile in grain, fruits, hemp, flax, and paſtures, and has ſome foreſts.

SOMMEIL, in *French Muſic*, an invocation to ſleep; an old French movement of the lullaby kind, much in favour during the time of Merſennus; and continued in uſe, according to Blainville, in the reign of Louis XIV., when operas were firſt attempted at Paris.

SOMMERDA, or SOMMERN, in *Geography*, a town of Saxony, in the territory of Erfurt; 11 miles N.N.E. of Erfurt.

SOMMERDYCK, or SOMMELSDYKE, or *Zomerdyck*, a town of Holland, and chief town of the iſland of Overflakee; 20 miles W.S.W. of Dort.

SOMMEREUX, a town of France, in the department of the Oiſe; 3 miles N.E. of Grandvilliers.

SOMMERFELD, a town of the New Mark of Brandenburg; 15 miles S. of Croſſen.

SOMMERGEM. See SOMERGEM.

SOMMERO, a ſmall iſland in the gulf of Finland. N. lat. 60° 8′. E. long. 24° 36′.

SOMMERSET. See SOMERSET.

SOMMERSHAUSEN, a town of Germany, in the lordſhip of Speckfeld, on the Maine; 4 miles S. of Wurzburg. N. lat. 49° 45′. E. long. 10° 3′.

SOMMIER, Fr. the wind-cheſt, or ſound-board of an organ. See SOUND-BOARD.

SOMMIERES, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Gard; 12 miles S.W. of Niſmes. N. lat. 43° 47′. E. long. 4° 11′.

SOMMITE, in *Mineralogy*, *Nepheline*, Haüy, a mineral which occurs in ſmall cryſtals and cryſtalline grains, in the lava on the ſides of mount Somma, a part of Veſuvius. The form of the cryſtal is a ſix-ſided priſm; the colour is greyiſh or greeniſh-white: the angles are ſufficiently hard to ſcratch glaſs. The cryſtals are lamellar on the faces of the priſm, but conchoidal, with a vitreous luſtre, in the direction perpendicular to the axis of the cryſtal. It melts with difficulty before the blow-pipe, into a tranſparent homogeneous glaſs. Its ſpecific gravity is 3.3. According to Vauquelin, ſommite contains

Silex - - - -	46
Alumine - - -	49
Lime - - - -	2
Oxyd of iron - -	1

This mineral covers the cavities of lava, and is accompanied with hornblende, mica, and veſuvian.

SOMNAMBULISM, in *Medicine*, from *ſomnus*, *ſleep*, and *ambulo*, *I walk*; ſometimes alſo called *noctambuliſm*, or *night-walking*; is a ſingular condition of the body, in which a perſon performs many voluntary actions, implying a certain degree of perception of the preſence of external objects, but without conſciouſneſs while the actions are performed, and without recollection of them when the conſciouſneſs returns.

This affection, as its name implies, is commonly conſidered as an imperfect degree of ſleep; as it moſt frequently occurs after ſleep, and ſeems to be but a more active exertion of volition than that which takes place in imperfect ſleep, when we move, and even talk, and ſupport ourſelves in different poſtures. "There are many caſes," ſays Mr. Stewart, "in which ſleep ſeems to be partial; that is, when the mind loſes its influence over ſome powers, and retains it over others. In the caſe of the *ſomnambuli*, it retains its power over the limbs, but it poſſeſſes no influence over its own thoughts, and ſcarcely any over the body; excepting thoſe particular members of it which are employed in walking." (See his Elements of the Philoſophy of the Human Mind, chap. 5, part i. § 5.) The ſubject is very obſcure, in conſequence perhaps of the rarity of theſe caſes, which have not been ſufficiently examined, ſince the phyſiology of the mind was rationally inveſtigated. Dr. Cleghorn, however, in his excellent theſis "De Somno" (Edin. 1783), pointed out ſome circumſtances which diſtinguiſh this condition from ſleep; and Dr. Darwin has more recently conſidered it as belonging to *reverie*, and not to ſleep, or as approximating rather to epilepſy or catalepſy, than to mere dreaming, or night-mare, to which it has alſo been referred.

Some of the moſt remarkable and beſt authenticated caſes of ſomnambuliſm on record ſeem to favour this view of the ſubject. The older authors, Horſt, Sennert, Schenck, Henry ab Heers, Willis, and many others, have related caſes of ſomnambuliſm, in which various actions were unconſciouſly performed, ſuch as opening doors and windows, croſſing bridges, even walking on the tops of houſes, and up precipitous paths, climbing to take a rook's neſt, and various other feats. It is ſaid, that if any ſenſation is excited ſufficiently ſtrong to awaken the ſomnambuli, they experience great ſurprize and terror, ſometimes fall in ſyncope, and have no recollection of what has paſſed during the paroxyſm. The eſſence of the diſeaſe, however, as Dr. Darwin obſerves, ſeems to "conſiſt in the inaptitude of the mind to attend to external ſtimuli;" and they are not eaſily awakened. One of the caſes moſt fully inveſtigated, and reported to the Phyſical Society of Lauſanne, while it exhibits the peculiarities of the malady, ſeems to prove that a ſlight and brief impreſſion is actually made upon the ſenſes, which excites afterwards ſo powerful a conception, or is ſo ſtrongly fixed in the imagination, that the volition continues to direct the actions as accurately as if the impreſſions on the ſenſes were repeated; which is alſo the character of reverie.

The ſomnambuliſt, in the caſe alluded to, was a lad thirteen years and a half old, of a good conſtitution, but of great ſenſibility and irritability, and very variable ſpirits.

His proceedings were watched by a committee of gentlemen, who reported the reſult to the ſociety above-mentioned. His ſleep was at all times unquiet, but the walking did not occur every night; ſometimes ſeveral weeks paſt, during which he was free from it. The paroxyſm commonly began about three or four o'clock in the morning, and the longeſt of them laſted from three to four hours. It was preceded by motions in every part of the body, with ſtarting and palpitations: he then uttered broken words, and ſometimes ſat up in his bed, and afterwards lay down again. Then he began to pronounce words more diſtinctly, roſe abruptly, and acted according to the inſtigation of his imagination. When he came out of the paroxyſm, he did not recollect any of the actions he had been performing. It was dangerous, however, to awaken him during the continuance of it, eſpecially if it were done ſuddenly; for he ſometimes fell into convulſions. "Having riſen one night with the intention of going to eat grapes, he left the houſe, paſſed through the town, and went to a vineyard, where he expected good cheer. He was followed by ſeveral perſons, who kept at ſome diſtance from him, one of whom fired a piſtol, the noiſe of which inſtantly awakened him, and he fell down without ſenſe. He was carried home and brought to himſelf, when he recollected very well having been awakened in the vineyard, but nothing more, except the fright at being found in the vineyard alone, which had made him ſwoon."

The following ſtatements ſhew how the impreſſions of external objects on the ſenſes mingled with his reverie, as in the caſe of ordinary dreams. See DREAMS.

"Once he was obſerved dreſſing himſelf in perfect darkneſs. His clothes were on a large table, mixed with thoſe of ſome other perſons; he immediately perceived this, and complained of it much: at laſt a ſmall light was brought, and then he dreſſed himſelf with ſufficient preciſion. While his imagination was employed on various ſubjects, he heard a clock ſtrike, which repeated at every ſtroke the note of the cuckoo. 'There are cuckoos here,' ſaid he; and, upon being deſired, he imitated the ſong of that bird immediately." Again, the reporters ſay, "If he is teazed, or gently pinched, he is always ſenſible of it (unleſs he is at the time ſtrongly impreſſed with ſome other thing), and wiſhes to ſtrike the offender: however, he never attacks the perſon who has done the ill, but an ideal being, whom his imagination preſents to him, and whom he purſues through the chamber without running againſt the furniture, nor can the perſons whom he meets in his way divert him from the purſuit."

Other facts, which the reporters record, impreſſed them with a belief that the ſleep-walker was capable of receiving certain impreſſions through the medium of the ſenſes, when they accorded with the images which his imagination was occupied in forming; but that this faculty was predominant, and only admitted thoſe perceptions which, on the principles of aſſociation, mingled with the reverie. They inferred, too, that he was obliged to open his eyes, in order to recognize objects; but that the impreſſion, once made, although rapidly, was vivid enough to ſuperſede the neceſſity of opening them again; that is, the ſame objects appeared to be afterwards repreſented by the conceptions of his imagination, with as much force and preciſion, as if he actually ſaw them. In the effort to open his eyes, however, when he wiſhed to ſee an object, he could ſcarcely raiſe them a line or two, by drawing up his brows; and the iris appeared fixed, and the eye dim. He made this effort whenever any thing was preſented to him, and he was told of it, always half opening his eyes with great difficulty, and then ſhutting them after he had taken what was offered.

"Having engaged him to write a theme," the committee obſerve, "we ſaw him light a candle, take pen, ink, and paper from the drawer of his table, and begin to write, while his maſter dictated. As he was writing, we put a thick paper before his eyes, notwithſtanding which he continued to write, and to form his letters very diſtinctly; ſhewing ſigns, however, that ſomething incommoded him, which apparently proceeded from the obſtruction which the paper gave to his reſpiration, being held too near his noſe."

"An experiment was made by changing the place of the ink-ſtandiſh, while Devaud was writing. He had a light beſide him, and had certified himſelf of the place where his inkholder was ſtanding by means of ſight. From that time he continued to take ink with preciſion, without being obliged to open his eyes again: but the ink-ſtandiſh being removed, his hand returned as uſual to the place where he thought it was. It muſt be obſerved, that the motion of his hand was rapid, till it reached the height of the ſtandiſh, and then he moved it ſlowly, till the pen gently touched the table, as he was ſeeking for the ink. He then perceived that a trick had been put upon him, and complained of it: he went in ſearch of his ink-ſtandiſh, and put it in its place."

This experiment, they affirm, was ſeveral times repeated, and was always attended with the ſame circumſtances. And they put the following queſtions reſpecting the inferences to be drawn from it. "Does not what we have here ſtated prove, that the ſtandiſh, the paper, the table, &c. are painted on his imagination in as lively a manner as if he really ſaw them; ſince he ſought the real ſtandiſh in the place where his imagination told him it ought to have been? Does it not prove that the ſame lively imagination is the cauſe of the moſt ſingular actions of this ſleep-walker? And, laſtly, does it not prove that a mere glance of his eye is ſufficient to make his impreſſions as lively as durable?"

Theſe concluſions appear to be legitimate; and the facts ſeem to ſhew how much more completely this condition of the ſomnambuliſt is allied to *reverie*, than to *ſleep*, though commonly commencing from the latter. From the ſlighteſt degree of abſence, or *brown* ſtudy, as it is popularly called, in which the conceptions of the imagination, upon ſubjects that intereſt the individual, are ſo vivid as to exclude for a time the perceptions excited by ſurrounding objects, up to this complete ſomnambuliſm, various degrees of the abſtraction from external impreſſions may be traced. Moſt perſons, perhaps, have been ſenſible, at times, when any ſubject of ſevere ſtudy, or any great gratification, anxiety, or diſtreſs ſtrongly occupied their minds, how great the diſpoſition to this abſtraction has been. If engaged in reading, they have purſued every line with the eye, turned over leaf after leaf, and at length awoke from the reverie which had occupied the imagination, and found that not the ſmalleſt impreſſion had been made on the mind by the pages which the eye had peruſed, and the hand had turned over. If walking in a crowded ſtreet, they have probably proceeded ſome way under the influence of reverie, moving the limbs as uſual, directing the walking-ſtick, and performing other unconſcious but voluntary acts, winding ſafely among the paſſing people, avoiding the poſts and other obſtacles, but ſo excluſively occupied by the conceptions of the mind, as to be totally inſenſible of all theſe actions of their own volition, and of the objects which they have paſſed, and which neceſſarily impreſs their ſenſes ſo as to regulate thoſe acts. From this ſtate of the faculties in reverie, which we have ſo often experienced in ourſelves,

ſelves, and obſerved in others, as to ſuppoſe that the truth of the foregoing ſtatement will be readily admitted, that condition of them which conſtitutes ſomnambuliſm ſeems to differ principally in two circumſtances, *viz.* in commencing commonly in a diſturbed ſleep, and in requiring a ſtronger impreſſion upon the ſenſes to break the chain of mental conception; ſo that the lighter impreſſions only mingle with and modify the conceptions, according to the principle of aſſociation. The following ſingular example of the ſomnambuliſtic reverie is well authenticated, and is related of an amiable and diſtinguiſhed poet. We quote it from the life of that writer in Anderſon's edition of the poets, vol. xi.

"Dr. Blacklock, one day, haraſſed by the cenſures of the populace, whereby not only his reputation, but his very ſubſiſtence was endangered, and fatigued with mental exertion, fell aſleep after dinner. Some hours after, he was viſited by a friend, anſwered his ſalutation, roſe, and went with him into the dining-room, where ſome of his companions were met. He joined with two of them in a concert, ſinging, as uſual, with taſte and elegance, without miſſing a note, or forgetting a word. He then went to ſupper, and drank a glaſs or two of wine. His friends, however, obſerved him to be a little abſent and inattentive: by and by he began to ſpeak to himſelf, but in ſo ſlow and confuſed a manner, as to be unintelligible. At laſt, being more forcibly rouſed, he awoke with a certain ſtart, unconſcious of all that had happened; as till then he had continued faſt aſleep."

Thoſe who wiſh to inveſtigate this curious ſubject farther, may conſult the old writers mentioned in the beginning of this article; alſo Hoffmann's Diſſertatio de Somnambuliſmo, in the third volume of the ſupplement to his works; the French Encyclopédie, article *Somnambuliſme;* Darwin's Zoonomia, vol. i. ſect. xix; Cleghorn de Somno, &c.

SOMNER, William, in *Biography*, an able antiquary, was born at Canterbury in the year 1606. He received a good common education, after which he was taken as clerk by his father, who was regiſter of the court of Canterbury. He was afterwards promoted by archbiſhop Laud to an office in the eccleſiaſtical court of that dioceſe, which naturally engaged him in the ſtudy of national antiquities. To purſue this to advantage, he applied with great diligence to the Saxon tongue, and having made himſelf maſter of that language, he drew up copious notes, and a gloſſary, to ſir Roger Twiſden's publication of the laws of Henry I. The antiquities of his own country engaged his particular attention, and he compoſed "A Treatiſe of the Roman Poſts and Forts in Kent," left by himſelf in MS. but which was printed at Oxford in 1693; and "A Treatiſe on Gavelkind," completed in 1647, and publiſhed in 1660. He alſo wrote "A Diſcourſe of Portus Iccius," which was afterwards tranſlated into Latin by biſhop Gibſon, and publiſhed with ſome other tracts. Having ſtudied all the kindred dialects to the Saxon, he wrote obſervations on ſome old German words, collected by Lipſius, which were publiſhed by Meric Caſaubon, and he drew up the Gloſſary annexed to the ten writers of Engliſh hiſtory, publiſhed by Twiſden. This gloſſary being a key to recluſe and antiquated words, improved whatever of this nature had been done before. It is, indeed, a work of that extent as may ſerve as a key to all other hiſtorians, and to all records: "nevertheleſs," ſays the writer of the life in the Biographia Britannica, "it might be greatly improved from our author's ſubſequent collections, which remain in the archives of Canterbury; from Junius's "Etymologicum Anglicanum;" and from Dr. Wilkin's Gloſſary, at the end of his edition of the Saxon laws. Mr. Somner aſſiſted Dugdale in compiling the "Monaſticon." In 1659 he publiſhed a Saxon dictionary, in folio, which has been ſtyled the true and laſting monument of his praiſe; a work of incredible labour to himſelf, and of ſingular benefit to the world. The previous aſſiſtance of the like kind which came into Mr. Somner's hands were, 1. Ælfric's Gloſſary, tranſcribed by Fr. Junius, from a very ancient copy in the library of ſir Peter Paul Rubens, of Bruſſels; 2. The two ancient gloſſaries in the Cotton library; 3. Nowell's Saxon Vocabulary; 4. Joceline's Collections. From theſe and ſome other Saxon books then extant, Mr. Somner made immenſe collections, in two large volumes, for the compiling his dictionary. When it was finiſhed, he ſent it to Oxford, where it was printed, and it came out in the year already mentioned. During the compoſition of this dictionary, he was chiefly ſupported by the ſalary ſettled on the Saxon lecture, founded by ſir Henry Spelman. Somner being a zealous royaliſt, he was arreſted and impriſoned on account of the Kentiſh petition for a free parliament, in the ſame year that his dictionary was publiſhed; but was liberated on the reſtoration, and promoted to the maſterſhip of St. John's hoſpital, in Canterbury. He died in 1669, and his books and manuſcripts were purchaſed by the dean and chapter of Canterbury, and depoſited in the cathedral library. Biog. Brit.

SOMNIFEROUS. See Soporiferous.

SOMNOLENTUM Coma. See Coma.

SOMNUS, in *Mythology*. See Sleep.

SOMORROSTROW, in *Geography*, a town of Spain, in the province of Biſcay, ſituated on a bay of the Atlantic; which, according to the opinion of baron Dillon, has all the appearance of being alluvial. Some of the workmen, as he ſays, aſſured him that they have often found broken pieces of pick-axes, mattocks, and other inſtruments, in places that had been worked centuries ago, and are now replete with new ore. Hence he infers that the mine increaſes. The ore is ſaid to form an uninterrupted ſtratum, whoſe thickneſs varies from three to ten feet, and is covered with a coat of whitiſh calcareous rock, from two to ſix feet thick. Every one is at liberty to dig at pleaſure, and tranſport it by land or water, without being ſubject to duties or any formalities. It is generally allowed, that no iron in Europe is ſo eaſy to fuſe, or ſo ſoft, as that of Somorroſtrow. When the ore is firſt taken out of this mine, it has the colour of bull's blood; and when wetted becomes purple. Great quantities are carried away by water to the neighbouring provinces, where they fuſe it by itſelf, or mix it with ore of their own, which generally yields a harder iron. According to appearance, a quintal of ore will produce about 35 lbs. of good iron, and the reſidue about 30 lbs. of ſlag and dead earth. 13 miles N.W. of Bilbao. N. lat. 43° 19′. W. long. 3° 7′.

SOMOSIERRA, a town of Spain, in New Caſtile; 8 miles N. of Buytrago.

SOMOVNIA, a town of European Turkey, in Bulgaria; 10 miles W. of Nicopoli.

SOMPIL, a town of Thibet; 45 miles E.S.E. of Pa.

SOMPUINS, or Sompy, a town of France, in the department of the Marne, and chief place of a canton, in the diſtrict of Vitry-ſur-Marne; 18 miles N.W. of Menehould. The place contains 645, and the canton 4745 inhabitants, on a territory of 382½ kiliometres, in 16 communes.

SOMSDORF, a town of Saxony, in the circle of Erzgebirg; 10 miles S. of Freyberg.

SON, a relative term, applied to a male child, conſidered in the relation he bears to his parents. See Child and Parent.

The children of the king of England are called *ſons* and *daughters* of *England.* The eldeſt ſon is born duke of Cornwall, and created prince of Wales. The younger ſons are called *cadets.*

The king of France's children were anciently called *fils* and *filles de France, ſons* and *daughters of France;* and the grand-children, *petits fils* and *petits filles de France.* At a later period, the daughters were called *meſdames;* and the grand-daughters *meſdemoiſelles de France.*

Son, *Natural.* See Bastard.

Son, *Adoptive.* See Adoptive.

Son *of God,* is a term uſed in various ſenſes in the holy ſcripture, as, 1. For Jeſus Chriſt, or the Saviour of mankind; who is thus called, as ſome ſay, with reſpect to the manner of his generation, as being begotten of the Father.

This ſeems to have been the opinion of Dr. Clark, in his "Scripture Doctrine of the Trinity." Generation, ſays he, when applied to God, is but a figurative word, ſignifying only, in general, immediate derivation of being and life from God himſelf: and "only begotten" ſignifies being ſo derived from the Father, in a ſingular and inconceivable manner, as thereby to be diſtinguiſhed from all other beings. Among men, a ſon does not, properly ſpeaking, derive his being from his father; father, in this ſenſe, ſignifying merely an inſtrumental, not an efficient, cauſe: but God, when he is ſtyled father, muſt neceſſarily be underſtood to be (*αιτια*) a true and proper cauſe, really and efficiently giving life. This conſideration, he ſays, clearly removes the argument uſually drawn from the equality between a father and ſon upon earth. It is obſervable, as our author proceeds, that St. John, in that paſſage, where he not only ſpeaks of the Word before his incarnation, but carries his account of him farther back than any other place in the whole New Teſtament, gives not the leaſt hint of the metaphyſical manner how he derived his being from the Father; does not ſay, he was created, or emitted, or begotten, or was an emanation from him, but only that he *was,* that he *was in the beginning,* that he *was with God,* and that he was (Θεος) partaker of divine power and glory with and from the Father, not only before he was *made fleſh* or *became man,* but alſo *before the world was.* As the ſcripture, ſays Dr. Clark, has no where diſtinctly declared in what particular metaphyſical manner the Son derives his being from the Father, men ought not to preſume to be able to define.

Some ſuppoſe, that this title of "ſon of God" belongs to Chriſt, on account of his poſſeſſing the ſame divine nature with the Father. Accordingly biſhop Pearſon ſays, the communication of the divine eſſence by the Father was the true and proper generation, by which he hath begotten a ſon. A ſon is nothing but another produced by his father, of the ſame nature with him. But God the Father hath communicated to the Word the ſame divine eſſence, by which he is God; and he ſays, the Father hath the eſſence or attributes of himſelf, and the Son by communication from the Father. But Dr. Waterland denies any literal generation of the ſon at all; for he ſuppoſes his being in the Father, before he was generated, to be the firſt and moſt proper filiation or generation; which he allows to be a mere co-exiſtence with the Father, and not any derivation from him.

Whilſt the Athanaſians believed the Father and Son to be of the ſame ſubſtance, *i. e.* of the ſame *generical* ſubſtance, as two men are of the ſame ſubſtance; and the Pſeudo-Athanaſians believed them to be of the ſame identical *numerical* ſubſtance; the Arians, who believed the divine ſubſtance of the Father to be αγεννητος, unbegotten, and αναρχος, without beginning, concluded, that it was different from the ſubſtance of the Son, who was begotten, and had a beginning. Moreover, as they believed the divine ſubſtance of the Father to be indiviſible and uncompounded, they could not believe the Son to be generated in or from it, in any *literal* ſenſe, either as being compounded with it, or divided from it; and, therefore, they concluded, that the generation of the Son was *figurative,* and was not a participation of ſubſtance, but a creation; as the word creation is frequently uſed in ſcripture with regard to mankind. They believed that Chriſt was the only begotten Son of God, becauſe he only was created by the immediate act and power of God himſelf, and that all other beings, the Holy Ghoſt not excepted, were created by Chriſt; in which they agreed with Origen and Euſebius; and, therefore, they called him a creature, but not like other creatures; but they believed that he was generated or created before all ages.

Sonſhip, ſays Dr. Lardner, in his "Letter on the Logos," (Works, vol. x. vol. xi.) is a term of nearneſs, dearneſs, and affection; and Jeſus is the Son of God, 1ſt, upon account of his miraculous conception and birth (Luke, i. 31—35); 2dly, upon account of the eſpecial commiſſion given him by the Father, and the extraordinary qualifications beſtowed upon him, in order to his fulfilling it (Matt. iii. 16. Mark, i. 10. Luke, iii. 21, 22. John, i. 32—34. iii. 34. Iſ. xi. 1—3. xlii. 1—4. lxi. 1—3. and Matt. xii. 17. Luke, iv. 18, 19.); 3dly, on account of his reſurrection from the dead on the third day, to die no more (Rom. i. 3, 4. Heb. i. 6.); 4thly, on account of his exaltation to God's right hand, and being inveſted with authority and dominion over all fleſh, and conſtituted judge of the world, by whom God will paſs ſentence upon all mankind (John, iii. 35. v. 21, 22. Heb. i. 1, 2. iii. 5, 6.); 5thly, on account of the pouring out of abundance of ſpiritual gifts, though in different degrees, upon his apoſtles, and thoſe who believed in him after his reſurrection (John, i. 32—34. Matt. iii. 1. Mark, i. 8. Luke, iii. 16. John, vii. 37—39. Acts, xi. 15, 16. i. 5. ii. 1—36. Gal. iv. 6. Eph. ix. 8—13.) Upon all theſe accounts, and not only upon account of his miraculous conception and birth, is Jeſus "the Son of God." Our author ſuggeſts, that the paſſages which he has cited manifeſtly ſhew, that it is in reſpect to his humanity, and the dignity conferred upon it, that he has the title of the Son of God. This learned author rejects the opinion of thoſe who underſtand by the "Son of God," an intelligent being or emanation, begotten by the Father, or proceeding from him, in an ineffable manner, from all eternity, and of the ſame eſſence or ſubſtance with the Father; and alſo of others, who underſtand by this appellation a mighty ſpirit, or angel, begotten or formed by the will of the Father, in time, before the creation of the world, and of a different ſubſtance from the Father; which ſon of God, as they ſay, became incarnate, that is, united himſelf, either to the human nature, conſiſting of ſoul and body, or to an human body, ſo as to ſupply the place of a human ſoul. Theſe ſenſes of the title, as he ſays, are not to be found in any of the books of the New Teſtament. The Jews, according to Whitby upon Rom. ix. 5. had no notion that their Meſſiah ſhould be any thing more than mere man. See alſo Jortin's Diſcourſes concerning the Chriſtian Religion, p. 17. In the goſpels, as Dr. Lardner obſerves, this title of the "Son of God" is given to our Lord, by many who took him to be a man ſpecially favoured by God. (Matt. xvi. 16. and the parallel places. John, vi. 69. John, i. 34. iii. 35, 36. John, i. 49. xi. 27. Matt. xiv. 33. Luke, iv. 41.) Our bleſſed Lord likewiſe often takes it to himſelf, either directly or indirectly. (John, iii. 17, 18, v. 25. ix. 35—37. x. 36. xi. 4.) In the Jewiſh ſtyle, and the language of ſcripture, all good men, and all people who are in a covenant relation to God, are his ſons, and as ſuch entitled to many privileges and bleſſings; but Jeſus, as the Meſſiah, is "the Son of God," by way of eminence and diſtinction, and has in all things the pre-eminence. Accordingly, the Chriſt, or the Meſſiah, and the "Son of God," are equivalent in the New Teſtament. (Matt. xvi. 16. John, vi. 69. Mark, viii. 19. Luke, ix. 20.) And that, in the language of the Jews, the titles of Meſſiah and Son of God are the ſame, may be ſeen in Matt. xxvi. 63. and Luke, xxii. 66. 70. John, i. 34—49.

2. Several creatures are alſo called "ſons of God," not as being ſo by nature and generation, but on divers other accounts. Thus, the angels are called ſons of God by Job, in reſpect to their creation, adoption, &c. And great men are called ſons of God in the Pſalms, as being his lieutenants, or the depoſitories of his authority. Good men, and particularly the eminently pious, as we have clearly ſhewn, are alſo called ſons of God, in various places of the ſacred writings.

Son *of Man*, is frequently uſed, in ſcripture, to ſignify man; as expreſſing not only the nature of man, but his frailty.

The expreſſion is very uſual among the Hebrews and Chaldeans: Daniel, Ezekiel, and Jeſus Chriſt, are particularly thus called; the firſt once, and the two latter frequently.

Some think, that the "ſon of man," when uſed by our Saviour, denotes his high dignity, or a man of diſtinction and eminence, and is equivalent to Meſſiah, or the Chriſt; and he thus intends to ſignify, that he is the great perſon ſpoken of by the prophets, who was to come for the benefit of mankind. (See Dan. vii. 13, 14. Matt. xxvi. 63, 64. Mark, xiv. 61, 62.) Againſt this ſenſe Dr. Lardner has ſuggeſted ſome exceptions: and he obſerves, that man, and ſon of man, with the Hebrews, often denote a man of low condition. (Pſ. xlix. 1, 2. Pſ. cxliv. 3.) Our Lord, therefore, by this phraſe or character, might repreſent that humbling of himſelf, which is ſpoken of by the apoſtle in the ſecond chapter to the Philippians, and is the ſame with what is ſaid in Iſ. liii. 3. "he is deſpiſed, and rejected of men," or is one of the loweſt and meaneſt of men. Our Lord adopts this character in ſpeaking of himſelf, in order to undeceive the Jews, and correct their falſe opinion concerning the kingdom of the Meſſiah; and to intimate, that he was not to arrive at glory, and the full poſſeſſion of his kingdom, but through ſufferings and humiliations. If ſon of man, then, be equivalent to Meſſiah, it is not uſed, as our author conceives, to denote his dignity, as the firſt and greateſt of men, but rather to ſignify his humble form and low condition, in which he then lived; and is expreſſive of the ſcorn and contempt which were caſt upon him, and in which he acquieſced.

Dr. Lardner further intimates, agreeably to his own opinion of the perſon of Chriſt, that he frequently makes uſe of this expreſſion to denote his real humanity, and alſo that he was not made and created as Adam, but was a man born even of a woman. He adds alſo, that our Lord might aſſume this character as a modeſt way of ſpeaking. Eminent and diſtinguiſhed perſons, who have many occaſions to ſpeak of themſelves, eſpecially if it be to their advantage, decline the too frequent uſe of the phraſes *I* and *me*, and chooſe to ſpeak in the third perſon, as of another, diſtinct from themſelves. Works, vol. x.

Sometimes the phraſe ſon of man is alſo uſed for the wicked and reprobate; in contradiſtinction to thoſe called ſons of God.

Son, Fr., a muſical ſound.

Son *Fondamental.* See Fundamental.

Son *Fix*, Fr., a fixed and unalterable ſound. To acquire ſuch a ſound, we muſt be certain that it will be the ſame at all times, and in all places. To be ſure of this, it is not ſufficient to have a pipe of a certain length or diameter in the fixed place; for though the pipe may always remain in the ſame ſtate, the weight of the air will not always remain the ſame: the ſound will become more grave or acute, as the air becomes more denſe or rarefied. For the ſame reaſon, the ſound of the ſame pipe will change with the column of the atmoſphere, in proportion as this pipe ſhall be carried high or low, in the mountains or in the villages.

Secondly, this ſame pipe, of whatever materials it is made, will be ſubject to the variations which heat and cold occaſion in all bodies. A pipe or ſtring, if of metal, will lengthen or ſhorten; and its tone will be higher or lower, in proportion. If the pipe be of wood, it will ſwell or ſhrink, expand or contract; and from theſe cauſes combined, ariſes the difficulty of acquiring a fixed tone, and almoſt the impoſſibility of being ſure of the ſame ſound in two places at the ſame time, or twice in the ſame place.

Son, or *Sun-Plant*, the *crotalaria juncea* of Linnæus, in *Botany*, is cultivated in every part of Hindooſtan with great aſſiduity, and applied to various uſes. The ſeeds reduced to powder, and mixed with oil, form a kind of unguent, which the black ladies apply to their hair, in order to make it grow. The bark of this plant furniſhes all kinds of rope, packing-cloths, nets, &c.; and from theſe, when old, moſt of the paper in that country is prepared. For this purpoſe they cut them into ſmall pieces, macerate them in water for about five days, waſh them in water, and then throw them into a veſſel of water ſtrongly impregnated with a lixivium compoſed of ſix parts of ſedgi mutti, which is an earth containing a large portion of foſſile alkali, and ſuppoſed to be the natron of the ancients, and ſeven parts of quick-lime. Here they remain eight or ten days, when they are again waſhed, broken into fibres by a ſtamping lever, and then expoſed to the ſun, and again ſteeped in a freſh lixivium, as before. When they have undergone three operations of this kind, they are fit for making coarſe brown paper; and after ſeven or eight operations, they are prepared for making paper of a tolerable whiteneſs. For a farther account of the proceſs, ſee Phil. Tranſ. vol. lxiv. p. 101, where it is minutely deſcribed and illuſtrated by figures.

SONABARYA, in *Geography*, a town of Bengal; 38 miles N.E. of Calcutta.

SONAH, a town of Hindooſtan, in Bengal; 8 miles S.S.E. of Ghidore.

SONAN Sundi, a town of Congo; 10 miles W. of Cundi.

SONAPURRA, a town of Hindooſtan, in Bengal; 26 miles E.S.E. of Kiſhenagur.

SONATA, Ital. from *ſuonare, to ſound*, or play on an inſtrument. Its uſe at preſent, in *Muſic*, is confined to ſolos for a ſingle inſtrument: as Corelli's ſolos for the violin, Martini's ſolos for the German flute; and trios, or compoſitions in three parts, for two violins and a baſe, &c. But which, in the body of theſe works, are all called *ſonatas*.

In the laſt and 17th century, the Italians had diſtinct ſonatas of two kinds: as *ſonate da chieſa*, ſonatas for the church; and *ſonate da camera*, ſonatas for the chamber, or private concerts, of a lighter kind. The firſt and third ſet of Corelli's ſonatas are of the former kind, and the ſecond and fourth of the latter. To the firſt and third ſet of Corelli's ſonatas for the church, there are two baſes, one for the baſe viol, or viol da gamba, and the other for the organ, arch lute or harp, figured for thorough-baſe.

In vocal muſic, *ſi ſuona* is written over the ſymphony or ritornelli, interſtitial paſſages played by an inſtrument, either as an echo to the voice part, or to give the ſinger time to breathe. *Si canta*, "it is ſung," to diſtinguiſh the vocal from the inſtrumental paſſages of ſongs written on one ſtaff.

SONAUT, or SUNAT *Rupee*, in *Commerce*. See RUPEE.

SONAWRY, in *Geography*, a town of Hindooſtan, in Oude; 20 miles S. of Bahraitch.

SONAX, a town of France, in the department of Mont Blanc; 4 miles N.N.E. of Chambery.

SONCHUS, in *Botany*, σογχος of Dioſcorides, ſuppoſed by ſome etymologiſts to be corrupted from σομφος, *hollow*, or *empty*, in alluſion to its hollow ſtem. This ſeems ſcarcely ſatisfactory, and yet we meet with nothing elſe worth mentioning. In Engliſh it is named Sow-thiſtle, becauſe ſwine are particularly fond of the plant.—Linn. Gen. 400. Schreb. 527. Willd. Sp. Pl. v. 3. 1509. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 436. Sm. Fl. Brit. 815. Prodr. Fl. Græc. Sibth. v. 2. 124. Purſh 501. Juſſ. 169. Tourn. t. 268. Lamarck Illuſtr. t. 649. Gærtn. t. 158.—Claſs and order, *Syngeneſia Polygamia-æqualis*. Nat. Ord. *Compoſitæ ſemifloſculoſæ*, Linn. *Cichoraceæ*, Juſſ.

Gen. Ch. *Common Calyx* imbricated, bellying, of numerous, linear, unequal ſcales. *Cor.* compound, imbricated, uniform; florets all perfect, numerous, equal, of one petal, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments five, capillary, very ſhort; anthers united into a cylindrical tube. *Piſt.* Germen nearly ovate; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, reflexed. *Peric.* none, except the calyx, cloſing into the form of a depreſſed globe, with a conical point. *Seeds* ſolitary, rather oblong; down capillary, ſeſſile. *Recept.* naked.

Eſſ. Ch. Receptacle naked. Calyx imbricated, ſwelling at the baſe. Seed-down ſimple, ſeſſile.

Having detailed at length the ſpecies of SCORZONERA, (ſee that article,) a genus which has been, in ſeveral inſtances, confounded with the preſent, we find it neceſſary to give a reformed view of *Sonchus*, following Willdenow in the diſtribution of the ſpecies.

1. S. *maritimus*. Sea Sow-thiſtle. Linn. Sp. Pl. 1116. Willd. n. 1. Ait. n. 1. Prodr. Fl. Græc. n. 1889. Allion. Pedem. v. 223. t. 16. f. 2. Cavan. Ic. v. 1. 38. t. 51.—Flower-ſtalks moſtly ſolitary, terminal, naked. Leaves claſping the ſtem, lanceolate, undivided, with ſharp reflexed teeth.—Native of maritime ſituations in the ſouth of Europe, and north of Africa. Dr. Sibthorp met with it in Crete. Miller cultivated this plant in 1748, but it is hardly to be ſeen in any garden at preſent, either here or on the continent. The *root* is perennial. *Stem* herbaceous, about two feet high, ſlender, round, ſcarcely divided. *Leaves* near a foot long, narrow, ſmooth, glaucous, with a double ſet of ſmall, ſharp, recurved teeth; their baſe tapering, entire, claſping the ſtem at the bottom. *Flowers* ſometimes two or three, on long, ſlightly bracteated, ſtalks, yellow, above an inch in diameter, with a ſmooth *calyx*.

2. S. *craſſifolius*. Thick-leaved Sow-thiſtle. Willd. n. 2. Pourret MSS.—"Flower-ſtalks ſomewhat umbellate, ſcaly. Leaves lanceolate, with ſpreading pointed teeth; their baſe rounded, claſping the ſtem."—Native of Spain. *Root* perennial. This plant is intermediate between *S. maritimus* and *arvenſis*, but moſt akin to the former. *Stem* ſimple, erect. *Leaves* thick and glaucous, unequally toothed; the teeth lanceolate, ſpreading at right angles. *Flowers* the ſize of the preceding, terminal, ſomewhat umbellate, with very ſhort, ſolitary, ſingle-flowered, axillary ſtalks, from the uppermoſt leaves. Each *ſtalk* is ſcaly, and ſhorter than its *calyx*.

3. S. *uliginoſus*. Bog Sow-thiſtle. "Marſchall von Bieberſtein." Fiſcher MSS.—Flower-ſtalks ſomewhat umbellate, naked, much longer than the calyx. Leaves elliptic-oblong, with copious, ſpreading, pointed teeth; their baſe rounded, claſping the ſtem.—Native of mount Caucaſus. Communicated under the above name, by Dr. Fiſcher of Moſcow. This ſeems nearly related to the laſt. The *ſtem* is erect, ſtout, ſomewhat branched, three feet or more in height, round, ſmooth, leafy. *Leaves* four or five inches long, and above an inch broad, acute, ſmooth, veiny, rather thick or coriaceous, ſlightly glaucous, bordered with very numerous ſpinous teeth, projecting at right angles. *Flowers* reſembling the laſt, four or five together in terminal umbels, whoſe ſtalks are quite naked and ſmooth, as well as the *calyx*.

4. S. *quercifolius*. Oak-leaved Shrubby Sow-thiſtle. Desfont. Atlant. v. 2. 225. t. 213. Willd. n. 3.—Flower-ſtalks ſomewhat corymboſe, alternate, ſlightly ſcaly. Calyx-ſcales looſely imbricated. Leaves oblong, ſinuated, toothed, ſomewhat three-pointed. Stem ſhrubby. On hills near Cafsa in Barbary. *Stem* from one to two feet high, branched, thick and fleſhy. *Leaves* ſcattered, from four to eight inches long, very ſmooth and glaucous, rather ſucculent, evergreen, pinnatifid, with ſharp lobes, directed forward rather than backward, their baſe tapering down into a ſhort dilated *footſtalk*. *Flowers* terminal, yellow, about an inch and a half broad, four or five together in a lax corymboſe panicle. Scales of the *calyx* ovate, ſmooth, not cloſe-preſſed. *Desfontaines*.

5. S. *fruticoſus*. Great Shrubby Sow-thiſtle. Linn. Suppl. 346. Willd. n. 4. Ait. n. 2. Jacq. Coll. v. 1. 83. Ic. Rar. t. 161. L'Herit. Stirp. t. 81.—Flower-ſtalks ſomewhat umbellate, bracteated. Calyx-ſcales looſely imbricated. Leaves oblong, ſinuated, ſlightly runcinated, toothed. Stem ſhrubby.—Gathered by Mr. Maſſon on rocks in the iſlands of Teneriffe and Madeira, from whence it has found its way into the more curious greenhouſes of this and other countries. The habit is much like the laſt, with a thick fleſhy *ſtem*. The chief difference ſeems to conſiſt in the more umbellate *infloreſcence*, accompanied by leafy *bracteas*. The *calyx* is ſquarroſe in a dried ſtate only. *Flowers* like the common Dandelion in ſize and colour.

6. S. *acidus*. Sour Sow-thiſtle. Willd. n. 5.—"Flower-ſtalks branched, naked. Calyx-ſcales ſpreading. Leaves pinnatifid, with oblong-lanceolate, pointed, entire ſegments. Stem ſhrubby."—Gathered in Morocco by Mr. Schouſboe. *Leaves* half a foot long, ſtalked, ſmooth. *Flower-ſtalks* very much branched, ſomewhat forked, and partly umbellate. *Flowers* the ſize of *S. arvenſis*. *Willdenow*.

7. S. *pinnatus*. Wing-leaved Sow-thiſtle. Ait. ed. 1. v. 3. 116. ed. 2. n. 3. Willd. n. 6.—"Flower-ſtalks naked. Calyx ſmooth. Leaves pinnate; leaflets linear-lanceolate, ſlightly toothed. Stem ſhrubby."—Gathered by Mr. Maſſon in Madeira, from whence it was introduced into the greenhouſe at Kew, in 1777, but it ſeems never to have flowered, and is now perhaps loſt.

8. S. *radicatus*. Long-rooted Sow-thiſtle. Ait. ed. 1. v. 3. 116. ed. 2. n. 4. Willd. n. 7.—"Flower-ſtalks naked, ſmooth like the calyx. Stem ſhrubby, almoſt naked. Radical leaves lyrate, ſmooth on both ſides, with

triangular ovate lobes. Brought by Mr. Maſſon from the Canary iſlands, in 1780. It flowers in the greenhouſe in July. *Aiton.*

9. S. *taraxacifolius.* Dandelion-leaved Sow-thiſtle. Willd. n. 8.—Flower-ſtalks ſcaly, panicled. Leaves runcinate, with callous teeth; tapering at the baſe.—Native of Guinea. *Stem* as thick as a gooſe-quill, ſpongy. *Leaves* rather crowded, ſmooth, like Dandelion, but the tips of their teeth are white; the upper ones lanceolate, ſcarcely divided, though minutely toothed; the uppermoſt of all linear and entire. *Common flower-ſtalk* ſix inches, or more, in length, furniſhed with a few leaves, and dividing into a panicle at the top; *partial ones* very ſhort, ſcaly, crowded at the terminations of the panicle. *Calyx* like the Garden Lettuce. *Willdenow.*

10. S. *paluſtris.* Tall Marſh Sow-thiſtle. Linn. Sp. Pl. 1116. Willd. n. 9. Fl. Brit. n. 2. Engl. Bot. t. 935. Curt. Lond. faſc. 5. t. 59. Fl. Dan. t. 606. (S. lævior auſtriacus quintus altiſſimus; Cluſ. Hiſt. v. 2. 147. S. arboreſcens alter; Ger. Em. 294.) — Flower-ſtalks ſomewhat umbellate, briſtly like the calyx. Leaves runcinate; arrow-ſhaped at the baſe; rough in the margin. —In low marſhes, eſpecially about the mouths of great rivers, in Holland, France, England, &c. as well as in Greece, flowering in July and Auguſt. It occurs in ſeveral places bordering on the Thames, below London, as well as in the iſle of Ely. The *root* is perennial, fleſhy, branched, but not creeping. *Stems* herbaceous, from ſix to eight feet high, leafy, angular, hollow, but little branched. *Leaves* runcinate, acute, ſmooth, finely toothed, not rounded, but acutely arrow-ſhaped, at the baſe. *Panicle* umbellate or cymoſe, of ſeveral yellow *flowers*, whoſe *calyx*, as well as the *flower-ſtalks*, is rough with denſe, black, glandular hairs. Haller confounded this with the following, but Curtis has well diſtinguiſhed them.

11. S. *arvenſis.* Corn Sow-thiſtle. Linn. Sp. Pl. 1116. Willd. n. 10; (excluding the reference to Fl. Dan.) Fl. Brit. n. 3. Engl. Bot. t. 674 Curt. Lond. faſc. 4. t. 53. Purſh n. 1. (S. arboreſcens; Ger. Em. 294. Hieracium majus; Fuchſ. Hiſt. 319.) — Flower-ſtalks ſomewhat umbellate, briſtly like the calyx. Leaves runcinate, finely toothed; heart-ſhaped at the baſe. Root creeping.—In fields and about hedges, on a clay ſoil, in the middle or ſouthern parts of Europe, as well as in Pennſylvania; frequent in England, eſpecially towards the ſea, flowering in Auguſt. The *root* is fleſhy and milky, running deep into the ground, and difficult of extirpation. *Stem* but three or four feet high, nearly ſimple. *Leaves* rounded at the baſe. *Flowers* larger than in the laſt, and of a fuller golden hue, externally reddiſh; the tubes of their florets hairy. Dr. Sibthorp thought this the σογχος ἥμερος of Dioſcorides.

12. S. *agreſtis.* Weſt Indian Sow-thiſtle. Swartz. Prodr. 110. Ind. Occ. 1289. Willd. n. 11. (S. lævis; Sloane Jam. v. 1. 255.)—Flower-ſtalks downy, many-flowered. Calyx ſmooth. Stem ſtriated. Leaves ſeſſile, deeply ſerrated or cut.—Native of cultivated ground in the Weſt Indies, along with *S. oleraceus.* *Root* annual. *Stem* two or three feet high, leafy, round, deeply ſtriated, downy. Lower *leaves* ſcarcely divided. *Flowers* terminal and axillary, yellowiſh-white. *Calyx* elongated, ſometimes ſlightly pubeſcent, but little tumid at the baſe, in which this ſpecies differs from the *oleraceus*, as well as in the remarkable ſhortneſs of its *florets*, which have not the appearance of being ligulate, but tubular. *Seeds* long, ſtriated. *Swartz.*

13. S. *lacerus.* Jagged-leaved Sow-thiſtle. Willd. n. 12.—"Flower-ſtalks umbellate, rather downy. Calyx ſmooth. Leaves pinnatifid, toothed; auricled and heart-ſhaped at the baſe." — Native country unknown. *Root* annual. *Stem* two feet high, or more. *Leaves* with lanceolate, angular-toothed ſegments; their baſe dilated, claſping the ſtem, and coarſely toothed. *Flower-ſtalks* branched. *Flowers* the ſize of *S. oleraceus.* *Willdenow.* We have a mutilated ſpecimen gathered by Thunberg at the Cape of Good Hope, which, as far as any judgment can be formed of it, anſwers to the above deſcription; but it is very like the prickly varieties of the common *oleraceus.*

14. S. *anguſtifolius.* Narrow-leaved Sow-thiſtle. Desfont. Atlant. v. 2. 225. Willd. n. 13.—"Leaves pinnate, glaucous, ſmooth; leaflets diſtant, linear, finely toothed. Stem ſcarcely any."—Gathered near Caſsa, in Barbary, by Desfontaines. *Root* perennial, long, ſpindle-ſhaped. *Stem* very ſhort, or none. *Leaves* from four to eight inches long; their teeth withered and whitiſh. *Flower-ſtalks* ſlightly ſcaly, bearing one or more yellow *flowers*, the ſize of *S. arvenſis.* *Calyx* ſmooth, ovate. *Desfont.*

15. S. *umbellifer.* Umbelliferous Cape Sow-thiſtle. Thunb. Prodr. 139. Willd. n. 14. — "Flower-ſtalks hiſpid, ſomewhat umbellate. Leaves oblong-heart-ſhaped, ſerrated."—Native of the Cape of Good Hope.

16. S. *glaber.* Smooth Cape Sow-thiſtle. Thunb. Prodr. 139. Willd. n. 15. — "Flower-ſtalks umbellate, ſmooth like the calyx. Leaves heart-ſhaped, runcinate." —Native of the ſame country.

17. S. *goræenſis.* Scaly Goree Sow-thiſtle. Lamarck Dict. v. 3. 397. Willd. n. 16.—"Flower-ſtalks lateral, ſhort, clothed with membranous ſcales. Leaves lyrate, with little ſpinous teeth."—Native of the iſland of Goree, on the weſt coaſt of Africa. Sparrmann ſent ſeeds to the Paris garden. The *root* is annual. *Stem* a foot high, round, ſmooth, with lax branches. *Leaves* diſtant, claſping the ſtem, ſcarcely more than two inches long, and one broad, ſmooth, green, ſomewhat runcinate. *Flowers* yellow, almoſt ſeſſile along the branches. *Calyx* nearly cylindrical. *Flower-ſtalks* ſmooth, their ſcales with white membranous edges. *Lamarck.*

18. S. *oleraceus.* Common Sow-thiſtle. Linn. Sp. Pl. 1116. Willd. n. 17. Fl. Brit. n. 4. Engl. Bot. t. 843. Curt. Lond. faſc. 2. t. 58. (S. lævis; Ger. Em. 292. Camer. Epit. 279. Matth. Valgr. v. 1. 452.)

β. S. oleraceus; Fl. Dan. t. 682. (S. lævis latifolius; Ger. Em. 292.)

γ. S. aſperior; Ger. Em. 291.

δ. S. aſper; ibid.

ε. S. ſubrotundo folio noſtras; Pluk. Phyt. t. 61. f. 5.

ζ. S. aphyllocaulis, anguſto et oblongo folio, noſtras; Pluk. Phyt. t. 62. f. 4. See alſo t. 61. f. 5.

Flower-ſtalks downy, imperfectly umbellate. Calyx ſmooth. Leaves runcinate, toothed.—A common weed in cultivated land throughout Europe, as well as in other parts of the world to which Europeans have had acceſs, flowering in ſummer and autumn. The *root* is annual, ſpindle-ſhaped. *Herbage* ſmooth, brittle, milky, very various with reſpect to luxuriance, and the quantity of teeth, lobes, or prickles about the edges of its *leaves*; their ſegments, however, are almoſt always acute and runcinate. *Flower-ſtalks* axillary and terminal, rather cymoſe than umbellate, clothed when young with ſoft, white, denſe, cobweb-like, deciduous down. *Corolla* lemon-coloured. *Seeds* angular, with crenate ribs.

19. S. *tenerrimus.* Clammy Sow-thiſtle. Linn. Sp. Pl. 1117. Willd. n. 18. Ait. n. 8. Sm. Fl. Græc. Sibth. t. 790,

t. 790, unpubliſhed. Tour on the Continent, v. 2. 313.—(Hieracium foliis in tenues lacinias profundè ſectis, flore luteo; Pluk. Phyt. t. 93. f. 3. Chondrilla lutea; Bauh. Hiſt. v. 2. 1020.)—Flower-ſtalks downy, ſomewhat umbellate. Calyx hairy. Leaves deeply pinnatifid, with parallel, oblong, toothed, bluntiſh ſegments; their baſe ſomewhat arrow-ſhaped.—Native of rocks and old walls, in Italy, Barbary, Crete, and Cyprus, as well as the ſouth of France, flowering in ſpring. At Rome and Florence it is eaten in ſallads, being of a more delicate, leſs bitter, flavour than *S. oleraceus*, from which it is alſo readily known, by the almoſt pectinate lobes of its *leaves*, hairy viſcid *calyx*, and a much more elegant and ſlender aſpect in the whole plant. The *root* is annual.

20. S. *chondrilloides*. Scaly Sow-thiſtle. Desfont. Atlant. v. 2. 226. Willd. n. 19. Sm. Fl. Græc. Sibth. t. 791, unpubliſhed. (Chondrilla ſicula tragopogonoides maritima; Bocc. Sic. 13. t. 7. f. 1.)—Flower-ſtalks elongated, ſcaly, ſingle-flowered, ſomewhat corymboſe. Calyx ſmooth; its outer ſcales heart-ſhaped. Radical leaves deeply pinnatifid, toothed: thoſe of the ſtem oblong, toothed; heart-ſhaped at the baſe.—Native of ſandy ground, in Barbary, Sicily, and Zante. *Root* perennial. *Herb* ſmooth, ſomewhat glaucous, with more radical, and fewer ſtem-leaves, than the laſt. *Flowers* large, yellow. Outer ſcales of the *calyx*, like thoſe ſcattered over the *flower-ſtalks*, heart-ſhaped, pointed, with a broad, white, membranous border.

21. S. *hiſpanicus*. Spaniſh Sow-thiſtle. Jacq. Hort. Schoenbr. v. 2. 9. t. 143. Willd. n. 20.—Flower-ſtalks ſcaly, ſwelling upward, ſomewhat corymboſe. Calyx-ſcales recurved. Leaves pinnatifid, toothed, claſping the ſtem, glaucous, with white downy dots. Found near Malaga, in Spain. An annual, milky herb, flowering from June to Auguſt. *Jacquin*. *Stem* a foot high, branching from the baſe, ſpreading, glaucous, and covered, like both ſides of the *leaves*, with white dots, which prove, under a magnifier, tufts of down. *Flowers* ſmaller than the laſt, and more like the following, eſpecially in their dark-purple central tint; but differing from both in the recurved points of their *calyx-ſcales*, whoſe white membranous margins, moreover, are criſped, or undulated.

22. S. *tingitanus*. Tangier Sow-thiſtle. Lamarck Dict. v. 3. 397. Willd. n. 21. Sm. Fl. Græc. Sibth. t. 792, unpubliſhed. (S. tingitanus, papaveris folio; Tourn. Inſt. 475. Scorzonera tingitana; Linn. Sp. Pl. 1114. Curt. Mag. t. 142. S. orientalis; Linn. Sp. Pl. 1113. Willd. Sp. Pl. v. 3. 1507. Chondrilla tingitana, floribus luteis, papaveris hortenſis folio; Herm. Lugd-Bat. 657. t. 659.)—Flower-ſtalks ſwelling upward, ſlightly ſcaly. Calyx-ſcales erect, with membranous edges. Leaves pinnatifid, toothed, claſping the ſtem, glaucous, ſmooth.—Native of maritime rocks in Barbary and the Levant. Said to have been cultivated at Chelſea above 100 years ago, but it had long been loſt, and its ſeeds were brought, by the writer of this, from Paris, to the garden of his worthy friend Dr. Gwyn of Ipſwich, in 1787. The plant is annual, flowering in autumn, and its glaucous *leaves*, finely contraſted with the golden, purple-eyed *flowers*, make a ſtriking appearance. The purple-tipped white-edged ſcales of the *calyx* alſo contribute to the beauty and ſingularity of the whole. That this plant is a *Sonchus*, not a *Scorzonera*, is evident to all who look at its *ſeed-down*, and the Linnæan herbarium proves *Scorzonera orientalis*, gathered by Haſſelquiſt, to be the very ſame ſpecies.

23. S. *picroides*. Various-leaved Sow-thiſtle. Lamarck Dict. v. 3. 398. Willd. n. 22. Allion. Pedem. v. 1. 223. t. 16. f. 1. Sm. Fl. Græc. Sibth. t. 793, unpubliſhed. (Scorzonera picroides; Linn. Sp. Pl. 1114. Crepis Dalechampii; Dalech. Hiſt. 562.)—Flower-ſtalks ſwelling upward, ſcaly. Calyx-ſcales cloſe-preſſed, with ſlightly membranous edges. Leaves toothed; radical ones ſomewhat lyrate; the reſt claſping the ſtem, obovate-oblong; uppermoſt linear, nearly entire. Native of the ſouth of France, Barbary, Greece, Cyprus, and the Archipelago; ſent by M. Richard to Kew, in 1773. It is a hardy annual, flowering in ſummer. The *herb* is ſmooth, rather glaucous, varying much in luxuriance, and the *leaves* of the ſame plant differ greatly in ſhape. The radical ones are runcinate and lyrate; being rarely obovate, and merely bordered with ſmall teeth, like the reſt. *Flowers* of an uniform yellow, above an inch broad, ſolitary, on a ſlightly ſcaly elongated ſtalk, at the end of each branch. The ſcales of the ſtalks, like the outer ones of the *calyx*, are heart-ſhaped, pointed, ſmall, cloſe and flat, with a narrow white edge. Although Plukenet's t. 61. f. 5, cited by Linnæus and Willdenow, bears ſome reſemblance to the leaves of the ſpecies before us, yet that, being of Engliſh growth, can hardly be any thing elſe than a variety of *S. oleraceus*, to which we have often ſeen near approaches in that variable plant; ſee n. 18, ζ.

24. S. *crepioides*. Hawkweed Sow-thiſtle. (Scorzonera crepioides; Poiret in Lam. Dict. v. 7. 25.)—Flower-ſtalks naked, ſomewhat panicled. Stem much branched, rather downy as well as the calyx, whoſe outer ſcales are oval.—Gathered by M. Poiret, on the coaſts of Barbary. His deſcription of the fine, ſilky, ſimple *ſeed-down*, and naked *receptacle*, induces us to refer the plant to *Sonchus*. He deſcribes it as having the aſpect of *Crepis biennis*; but he knew not its *leaves*, nor the lower part of its herbage. Each diviſion of the *ſtem* has, at its baſe, a little, claſping, linear-lanceolate, pointed, downy leaf. *Flowers* of a middle ſize, yellow. *Calyx* oval, cloſe; its inner ſcales long, narrow, downy, or farinaceous; outer very ſhort and oval.

25. S. *dichotomus*. Forked Sow-thiſtle. Willd. n. 23. (Scorzonera dichotoma; Vahl. Symb. v. 2. 89. Desfont. Atlant. v. 2. 450. Lactuca flava; Forſk. Ægypt-Arab. 143.)—“Flower-ſtalks ſcaly, of equal thickneſs throughout. Stem forked, almoſt leafleſs. Radical leaves runcinate.”—Gathered by Forſkall in the vale of Surdúd, in Arabia Felix, and by Vahl in the kingdom of Tunis. The *herbage* is ſmooth. *Stems* divided from the baſe into rigid forked branches, bearing in their lower part two lyrate *leaves*, like the radical ones, but otherwiſe only ſmall, lanceolate, or ovate, entire ones under each ſubdiviſion. *Flowers* terminal, ſolitary, yellow. *Calyx* very ſmooth; its outer ſcales ovate, looſe, with broad white edges.

26. S. *Plumieri*. Pyrenean Blue Sow-thiſtle. Linn. Sp. Pl. 1117. Willd. n. 24. Ait. n. 11.—Flower-ſtalks panicled, ſmooth, with claſping, long-pointed bracteas. Leaves pinnatifid, pointed, runcinate —Native of the Pyrenees. It is alſo found, though rarely, on the Alps of Switzerland, having been obſerved by M. Favrod, on the mountain called Deut de Jamare, and above Queiſimen, in Teufelsgraben. We have ſeen this fine plant in ſome curious gardens, but cannot find it any where figured. The *root* is perennial. *Stem* often as tall as a man, round, branched, ſtriated, leafy, ſmooth and glaucous like every other part of the herbage. *Leaves* one or two feet long, deeply pinnatifid, with numerous, pointed, oppoſite, parallel, ſharp-toothed ſegments, and a terminal, pointed, triangular lobe; their baſe dilated, claſping the ſtem; under ſide moſt glaucous.

Flowers numerous, large, pale blue, leſs vivid than thoſe of the Wild Succory. *Bracteas* ſmooth, rounded at the baſe, with long, taper points. *Calyx* ſmooth. Its outer ſcales ſomewhat cordate.

27. S. *macrophyllus*. Large-leaved Hairy Blue Sow-thiſtle. Willd. n. 25. Purſh n. 3. (S. canadenſis; Froelich in Uſter's Annal. v. 1. 29. S. n. 1; Gronov. Virg. ed. 2. 115. "Chondrilla ſylveſtris alta, flore cæruleo ſpecioſo, foliis ſinuatis longis acuminatis alternis, levitèr hirſutis, caule ad cacumen ramoſo, ſemine nigro, pappis albis et quaſi argenteis inſtructo; Clayt. n. 139.")—Flower-ſtalks hairy, panicled. Leaves lyrate; heart-ſhaped at the baſe; hairy beneath.—In ſhady low grounds, near ſprings, from Pennſylvania to Carolina, flowering in Auguſt and September. From four to ſeven feet high. *Flowers* blue, the ſize of *Cichorium Intybus*. *Root* tuberous. *Purſh*. Mr. Froelich, above quoted, deſcribes this ſpecies as having for ſome years been cultivated in the botanic garden at Erlang, with ſimple, ſpatulate radical *leaves* a foot long, which wither before the *flowers* come to perfection; their ribs and veins hairy beneath; the *ſtem-leaves* lyrate, toothed, ſomewhat fringed; much dilated, heart-ſhaped, rounded, and finely toothed, at the baſe; paler and hairy beneath; their terminal lobe very large, triangular, in ſome degree heart-ſhaped; the intermediate ones ovate, obtuſe, unequal: *upper leaves* more ſimple, ſpatulate, very broad at their baſe, with ſcarcely any intermediate lobes. *Panicle* with alternate, hairy, ſubdivided, unequal branches; the upper ones longeſt and moſt compound. *Flower-ſtalks* unequal, erect, denſely clothed with glutinous hairs, and bearing one or two ſcales. *Bracteas* lanceolate, pointed, hairy, much ſhorter than the partial ſtalks. *Calyx* half an inch long, cylindrical, pale violet; its inner ſcales about fourteen, linear, equal, thin at the edges; outer ſhorter, ſcattered, unequal, cloſely imbricated, a little hairy at the back. *Florets* from thirty-four to forty, of a purpliſh fleſh-colour, with hairy tubes. *Seeds* ovate-oblong, triangular, ſtriated. *Down* ſeſſile, roughiſh, very white. *Odour* of the plant like opium, diſagreeable, as well as the *taſte*, which is bitter. Of this little-known ſpecies we ſuſpect there is an imperfect ſpecimen in the Linnæan herbarium, firſt marked as having been communicated by Kalm, and then by Gmelin, a reference to *Sonchus*, n. 12. Fl. Sibir. v. 2. 12. t. 4. f. 1, being at the back. This laſt is an error, the ſaid figure anſwering beſt to *S. alpinus* of moſt authors, *cæruleus* of Fl. Brit. which we ſuſpect to have been Gmelin's plant. He mentions having ſeen but a ſingle ſpecimen, or we ſhould think it had been one of his, now alſo in our hands, which Linnæus, by a parallel error to the above, has marked as coming from Kalm, and deſcribed by the name of *canadenſis*. At leaſt, Linnæus's having confuſed himſelf about theſe two ſpecimens, may account for his deſcribing as a Canadian plant, what no one has ever found in that country; for Mr. Purſh evidently admits it on report only, by the name of *alpinus*.

28. S. *cæruleus*. Alpine Hairy Blue Sow-thiſtle. Camer. Epit. 281. Fl. Brit. n. 1. Engl. Bot. t. 2425. (S. canadenſis; Linn. Sp. Pl. 1115. S. montanus; Lamarck Dict. v. 3. 401. S. alpinus; Willd. n. 26. Ait. n. 12, excluding the reference to Fl. Lapp. Purſh n. 4. Froelich in Uſt. Annal. v. 1. 26. Fl. Dan. t. 182. S. cæruleus latifolius; Bauh. Hiſt. v. 2. 1005. S. flore cæruleo; Ger. Em. 294. S. n. 20; Hall. Hiſt. v. 1. 9.)—Flower-ſtalks hairy, racemoſe, with ſetaceous bracteas. Leaves ſomewhat lyrate; arrow-ſhaped at the baſe; their terminal lobe triangular, very large.—Native of alpine paſtures in various parts of Europe, flowering in July and Auguſt. The late Mr. G. Don found it on Lochnagore, Aberdeenſhire, which is the only authority for retaining it in our Flora Britannica; *S. alpinus* of former Britiſh writers being only *Cichorium Intybus*, admitted on the word of a Northumberland writer, ſcarcely more correct than he who deſcribed the lemon, as growing on the bleak Welſh crag of Penmaen Mawr. This ſpecies has a fleſhy, perennial, tufted *root*. *Stems* about a yard high only, ſimple, leafy. *Leaves* conſiſting chiefly of a large, triangular, toothed, ſharply-pointed lobe, on a bordered, ſlightly pinnatifid, ſtalk, claſping the ſtem with an arrow-ſhaped baſe; the under ſide glaucous, with now and then a few hairs on the rib: the uppermoſt *leaves* are often quite linear, and merely fringed. *Cluſter* terminal, ſolitary, erect, many-flowered, ſcarcely compound, its ſtalks, like the *calyx*, rough with copious, red, glutinous, prominent hairs. *Bracteas* linear or ſetaceous. *Corolla* of a fine blue. *Anthers* red. *Seed-down* roughiſh.

Linnæus originally confounded this with his true *S. alpinus*, which has given riſe to much confuſion and controverſy; for authors, indolently following ſome of his ſynonyms, without regarding his definitions, have been thus led widely aſtray; nor can we ſcreen their errors, by allowing them to change a fixed and primary Linnæan name. The learned and candid Mr. Froelich only has any claim to attention on this ſubject. He would call this plant *alpinus*, becauſe Linnæus has, in *Philoſophia Botanica*, p. 273 & 274, inadvertently ſpoken of his true *alpinus*, by the name of *lapponicus*. So has he there called his *oleraceus*, *lævis*; his *paluſtris*, *belgicus*; and his *Cichorium Intybus*, *ſcanenſe*; all which errors he has corrected in his own copy of the work; nor did he dream of their miſleading any body. Even Lamarck has uſed the name of *alpinus*, according to its original deſtination, and ſo we ſhall preſume ſtill to apply it; ſee the following ſpecies.

29. S. *alpinus*. Alpine Scaly Blue Sow-thiſtle. Linn. Sp. Pl. 1117. Fl. Suec. ed. 2. 269, excluding all, except Linnæan, ſynonyms. Fl. Lapp. ed. 2. 240. Lamarck Dict. v. 3. 400. Sm. Plant. Ic. t. 21. (S. lapponicus; Froelich in Uſt. Annal. v. 1. 26. Willd. n. 27.)—Flower-ſtalks ſcaly, racemoſe, erect. Leaves pinnatifid, pointed, toothed, ſmooth; glaucous beneath. Stem ſimple.—Found by Linnæus on the ſides of hills, and in valleys, among the Lapland alps, where it is extremely common, though not known in any other part of the world. The Laplanders peel the ſtalks, before flowering, and eat the fleſhy part, which Linnæus thought too bitter, without the uſual ſeaſoning of a ſallad. He ſpeaks of this plant as extremely handſome, the height of a man, or taller, with a ſtraight, rigid, leafy *ſtem*. The *leaves* are ſmooth and ſhining, deeply pinnatifid, ſharply toothed; rounded, but not dilated nor claſping, at the baſe; glaucous beneath. *Cluſter* more or leſs compound, long, denſe; its *ſtalks* not at all hairy or downy, but clothed with imbricated, concave, acute, ſheathing ſcales. *Flowers* blue, about half the ſize of the laſt, but much more numerous. *Calyx* ovate, ſmooth. The late profeſſor Willdenow informed us, in 1796, that this rare plant was then growing luxuriantly, in the garden of Mr. Krauſe, at Berlin. He favoured us with ſeeds, but they did not ſucceed. The *root* is marked as biennial.

30. S. *leucophæus*. Pale-blue American Sow-thiſtle. Willd. n. 28. Purſh n. 5. (S. ſpicatus; Lamarck Dict. v. 3. 401.)—Flower-ſtalks ſcaly, racemoſe, drooping. Leaves pinnatifid, toothed, ſmooth. Stem wand-like, panicled.—On the borders of woods, by road ſides, from New England to Virginia, flowering from July to September. *Root* biennial. *Flowers* ſmall, white tinged with blue. *Purſh*. Lamarck

ſays the *ſtem* is only two or three feet high. *Leaves* narrow; the upper ones ſmall, linear, and entire.

31. S. *floridanus.* Small-flowered Florida Sow-thiſtle. Linn. Sp. Pl. 1118. Willd. n. 13. Purſh n. 6.—Flower-ſtalks panicled, diſtantly ſcaly. Leaves ſomewhat lyrate, minutely toothed, ſmooth, with a large, triangular, acute, terminal lobe.—On road ſides, in the ſhady woods of Virginia and Carolina, flowering from July to September. *Root* biennial. *Leaves* a ſpan long, of two large lobes, beſides the much larger terminal one; narrow and linear at the baſe. *Panicle*, or *cluſter*, doubly branched, ſpreading. *Flowers* very ſmall, blue. Mr. Purſh ſays, this plant has been uſed for curing the bite of the rattle-ſnake, in the ſame manner as his *Prenanthes ſerpentaria*, and is known by the name of Gall of the earth.

32. S. *acuminatus.* Pointed-leaved Sow-thiſtle. Willd. n. 30. (Lactuca villoſa; Jacq. Hort. Schoenbr. v. 3. 62. t. 367?) —" Flower-ſtalks ſlightly ſcaly, panicled. Radical leaves ſomewhat runcinate; thoſe of the ſtem ovate, pointed, ſtalked."—In low ſhady places, from Pennſylvania to Virginia, flowering in Auguſt and September. Biennial. *Flowers* ſmall, blue. *Purſh.* *Stem-leaves* tapering at each end, and furniſhed at each ſide, in the middle, with ſmall pointed teeth. It differs from *S. floridanus* in theſe leaves being undivided. They are alſo ſlightly hairy beneath. The *panicle* was ſlender, compoſed of few *flowers*, in Willdenow's wild ſpecimen, and the *ſeed-down* ſeſſile. Jacquin's figure exhibits a triply-compound *panicle*, of innumerable ſmall pale-blue *flowers*, and he unluckily does not mention the *ſeed-down*. We know nothing of this ſpecies, but from theſe authorities. It appears akin to the laſt, though ſufficiently diſtinct.

33. S. *pallidus.* Pale-yellow Canadian Sow-thiſtle. Willd. n. 31. Ait. n. 14. Purſh n. 8. (Lactuca canadenſis; Linn. Sp. Pl. 1119.)—Cluſter compound, with ſcaly ſtalks. Leaves lanceolate, toothed, ſmooth, claſping the ſtem; the upper ones taper-pointed.—On road ſides, and in woods, from Canada to New England, flowering from July to September. Perennial. *Flowers* ſmall, yellow. *Purſh.* The ſcales of the *flower-ſtalks* are ovate, pointed, crowded and recurved. *Cluſter* denſe. *Calyx* very ſmooth. *Seed-down* quite ſeſſile. The *leaves* are not properly ſword-ſhaped. Mr. Purſh cites under this ſpecies Robert's Icones t. 148 and 151, which we have not been able to conſult.

34. S. *pulchellus.* Beautiful Blue Sow-thiſtle. Purſh n. 9.—" Flower-ſtalks ſcaly, in a corymboſe cluſter. Stem-leaves ovate-oblong, acute, entire, ſmooth; with a claſping heart-ſhaped baſe."—On the banks of the Miſſouri, flowering in September. Perennial. *Flowers* large, of a beautiful blue. *Purſh.*

35. S. *ſibiricus.* Willow-leaved Sow-thiſtle. Linn. Sp. Pl. 1118. Willd. n. 32. Ait. n. 15. (S. n. 11; Gmel. Sib. v. 2. 11. t. 3. Lactuca ſalicis folio, n. 211 and 212; Amm. Ruth. 150.)—Flower-ſtalks corymboſe, with diſtant lanceolate ſcales. Leaves lanceolate, ſeſſile; the upper ones entire; lower variouſly toothed.—Found throughout Siberia, as well as about the river Wolga, and in ſome parts of Ruſſia and Finland. The *root* is perennial, creeping extenſively. *Stem* from one to four feet high, leafy, wand-like; ſometimes branched in the upper part. *Leaves* numerous, about four inches long, very ſmooth and even; rather glaucous at the back. *Flowers* blue, about an inch in diameter, compoſing a level-topped corymb.

36. S. *tataricus.* Tartarian Sow-thiſtle. Linn. Mant. 572, excluding the ſynonym. Willd. n. 33. Ait. n. 16.—Flower-ſtalks racemoſe, nearly naked. Leaves lanceolate, runcinate.—Native of Siberia and Tartary. Perennial, flowering in June and July. A rather larger plant than the laſt; the teeth of its *leaves* large, pointing backward. *Flowers* blue, in compound cluſters, terminating the ſtem and branches.

37. S. *prenanthoides.* Long-cluſtered Sow-thiſtle. " Marſchall von Bieberſtein." Fiſcher MSS.—Flower-ſtalks racemoſe, lateral and terminal, ſcaly, downy. Leaves elliptic-oblong, toothed, ſomewhat fiddle-ſhaped.—Native of mount Caucaſus. The *ſtem* is round, terminating in a long ſeries of alternate, ſhortiſh, ſomewhat compound, *cluſters*, whoſe partial ſtalks are cottony and ſcaly. The *flowers* ſeem to be blue or purpliſh. *Leaves* ſmooth, ſomewhat ſtalked, three or four inches long, an inch and half broad, finely toothed; the upper ones diminiſhing into lanceolate narrow *bracteas*.

SONCINO, in *Geography*, a town of Italy, on the Oglio; 8 miles E.N.E. of Crema.

SONDAU, a town of Brandenburg, in the duchy of Magdeburg; 50 miles N.N.E. of Magdeburg.

SONDELY, a town of Norway, in the province of Bergen; 30 miles S.S.W. of Romſdal.

SONDERBORG, a ſea-port town of Denmark, on the S. coaſt of the iſland of Alſen, with a royal palace, and one of the beſt harbours in Denmark. In this palace Chriſtian II. king of Denmark, was confined as a priſoner for 13 years: the inhabitants are chiefly ſeamen: 16 miles E.N.E. of Flenſborg. N. lat. 54° 57′. E. long. 9° 59′.

SONDERSHAUSEN, a town of Germany, in the county of Schwartzburg, ſituated on the Wipper. On an eminence without the town ſtands the palace, where the ruling prince of the Sonderſhauſen line uſually reſides; 20 miles N.E. of Mulhauſen. N. lat. 31° 22′. E. long. 10° 57′.

SONDERSITZ. See URSITZ.

SONDHEIM, a town of the duchy of Wurzburg; 7 miles N. of Biſchoffsheim.

SONDRE GRUND, or BOTTOMLESS, an iſland in the South Pacific ocean, diſcovered by Le Maire and Schooten, in 1616; about 20 leagues in circumference, long but not broad. It appeared covered with trees, among which were palmetoes and cocoa-nut trees. It had no anchoring ground. The inhabitants were naked, except a piece of mat round the middle, of a yellowiſh or reddiſh-brown colour, and black hair; their ſkin was marked with many figures: they were covetous of iron, and thieves. S. lat. 15°. W. long. 148°.

SONDRIO, or SONDERS, a town of Italy, and capital of the Valteline, partly on a plain and partly on the ſide of a rock, in a romantic ſituation, at the extremity of a narrow valley, on a ſmall river which runs into the Adda; 15 miles E. of Chiavenna. N. lat. 46° 6′. E. long. 9° 50′.

SONE, a town of Bengal; 8 miles S.E. of Ramgur.

SONEGA, a town of Holland, in Frieſland; 9 miles E. of Kuynder.

SONEGUERA, a town of Mexico, in the province of Honduras; 32 miles N. of St. Jorge de Olancho. N. lat. 15° 15′. W. long. 86° 40′.

SONEHUTCH, a town of Hindooſtan, in Malwa; 30 miles N.E. of Indore.

SONENBERG, a town of Germany, in the county of Pludentz; 4 miles N. of Pludentz.—Alſo, a town of the New Mark of Brandenburg; 6 miles E. of Cuſtrin.

SONEPOUR, a town of Hindooſtan, in Oriſſa, on the Mahanada; 38 miles S. of Sumbulpour. N. lat. 20° 47′. E. long. 83° 40′.

SONERGONG. See Sunergong.

SONEWALDT, a town of Luſatia; 8 miles S. of Luckau.

SONEY, a town of Hindooſtan, in Malwa; 9 miles E. of Saurungpour.

SONG, a town of Africa, in Bambarra, on the Niger. N. lat. 13° 54′. W. long. 3° 55′.

Song, a town of China, of the third rank, in Ho-nan; 37 miles S.S.W. of Ho-nan.

Song Song, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 8° 12′.

SONG, in *Poetry*, a little compoſition, conſiſting of ſimple, eaſy, natural verſes, ſet to a tune, in order to be ſung.

Each ſtanza of a ſong is called a *couplet*.

The ſong bears a great deal of reſemblance to the madrigal, and more to the ode; which is, indeed, nothing but a ſong, according to the ancient rules.

Its object is uſually either wine or love, whence M. le Brun defines a modern ſong, to be either a ſoft and amorous, or a briſk and Bacchic thought expreſſed in few words.

Indeed, this is to reſtrain it to too narrow bounds; for we have devout ſongs, ſatyrical ſongs, and panegyrical ſongs. But, be the ſong what it will, the verſes are to be eaſy, natural, and flowing; and are to contain a certain harmony, which neither ſhocks the reaſon nor the ear; and which unites poetry and muſic agreeably together.

Anciently, the only way of preſerving the memory of great and noble actions, was by recording them in ſongs; and, in America, there are ſtill people who keep their whole hiſtory in ſongs.

Songs have at all times, and in all places, afforded amuſement and conſolation to mankind: every paſſion of the human breaſt has been vented in ſong; and the moſt ſavage as well as civilized inhabitants of the earth have encouraged theſe effuſions. The natives of New Zealand, who ſeem to live as nearly in a ſtate of nature as any animals that are merely gregarious, have their ſongs, and their *improviſatori;* and the ancient Greeks, during every period of their hiſtory and refinement, had their *ſcolia* for almoſt every circumſtance and occaſion incident to ſociety.

Singing was ſo common among the ancient Romans as to become proverbial. Phædria, in the Phormio of Terence, begs Dorio to hear him, he has but one word to offer; when Dorio tells him he is always ſinging the ſame ſong. Horace ſpeaks of the ſame affectation among the ſingers of his time as prevails with the preſent; never to ſing when they are entreated, or to deſiſt if no one wiſhes to hear them. And ſome idea of the cultivated ſtate of muſic in Gaul, ſo early as the fifth century, may be acquired from a paſſage in one of the epiſtles of Sidonius Apollinaris, who, in his character of king Theodoric the Goth, ſays, that "this prince was more delighted with the ſweet and ſoothing ſounds of a ſingle inſtrument, which calmed his mind, and flattered his ear by its ſoftneſs, than with hydraulic organs, or the noiſe and clangor of many voices and inſtruments in concert."

Clothaire II. in the ſeventh century, having gained a great victory over the Saxons, it was celebrated by a Latin ſong in rhyme, which the annaliſts tell us was ſung with great vociferation all over the kingdom.

As the origin of ſongs and the formation of the language of every country are ſo nearly coeval, we hope the reader will allow us to beſtow a few columns on a ſubject which, though it may not be thought abſolutely neceſſary for a muſical lexicographer, or even hiſtorian to trace, yet it lies ſo near his path, that he can hardly proceed on his way without its being impreſſed on his mind fortuitouſly. For the *ſongs* of the ancient Greeks, ſee Scolia.

But in enquiring after the moſt ancient ſongs in modern languages, we ſhall not enter upon the merits of a queſtion which has been much agitated in France during the middle of the laſt century, "Whether the preſent language of that country was firſt cultivated in the northern or ſouthern provinces?" The origin of all inventions, after having been ſuffered by ignorance and idleneſs to ſleep for many ages, is ſo difficult to aſcertain, that if the inhabitants of the kingdoms which gave them birth, where information is moſt likely to be furniſhed, are unable to bring them to light, it would be arrogance in a foreigner to attempt it. The French critics and antiquaries all agree that the capital was the laſt place to cultivate the vulgar tongue, and to receive the firſt eſſays of thoſe who made it the vehicle of their thoughts. Fontenelle ſays the firſt ſparks of poetry appeared chiefly at the two extremities of the kingdom, in Provence and Picardy. "The Provençaux," ſays he, "warmed by a more genial ſun, ought to have had the ſuperiority; but the inhabitants of Picardy are their inferiors in nothing." M. de la Ravaliere gives the honour of priority to the writers of Normandy; and Fauchet and Paſquier, ſeparating the French poetry from the Provençal, challenge the admirers of the Troubadours to produce verſes of their writing of equal antiquity with the ſpecimens of French poetry which they have exhibited. However, the Provençal bards have lately had many able champions, among whom M. de Lacurne de Sainte Palaye, and his faithful 'ſquire, M. Millot, have diſtinguiſhed themſelves. And though it cannot be denied but that fragments of ſongs ſubſiſt in the French language of higher antiquity than in the dialect of Provence, yet, as we have been able to find no melodies that have been ſet to a modern language more ancient than thoſe that have been preſerved in the Vatican library to the ſongs of the Troubadours, we ſhall begin our enquiries concerning the origin of vulgar dialects in Europe, by endeavouring to trace the firſt formation of the language of Provence.

Every refined and poliſhed nation has a vulgar language in its remote provinces, and even in its capital, among the common people, in which there are innumerable words and phraſes that have never been admitted into books. This muſt doubtleſs have been the caſe with the Romans; and it is the opinion of ſome perſons of great eminence in literature, among whom may be numbered the learned cardinal Bembo, and the marquis Maffei, that the ancient Romans had at all times an oral vulgar language which was different from that of books; and that this colloquial language, leſs grammatical and elegant than that of the learned, was carried by the Romans into all the provinces under their dominion. It is therefore probable that this, and not the written language of Italy, was the mother of the Provençal, Sicilian, Italian, and Spaniſh dialects.

But ſuppoſing ſuch a language as Cicero's was ever ſpoken, it could not be laid aſide for another all at once; and when we are told of a particular period or century, during which the Latin tongue ceaſed to be ſpoken in France or Italy, and the Provençal, French, or Italian begun; credulity itſelf is ſtaggered, and unable to reconcile it to probability. Every language is long ſpoken before it is written; and though the firſt poet of Italy or Provence, who committed his verſes to writing in the vulgar tongue, could be named, no one would venture to tell us by whom it was firſt ſpoken.

The learned Maffei is of opinion that there was a *vulgar* language in Italy long before the irruptions of the Lombards, Goths, or Franks; and has traced its uſe as early as the time of Quintilian, who tells us, that he had often heard the crowd in the Circus applaud, or demand ſomething of the champions, in a barbarous language; that is, in a vulgar and plebeian dialect, different from pure Latin. Sammonicus, who lived in the time of Septimius Severus, names the vulgar language. And both Pliny and St. Jerome ſpeak of the military language as of that kind; the latter even tells us that Fortunatianus, biſhop of Aquileia, wrote a commentary on the Evangeliſts in this vulgar language, *ruſtico ſermone*, during the time of Conſtantine. But this was a ſingular inſtance, which was not imitated.

It appears, however, from the Dialogues of St. Gregory the Great, written 593, that there was then a language merely colloquial at Rome. For he tells us that a new convert, of whom he is ſpeaking, was ſent to a convent with two veſſels of wine, which the vulgar call flaſks.

And Gregory of Tours, ſo early as 572, complains of this vulgar or ruſtic tongue gaining ground in France, and being more in favour than Latin, the language of the learned.

It was therefore by degrees that Latin ceaſed to be underſtood by the common people, and the Romance language had admiſſion into books. And in 813 it was ordered by a canon at the council of Tours, that the biſhops ſhould be employed in tranſlating homilies into the Roman ruſtic tongue, that they might be the more eaſily underſtood by the common people. The ſame canon, we are told, was renewed in a council at Arles in 851.

In the ninth century hiſtorians tell us, that Charlemagne and his ſons and ſucceſſors ſpoke the Romance language, ſpecimens of which may be ſeen in Fauchet, Paſquier, and ſeveral other writers on the French language. And in the twelfth century it began to be the general language of poets and polite writers. Some of the ſermons written and preached by St. Bernard, about 1137, in this language, are ſtill preſerved among the MSS. of the convent of Feuillans, in the rue St. Honoré at Paris.

The colloquial language uſed only in familiar converſation was called by the Romans *ſermo uſualis, quotidianus, pedeſtris, vulgaris, militaris, ruſticus*, &c. It is ſuppoſed by M. Bonamy, as well as by others, that from this vulgar Latin not only the French language and its different dialects but the Spaniſh and Italian are derived. Indeed, it is moſt probable that the Latin tongue, in its periods of greateſt purity, was only the language of the learned, in the Roman provinces remote from the capital; and that it was never ſo generally cultivated in other times as to exclude the vulgar dialect.

In the frequent revolutions and ſtruggles for empire during theſe ages, the Roman language muſt have been debaſed and corrupted, while new tongues were forming, which, though not ſufficiently fixed and grammatical to be uſed in books, were doubtleſs long the vulgar and colloquial dialects before the Latin ceaſed to be the common language of the learned.

It was about this time that the art of rhyming, or uniſonous terminations of verſes, ſtole into poetical compoſition, in a manner which the learned and judicious author of an Eſſay on the Language and Verſification of Chaucer, ſeems to have traced to its ſource. Leonine verſes, ſuppoſed to have been ſo called from a pope or monk Leo, their author, in the ſeventh century, are by ſome thought the firſt attempt at rhyme; while others imagine the hymn to St. John the Baptiſt, by Paul Diaconus, written about the latter end of the eighth century, to be not only rendered memorable by Guido's ſcale, but by having been the model of all other monkiſh rhymes in Latin, as well as in modern languages. *Ut queant laxis*, &c.

But neither of theſe genealogies ſatisfies all enquirers. Gravina thinks it as abſurd to aſcribe the invention of rhyme to any one writer, as to attribute to an individual the propagation of the plague, which is cauſed by the univerſal contagion of the air.

The Arabs had rhyme, according to Don Calmet, before the time of Mahomet, who died 632, and in the ſecond century uſed a kind of poetry in meaſures ſimilar to the Greek, and ſet to muſic. See RHYME.

While the new languages were unſettled, and but partially known, even in the ſingle kingdom or province where they were forming, it was not uncommon to write half a poem in Latin and half in a vulgar tongue. Indeed Dante has left a poem in three languages, Latin, Provençal, and Italian; and Rambaud de Vachieras, a Provençal poet, in five.

Petrarca and Muratori think that the Sicilians firſt compoſed and wrote ſongs in a vulgar language; that from them the cuſtom went into Provence, and from Provence into Italy. Indeed Sicily and Provence were long under the dominion of the ſame princes, and the ſame language may have been cultivated at the courts of both countries; but as no veſtiges remain of Sicilian poetry reſembling the Provençal, the opinions of theſe authors, however eminent, and, on other accounts, reſpectable, while unſupported by reaſons and facts, can have but little weight.

Cardinal Bembo, however, was of opinion that the firſt rhymers and poets who wrote in a modern language were of Provence; after them the Tuſcans, who had more aſſiſtance from them in their poetry than from any other people. And both Creſcembeni and Gravina make the ſame conceſſion.

Noſtradamus, in his lives of the Provençal poets, ſays that Provence was called the mother of Troubadours and Minſtrels; and that Dante, Petrarca, Boccaccio, and other Tuſcan poets, enriched both their language and fancy from the productions of his countrymen. However, as no *verſi ſcioliti*, or poetical lines without rhymes, are to be found in the Provençal poets, though they abound among the Italians, it is natural to ſuppoſe that in theſe meaſures of blank verſe the Italians imitated their anceſtors the Romans, and that in rhyming, the Provençals were their models.

It was the opinion of Voltaire that this language began to be formed in the ninth century, out of Latin and Teutonic; that it was the mother of French, Spaniſh, and Italian; "continued in favour till the reign of the emperor Frederic II. and is ſtill ſpoken in ſome villages of the Griſons, and near Switzerland."

Carpentier derives the word Troubadour from *Troba*, Provençal, *figmentum. Hinc Troubadours appellati poetæ Provinciales.*

It was in the eleventh century, during the firſt cruſade, according to the abbé Millot, that Europe began to emerge from the barbarous ſtupidity and ignorance into which it had long been plunged. And while its inhabitants were exerciſing every ſpecies of rapine, plunder, and pious cruelty in Aſia, art, ingenuity, and reaſon, inſenſibly civilized and ſoftened their minds.

It was then that the poets and ſongſters known by the name of Troubadours were multiplied, and their profeſſion honoured by the patronage and encouragement of the count of Poitou, and many other powerful princes and barons, who had themſelves ſucceſsfully cultivated poetry and muſic. At the courts of theſe munificent patrons they were treated with the greateſt conſideration and reſpect. The ladies, whoſe charms they celebrated, gave them the moſt generous and flattering reception; and ſometimes diſdained not even to liſten with compaſſion to tales of tenderneſs, and deſcriptions of the havock which the irreſiſtible charms of theſe ſublunary divinities of chivalry had made in their hearts. The ſucceſs of a few inſpired the reſt with hope, and excited exertions in the exerciſe of their art, which impelled them towards perfection with a rapidity that nothing but the united force of emulation and emolument could occaſion.

As theſe founders of modern verſification, theſe new poetical architects, conſtructed their poems upon plans of their own invention; and as all claſſical authority was laid aſide, either through ignorance or deſign, each individual gave unlimited indulgence to fancy in the ſubject, form, and ſpecies of his compoſition. And it does not appear, during the cultivation and favour of Provençal literature, that any one Troubadour ſo far outſtript his brethren in the approaches he made towards perfection, as to be conſidered as a model for his ſucceſſors. We find, though military proweſs, hoſpitality, Gothic gallantry, and a rage for feaſts and revelry prevailed, that taſte, refinement, and elegance, were never attained during this period, either in public or private amuſements. The want of originality of compoſition is frequently lamented when licence is repreſſed by laws, and the wild effuſions of an ardent imagination are bounded by authority; but the productions that have been preſerved of the Provençal bards, which may be called the offspring of writers in a ſtate of nature, ſeem to prove the neceſſity of rule, order, and example, even in the liberal arts as well as the government of a free ſtate. For the progreſs of taſte muſt ever be impeded by the ignorance and caprice of thoſe who cultivate an art without ſcience or principles.

During near two centuries after Guido's arrangement of the ſcale and invention of the time-table aſcribed to Franco, no remnants or records of ſecular muſic can be found except thoſe of the Troubadours, or Provençal poets. And though in the ſimple tunes which have been preſerved of theſe bards, no time is marked, and but little variety of notation appears, yet it is not difficult to diſcover in them germs of the future melodies, as well as poetry, of France and Italy. Unluckily the poetry and muſic of the Troubadours of Provence were not for a long time called into notice by writers poſſeſſed of thoſe blandiſhments of ſtyle or manner which faſcinate, and render whatever ſubject they treat intereſting to the generality of readers. Fauchet, Paſquier, and Noſtradamus have written in a language that is now become ſo uncouth and difficult, that few have the courage to attempt acquiring information or amuſement from it; and Muratori and Creſcembeni, who are reſpected for their diligence and exactitude, are certainly dry and dull narrators of facts which promiſe delight to every lover of literature; nor do we remember, in conſulting their voluminous writings, ever to have found them guilty of hazarding a ſingle reflection or conjecture that has embelliſhed the ſubject, or rendered it amuſing. But this cenſure muſt not be applied to Sainte-Palaye, Bonamy, la Ravaliere, and Barbazan, who, in the Memoires de Litterature and elſewhere, have not only embelliſhed, but nearly exhauſted the ſubject. Indeed, the period of Provençal poetry is intereſting to literature, and the melody to which it was ſung is a ſubject of curious enquiry to a muſical hiſtorian; for it is generally allowed that the Troubadours, by ſinging and writing in a new tongue, occaſioned a revolution not only in literature but the human mind. And as almoſt every ſpecies of Italian poetry is derived from the Provençals, ſo air, the moſt captivating part of ſecular vocal melody, ſeems to have had the ſame origin. At leaſt the moſt ancient ſtrains that have been ſpared by time, are ſuch as were ſet to the ſongs of the Troubadours. See TROUBADOURS.

Songs ſeem in a particular manner to belong to the language of Italy. The ancient Romans were no great ſongſters; and by what degrees the Latin language became Italian, would be a tedious and difficult enquiry. We know when the muſical drama or opera was eſtabliſhed, and conſequently when opera airs, with inſtrumenatal accompaniments, began firſt to be cultivated; but theſe are not the ſubjects of our preſent reſearch: but when national melodies, for ſuch every country has, were firſt applied to ſongs in the Italian language, a dialect which has long been univerſally allowed to be more favourable to ſinging than any one which the numerous combinations of letters in all alphabets of modern times has produced, we are ignorant. And if the French, Provençal, and Spaniſh dialects can be deduced from the Latin, how much more eaſy is it to trace the Italian from that ſource? which is itſelf frequently ſo near pure and claſſical Latin, that no other change or arrangement of words ſeems to have been made, than what contributed to its ſweetneſs and facility of utterance.

That the Italian tongue is derived from the vulgar language of the ancient Romans, ſeems the opinion of the beſt critics; but to diſcover and point out by what degrees it was ſmoothed and poliſhed to the ſtate in which Dante, Petrarca, and Boccaccio found it in the fourteeenth century, would require more time, and occupy more ſpace in this article, than the ſubject ſeems neceſſarily to require. However, as the Italian language has been truly allowed to be more muſical in itſelf when merely ſpoken with purity, than any other in Europe, an enquiry into the cauſes of its natural melody and mellifluence does not ſeem foreign to the ſubject of the preſent article.

Muratori (Diſſert. 32.) has given innumerable paſſages from authors of the eighth and ninth centuries, to prove, that after the Franks and Germans were ſettled in Italy, articles were uſed in the Latin language inſtead of pronouns and changes of termination, in order to ſave the trouble of inflecting the caſes in nouns; but pretends not to ſay what this vulgar language was, or whether the clergy preached to the common people, or merchants carried on their correſpondence in Latin or Italian.

The learned Maffei allows the Provençal, French, Spaniſh, and Italian languages, to be deſcendants from the Latin, but denies that the ancient inhabitants of Italy adopted any words from the Goths or Huns who invaded them. The genius of the German, Francic, or Teutonic language, which was ſpoken by the Lombards, was ſo diametrically oppoſite to that of the Italians, that it ſeems incredible there ſhould have been any exchange or union of dialects between them: the one being as remarkable for its numerous conſonants and harſh terminations, as the other for its open vowels and mellifluous endings. As it is the opinion of this profound critic that the Romans had always a vulgar dialect, leſs grammatical and elegant than that of the ſenate and of books, he ſuppoſes the French, Spaniſh, and Italian languages to have been different modifications of this ruſtic, plebeian dialect. But it is as difficult to aſſign a reaſon for all theſe daughters of one common mother being ſo diſſimilar, as it is to account for the little reſemblance that is frequently found between other children of the ſame parents. And why the French language ſhould have ſo many naſal endings, the Spaniſh ſo many ſibillating, and the Italian alone have none but vocal terminations, can only have been occaſioned by ſome particular and radical tendency in the vulgar and plebeian language of each country from very high antiquity.

While this language was forming, no muſic ſeems to have been cultivated in Italy, except the canto fermo of the church; and, unluckily, no written melody can be found to the Canzoni of Dante, the ſonnets of Petrarca, or the ſongs of Boccaccio, the three great founders of the Italian tongue. Yet theſe, we are told, were all ſet to ſome kind of muſic or other, and ſung even in the ſtreets. See the biographical articles of theſe lyric poets, particularly that of Boccaccio; whoſe "Decamerone" has always been regarded as a natural and faithful delineation of the manners and cuſtoms of Italy, at the time when it was written.

With reſpect to muſic, whether the perſonages which he aſſembles together after the plague at Florence 1348, and the ſtories they tell, are real or imaginary, the amuſements he aſſigns them in his ritual muſt have been ſuch as were uſual to the Florentines, among whom he lived at that time; and indeed the poems that are pretended to have been ſung, and the inſtruments with which they were accompanied, ſubſiſted before this period, and ſtill ſubſiſt.

Boccaccio tells us, at the end of his *prima giornata*, or firſt day, that "after ſupper the inſtruments were called in, when the queen, for the day, ordained that there ſhould be a dance; and after one had been led off by Lauretta, Emilia ſung a ſong, in which ſhe was accompanied by Dion, a gentleman of the party, on the lute." There is nothing new or extraordinary in this quotation. But in Italy, whence all the liberal arts have travelled to the reſt of Europe, it is curious to know in what rank muſic was held at this early period, and what uſe was made of it in polite aſſemblies, by the inhabitants. And here a writer, juſtly celebrated for the exactneſs with which he has deſcribed the cuſtoms of his contemporaries in all ſituations, tells us, that in an aſſembly of perſons of birth and education, who paſſed ten days together during ſummer in a conſtant ſucceſſion of innocent amuſements, each evening was cloſed by dance and ſong; in which the whole company, conſiſting of ſeven ladies and three gentlemen, of different characters and acquirements, were able to perform their parts.

When we are told, that the lady who ſang was accompanied by the lute, we know not of what this accompaniment conſiſted, whether it only fortified the voice-part by playing the ſame melody, or more elaborately furniſhed a baſe and a different treble, ariſing out of its harmony.

On the ſecond day we find, that one of the company leading off a carol, a ſong was ſung by another, which was anſwered in a kind of chorus by the reſt.

At the cloſe of the ſecond day Boccaccio tells us, that after the ſong, of which he gives the words, had been performed, many others were ſung, and many dances danced to different tunes, by which we may gather, that beſides carols and ballads, the ſinging of which marked the ſteps of a dance, there were at this time ſongs without dances, and tunes without ſongs.

Whoever reads the hiſtory of the moſt ancient inhabitants of this iſland, the Cambro-Britons, will find innumerable inſtances of the reverence which they paid to ther poet-muſicians, the bards both of Pagan and Chriſtian times; and ſongs of very high antiquity have been preſerved in the Welſh language, though not all the tunes to which they were ſung.

We are told (Miſcel. Antiq. vol. ii. p. 8.) that ſir Thomas Wyatt was the firſt who introduced Italian numbers into Engliſh verſification. This may have contributed to improve our lyric poetry; but to confeſs the truth, from the few parts of the firſt claſs throughout Europe, who, at the beginning of the ſixteenth century, condeſcended to write madrigals and ſongs for muſic, it ſeems that the rage for canon, fugue, multiplied parts, and diſſimilar melodies, moving at the ſame time, had ſo much employed the compoſers, and weaned the attention of the hearers of theſe learned, or, as ſome call them, Gothic contrivances, from poetry, that the words of a ſong ſeem to have been only a pretence for ſinging; and as the poets of the two or three laſt centuries were in little want of muſic, muſicians, in their turn, manifeſted as little reſpect for poetry; for in theſe elaborate compoſitions, the words are rendered utterly unintelligible by repetitions of particular members of a verſe; by each part ſinging different words at the ſame time; and by an utter inattention to accent.

In the "Eſſays on Song-writing," publiſhed with a collection of Engliſh ſongs (we need not name the author, whom he has not named himſelf, nor given the date of the publication) there are many judicious and excellent reflections; and the ſongs are admirably ſelected, and form the beſt collection in our language, under the three following heads: "On Song-writing in general;" "On Ballads and paſtoral Songs;" "On paſſionate and deſcriptive Songs."

We can perceive, however, that the author of theſe ingenious eſſays loves poetry better than muſic; a perſonage whom he does not treat with common civility, when he ſays, "the heroine Poetry muſt give place to the *harlot Muſic*," notwithſtanding her claim to the title of a *lady of faſhion*. But we think the two ladies ſhould *ride and tie*. There are ſongs where the poetry ſhould be reſpected, and the muſic ſubordinate; and others, where muſic is entitled to preeminence.

We wiſh not fine poetry to have fine muſic, nor fine muſic to be manacled by laboured poetry. Lyric poetry cannot be too ſimple.

The author allows the primitive meaning of a ſong to ſignify ſomething to be *ſung:* and when he ſays, "a ſong, as a poetical compoſition, may be defined a ſhort piece, divided into returning portions of meaſures, and formed upon a ſingle incident, thought, or ſentiment," we readily ſubſcribe to the definition. Indeed it was our opinion, (ſee Italian Tour,) long before we had the pleaſure to peruſe theſe well written eſſays; and it is an opinion to which Metaſtaſio has conſtantly adhered, in all his admirable muſical dramas.

With regard to paſtoral ſongs, though the Sicilian paſtoral is not natural to our climate, yet we produce better fruit for the table in our hot-houſes, than the ſouthern continent of Europe can boaſt. An opera ſong is a *hot-houſe* plant. Paſtoral ſongs may have paſtoral muſic, as the Siciliana movement has been happily treated more frequently by Handel, and many of our beſt national compoſers, ſuch as Arne and Boyce, than any other. And as for ſimple ballad tunes for hiſtorical and narrative ſongs, and common ditties, there can be no ſcarcity; as a collector of our acquaintance, many years ago, had amaſſed a ſufficient number of ſongs ſet to muſic, and printed on a ſingle folio half-ſheet, from the latter end of the 17th century, to fill twelve volumes.

For deſcriptive and paſſionate ſongs, we have pictureſque and paſſionate muſic; and we hope this intelligent and elegant writer will allow the *lady Muſic* to be tricked out a little in paſſionate and deſcriptive ſongs. Haydn, in his "Seaſons," has deſcribed very happily, we think, rural ſports and occupations, and admirably diſplayed her imitative and picturesque powers, in awakening ideas of the ſeveral ſeaſons, and the ruſtic employments of each.

Spring.

The overture paints the departure of winter, and approach of ſpring; ploughing, ſowing; a prayer to heaven for proſperity; the youths and virgins going a Maying; chorus of thanks to the Supreme Being, in which is an admirable fugue, equal to the beſt vocal fugues of Handel.

Summer.

The overture paints the dawn of day; the riſing ſun; choral hymn to that luminary; mowing, reaping; a ſhady retreat; rural employments, and evening ſports.

Autumn.

The ſymphony indicates the huſbandman's ſatisfaction at his plentiful harveſt; chorus in praiſe of induſtry and labour; fruits gathered; duet between an innocent fond pair; field ſports; hunting; vintage; dancing; romping; ſinging; revelling, and jubilation.

Winter.

The overture paints thick fogs at the approach of winter; horrors of winter; diſtreſs of travellers; evening domeſtic amuſements; purring of the wheel; a narrative ruſtic ſong; moral reflections on winter, ſet to a fine air, cantabile; future rewards of a life well ſpent, in the coro finale.

Milton's Allegro and Penſeroſo, as ſet by Handel, which are all *deſcription,* have not been injured by too elaborate muſic; but theſe are not the ſongs nor the muſic of which we meant to trace the hiſtory, when we began the preſent article. See Air.

Song *of Birds,* is defined by the Hon. Daines Barrington to be a ſucceſſion of three or more different notes, which are continued without interruption, during the ſame interval, with a muſical bar of four crotchets in an adagio movement, or whilſt a pendulum ſwings four ſeconds.

It is obſerved that notes in birds are no more innate than language in man, and that they depend entirely upon the maſter under which they are bred, as far as their organs will enable them to imitate the ſounds which they have frequent opportunities of hearing: and their adhering ſo ſteadily, even in a wild ſtate, to the ſame ſong, is owing entirely to the neſtlings attending only to the inſtruction of the parent-bird, whilſt it diſregards the notes of all others that may perhaps be ſinging round him.

Birds in a wild ſtate do not commonly ſing above ten weeks in the year, whereas birds, that have plenty of food in a cage, ſing the greateſt part of the year: and we may add, that the female of no ſpecies of birds ever ſings; and this is a wiſe proviſion of nature, becauſe her ſong would diſcover her neſt; and, in the ſame manner, we may rationally account for her inferiority in reſpect to plumage. The faculty of ſinging is confined to the cock birds; and accordingly Mr. Hunter, in diſſecting birds of ſeveral ſpecies, found the muſcles of the larynx to be ſtronger in the nightingale than in any other bird of the ſame ſize; and in all thoſe inſtances, where he diſſected both cock and hen, the ſame muſcles were ſtronger in the cock. To the ſame purpoſe, it is an obſervation as ancient as the time of Pliny, that a capon does not crow.

Some have aſcribed the ſinging of the cock-bird in the ſpring to the motive only of pleaſing his mate, during incubation; nature, indeed, partly for this end, has given to the male the power of ſinging: but the ſinging of a bird in the ſpring is more probably owing to the greater plenty of plants and inſects, which, as well as ſeeds, are the proper food of ſinging birds, at that time of the year.

Mr. Barrington remarks, that there is no inſtance of any bird's ſinging, which exceeds our black-bird in ſize; and this, he ſuppoſes, may ariſe from the difficulty of its concealing itſelf, if it called the attention of its enemies, not only by bulk, but by the proportionable loudneſs of its notes. This writer farther obſerves, that ſome paſſages of the ſong, in a few kinds of birds, correſpond with the intervals of our muſical ſcale, of which the cuckoo is a ſtriking and known inſtance; but much the greater part of ſuch ſong is not capable of muſical notations: partly, becauſe the rapidity is often ſo great, and it is alſo ſo uncertain when they may ſtop, that we cannot reduce the paſſages to form a muſical bar in any time whatſoever; partly alſo, becauſe the pitch of moſt birds is conſiderably higher than the moſt ſhrill notes of thoſe inſtruments which comprehend even the greateſt compaſs; and principally, becauſe the intervals uſed by birds are commonly ſo minute, that we cannot judge at all of them from the more groſs intervals into which we divide our muſical octave. This writer apprehends, that all birds ſing in the ſame key; and in order to diſcover this key he informs us, that the following notes have been obſerved in different birds, A, B flat, C, D, F, and G; and, therefore, E only is wanting to complete the ſcale: now theſe intervals, he ſays, can only be found in the key of F with a ſharp third, or that of G with a flat third; and he ſuppoſes it to be the latter, becauſe, admitting that the firſt muſical notes were learned from birds, thoſe of the cuckoo, which have been moſt attended to, form a flat third; and moſt of our compoſitions are in a flat third, where muſic is ſimple, and conſiſts merely of melody. As a farther evidence, that birds ſing always in the ſame key, it has been found by attending to a nightingale, as well as a robin, which was educated under him, that the notes reducible to our intervals of the octave were always preciſely the ſame.

Moſt people, who have not attended to the notes of birds, ſuppoſe, that thoſe of every ſpecies ſing exactly the ſame notes and paſſages, which is by no means true, though it is admitted that there is a general reſemblance. Thus the London bird-catchers prefer the ſong of the Kentiſh goldfinches, and Eſſex chaffinches; but ſome of the nightingale-fanciers prefer a Surrey bird to thoſe of Middleſex.

The nightingale has been almoſt univerſally reckoned the moſt capital of ſinging birds; and its ſuperiority, deduced from a caged bird, conſiſts in the following particulars: its tone is much more mellow than that of any other bird, though at the ſame time, by a proper exertion of its muſical powers, it can be exceſſively brilliant. Another point of ſuperiority is its continuance of ſong, without a pauſe, which is ſometimes no leſs than twenty ſeconds; and when the reſpiration became neceſſary, it has been taken with as much judgment as by an opera-ſinger. The ſky-lark in this particular, as well as in compaſs and variety, is only ſecond to the nightingale. The nightingale alſo ſings, if the expreſſions may be allowed, with ſuperior judgment and taſte. Mr. Barrington has obſerved, that his nightingale, which was a very capital bird, began ſoftly like the ancient orators; reſerving its breath to ſwell certain notes, which by this means had a moſt aſtoniſhing effect. This writer adds, that the notes of birds, which are annually imported from Aſia, Africa, and America, both ſingly and in concert, are not to be compared to thoſe of Europe.

The following table formed by Mr. Barrington, agreeably to the idea of M. de Piles in eſtimating the merits of painters, is deſigned to exhibit the comparative merit of the Britiſh ſinging birds: in which twenty is ſuppoſed to be the point of abſolute perfection.

	Mellowneſs of tone.	Sprightly notes.	Plaintive notes.	Compaſs.	Execution.
Nightingale - - - - -	19	14	19	19	19
Sky-lark - - - - - -	4	19	4	18	18
Wood-lark - - - - -	18	4	17	12	8
Tit-lark - - - - - -	12	12	12	12	12
Linnet - - - - - - -	12	16	12	16	18
Goldfinch - - - - - -	4	19	4	12	12
Chaffinch - - - - - -	4	12	4	8	8
Greenfinch - - - - -	4	4	4	4	6
Hedge-ſparrow - - - -	6	0	6	4	4
Aberdavine or ſiſkin - -	2	4	0	4	4
Red-poll - - - - - -	0	4	0	4	4
Thruſh - - - - - -	4	4	4	4	4
Blackbird - - - - - -	4	4	0	2	2
Robin - - - - - - -	6	16	12	12	12
Wren - - - - - - -	0	12	0	4	4
Reed ſparrow - - - -	0	4	0	2	2
Black-cap, or Norfolk mock nightingale - - -	14	12	12	14	14

See Phil. Tranſ. vol. lxiii. pt. ii. art. 31. p. 249, &c.

Song, *Reſponſary*. See Responsary.

SONGARI, in *Geography*, a river of Chineſe Tartary, which joins the Amur at Saghalien.—Alſo, a town of Chineſe Tartary; 10 miles N.W. of Foe Petouné Hotun.

SONGEONS, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Beauvais; 12 miles N.W. of Beauvais. The place contains 1041, and the canton 12,577 inhabitants, on a territory of 205 kiliometres, in 29 communes.

SONG-HOA, a town of Corea; 50 miles S.W. of Hoang.

SONGI, a river of Malacca, which runs into the Chineſe ſea, N. lat. 2° 10′. E. long. 104° 10′.

Songi *Tanjang*, a town on the weſt coaſt of the iſland of Sumatra. N. lat. 2° 35′. E. long. 97° 10′.

SONGIEU, a town of France, in the department of the Ain; 13 miles N. of Belley.

SONG-KI, a town of China, of the third rank, in Fo-kien; 40 miles N.N.E. of Kien-nhing.

SONG-KIANG, a city of China, of the firſt rank, in Kiang-nan, ſituated in the midſt of ſeveral rivers or canals, near the ſea, ſo that the Chineſe junks approach it in every direction. It carries on a large trade in cotton cloth, which the inhabitants ſend to different parts of the empire. It has four towns in its juriſdiction; 560 miles S. of Peking. N. lat. 31°. E. long. 120° 44′.

SONG-MEN-CHAN, a ſmall iſland, near the coaſt of China, in Tche-kiang. N. lat. 28° 22′. E. long. 121° 21′.

SONGO, or Sango, a town of Africa, in the kingdom of Mandingo, near the coaſt of the Gambia.

Songo. See Sankari and Sogno.

SONGOA, an iſland in the ſtraits of Malacca, about 50 miles in circumference. N. lat. 2° 18′. E. long. 100° 30′.

SONGOO, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 7° 20′.—Alſo, a town on the eaſt coaſt of the iſland of Banca. S. lat. 2° 12′. E. long. 106° 16′.

SONGORA. See Sangora.

SONG-TCHOUI, a town of China, of the third rank, in Hou-quang; 40 miles N.E. of Ou-tchang.

SONG-TSI, a town of China, of the third rank, in Hou-quang; 27 miles W. of King-tcheou.

SONG-YANG, a town of China, of the third rank, in Tche-kiang; 22 miles W. of Tchu-tcheou.

SONGY-DAVAN, a town on the weſt coaſt of Sumatra. N. lat. 1° 18′. E. long 98° 12′.

SONGY-LAMA, a town on the weſt coaſt of Sumatra. S. lat. 3° 40′. E. long. 101° 57′.

SONHO, Songo, or *Sogno*. See Sogno.

SON-HOIT, a diſtrict of Chineſe Tartary, in the territory of the Mongols. N. lat. 42° 48′. E. long. 114° 27′.

SONKOE, a town of Bengal; 15 miles W.N.W. of Moorſhedabad.

SONMEANY, the principal ſea-port in the diſtrict of Lus, and province of Mekran, in Perſia. It is a ſmall and mean town, and was deſtroyed in 1809 by the Jouaſſimees. It is ſituated on an elevated bank, at the mouth of the river Pooralee, which forms a bar about a mile from the town, three fathoms deep at low-water, and boats can anchor cloſe to the ſhore. The inhabitants, with the exception of a few Hindoo merchants, live chiefly by fiſhing. Freſh water is procured by digging in the ſand: and it is neceſſary that the well be immediately filled up; for if it be ſuffered to remain open, the water becomes ſalt.

SONNA, a book, or collection of the Mahometan traditions, or of the ſayings and actions of their prophet, which all the orthodox Muſſulmen are required to believe. This is a kind of ſupplement to the Koran, directing the obſervance of ſeveral things omitted in that book, and in ſenſe, as well as deſign, correſponding to the Miſhna of the Jews. See Mahometanism.

The word ſignifies, in Arabic, the ſame with *miſhna* in the Hebrew, that is, *ſecond law;* or, as the Jews call it, *oral law*.

The adherents to the Sonna are called *Sonnites*, or *Traditionaries;* and as, among the Jews, there is a ſect of Caraites, who reject the traditions as fables invented by the rabbins; there are alſo ſectaries among the Mahometans, called *Schiites*, (ſee the article,) who reject the traditions of the Sonnites, as being only founded on the authority of an apocryphal book, and not derived to them from their legiſlator.

There is the ſame enmity between the Sonnites and Schiites, as between the rabbiniſt Jews and the Caraites. The Schiites reproach the Sonnites, with obtruding the dreams of their doctors for the word of God; and the Sonnites, in their turn, treat the Schiites as heretics, who refuſe to admit the divine precepts, and who have corrupted the Koran, &c.

The Sonnites are ſubdivided into four chief ſects, which, notwithſtanding ſome differences as to legal concluſions in their interpretations of the Koran, and matters of practice, are generally acknowledged to be orthodox in radicals or matters of faith, and capable of ſalvation; and have each of them their ſeveral ſtations or oratories in the temple of Mecca. The founders of theſe ſects are regarded as the great maſters of juriſprudence, and are ſaid to have been men of great devotion and ſelf-denial, well verſed in the knowledge of thoſe things which belong to a future life, and to man's right conduct in the preſent ſtate, and directing all their knowledge to the glory of God. This is Al Ghazeli's encomium of them, who thinks it derogatory to their honour, that their names ſhould be uſed by thoſe who, neglecting to imitate the other virtues which form their character, apply themſelves merely to attain their ſkill, and follow their opinions in matters of legal practice.

The firſt of theſe orthodox ſects is that of the “Haneſites,” ſo named from their founder, Abu Hanifa al Nomen Ebn Thebet, who was born at Cufâ, in the 80th year of the Hegira, and died in the 150th; ending his life in priſon, at Bagdad. The reaſon of his confinement was his refuſal to be called “Kadi,” or judge; and when he was queſtioned concerning it, he is ſaid to have replied, “If I ſpeak the truth, I am unfit; but if I tell a lie, a liar is not fit to be a judge.” It is reported, that, during his confinement in priſon, he read over the Koran no leſs than 7000 times. An Arabian writer calls the Hanefites “the followers of reaſon,” and thoſe of the three other ſects “followers of tradition;” the former being principally guided by their own judgment in their deciſions, and the latter adhering more tenaciouſly to the traditions of Mahomet. This ſect formerly obtained chiefly in Irak, but now generally prevails among the Turks and Tartars. The ſecond orthodox ſect is that of Malec Ebn Ans, who was born at Medina, in the year of the Hegira 90, 93, 94, or 95; and died there in 177, 178, or 179. This doctor is ſaid to have paid great regard to the traditions of Mahomet. In his laſt illneſs, a friend who viſited him, and found him in tears, and aſking the reaſon of it, received for anſwer, “How ſhould I not weep? and who has greater reaſon to weep than I? Would to God that for every queſtion decided by me according to my opinion, I had received ſo many ſtripes! then would my account be more eaſy. Would to God I had never given any deciſion of my own!” The doctrine of Malec is chiefly favoured in Barbary, and other parts of Africa. The third orthodox ſect was denominated “Shafeites.” (See the article.) The founder of the fourth ſect was Ahmed Ebn Hanbal. See HANBAL. Sale's Koran, Int.

SONNEBECK, in *Geography*, a town of France, in the department of the Lys; 5 miles N.E. of Ypres.

SONNEBERG, a town of Bohemia, in the circle of Saatz; 6 miles W. of Commotan.—Alſo, a town of Germany, in the principality of Coburg; 10 miles N.N.E. of Coburg. N. lat. 50° 23′. E. long. 11° 13′.—Alſo, a town of Auſtria; 12 miles S.S.W. of Laab. N. lat. 48° 29′. E. long. 16° 2′.—Alſo, a citadel of Auſtria, which gives name to a county veſted in the houſe of Auſtria; 23 miles S. of Bregentz.

SONNEBORN, a town of Pruſſia, in the province of Oberland; 5 miles S. of Morungen.

SONNEBURG, a town of the Middle Mark of Brandenburg, on a ſmall river, which runs into the Warta; in which is a commandery of the knights of Malta. The grand-maſter may create as many knights as he pleaſes, nor are Lutherans excluded, who are permitted to marry. The elector of Brandenburg is the grand-maſter of the order; 10 miles E.S.E. of Cuſtrin. N. lat. 52° 37′. E. long. 14° 58′.

SONNECQUE, a river of Brabant, which runs into the Senne, 5 miles above Halle.

SONNEG, a town of the duchy of Carinthia; 2 miles S. of Eberndorff.

SONNEN KOGEL, a mountain of Auſtria; 8 miles S. of Steyr.

SONNENBERG, a town of Germany, in the principality of Naſſau Saarbruck Uſſingen; 2 miles N.E. of Wiſbaden.—Alſo, a town of Sileſia, in the principality of Grotkau; 6 miles S.E. of Grotkau.—Alſo, a town of Pruſſia, in the province of Bartenland; 12 miles S.E. of Bartenſtein.—Alſo, a town of Pruſſia, in the province of Ermeland; 16 miles E.N.E. of Elbing.

SONNENBURG, a town of Brandenburg, in the New Mark, on the Lenza; 7 miles E. of Cuſtrin. N. lat. 52° 37′. E. long. 14° 58′.

SONNENSTEIN, a fortreſs of Saxony, in the margraviate of Meiſſen, near Pirna.

SONNERATIA, in *Botany*, was ſo named by the younger Linnæus, in honour of a diſtinguiſhed French traveller and naturaliſt, M. Sonnerat, who publiſhed, in 1776, a Voyage to New Guinea, in one volume. 4to.; and in 1782, a Voyage to the Eaſt Indies and China, in two ſimilar volumes. Both works are adorned with a multitude of engravings. They do honour to the author's character, as well as to his information. The latter publication is peculiarly inſtructive and correct, on the ſubject of Hindoo mythology, and has been made much uſe of by various ſucceeding writers. Botany does not make a prominent part of M. Sonnerat's performances; but he has deſcribed and figured ſeveral new or rare plants, particularly adverting to important articles of trade or medicine whoſe hiſtory was previouſly obſcure, in his Voyages, and he is alſo the author of ſome expreſsly botanical treatiſes, of ſimilar aim, which have been given to the world in periodical publications. He died, a ſhort time ſince, at an advanced age, having juſt before paid a viſit to England.—Linn. Suppl. 38. Schreb. Gen. 337. Willd. Sp. Pl. v. 2. 999. Mart. Mill. Dict. v. 4. Juſſ. 325. Lamarck Illuſtr. t. 420. (Aubletia; Gærtn. t. 78.)—Claſs and order, *Icoſandria Monogynia*. Nat. Ord. *Myrti*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, coriaceous, ſomewhat bell-ſhaped at the baſe, with a tumid internal border; the limb in ſix or four ovate, acute, ſpreading, flat, permanent ſegments. *Cor.* Petals ſometimes ſix, awl-ſhaped, ſpreading, inſerted into the internal rim of the calyx, and about the ſame length; in ſome caſes wanting. *Stam.* Filaments numerous, flattened, inſerted likewiſe into the rim of the calyx, as long or longer than its ſegments; anthers roundiſh. *Piſt.* Germen ſuperior, globoſe, ſtyle thread-ſhaped, about the length of the ſtamens; ſtigma capitate. *Peric.* Berry large, globoſe, pointed, ſmooth, ſeated on the permanent calyx, of many cells, full of veſicular pulp. *Seeds* numerous, oblong, curved, gibbous and corrugated.

Eſſ. Ch. Calyx in four or ſix ſegments, coriaceous, inferior, permanent. Petals awl-ſhaped, or none. Berry of many cells. *Seeds* numerous, gibbous.

Obſ. This genus is ſomewhat like a *Punica*, with its fruit turned out of the calyx. The younger Linnæus ſeems to have ſtudied very ſuperficially the only ſpecies which fell in his way, never perceiving it to be an old plant of his father's, deſcribed and figured by Rumphius.

1. S. *acida*. Red-flowered Sonneratia. Linn. Suppl. 252. Willd. n. 1. (Rhizophora caſeolaris; Linn. Sp. Pl. 635. Aubletia caſeolaris; Gærtn. v. 1. 379, excluding the ſynonym of Rumphius. Mangium caſeolare rubrum; Rumph. Amboin. v. 3. 112. t. 74. Pagapate; Sonner. Nouv. Guin. 16. t. 10, 11.)—Flowers in ſix ſegments; with ſix petals. Leaves elliptic-oblong. Branches quadrangular.—Native of the muddy banks of large rivers in the Molucca iſlands; often planted about houſes for the ſake of its fruit. Sonnerat found it in moiſt parts of New Guinea. We have a ſpecimen, gathered by Dr. Buchanan in Bengal, where, as he informs us, the natives know this plant by the name of *Duabanga*. The Malays call it *Brappat*, according to Rumphius, who deſcribes it as a large tree, flowering in

October. The *branches*, as he juſtly obſerves, are ſquare, not round. The heart of the *wood* is hard and durable. *Leaves* oppoſite, on very ſhort ſtalks, elliptic-oblong, obtuſe, with a ſmall point, entire, ſomewhat ſucculent, a ſpan long, ſmooth, with one rib, and numerous tranſverſe veins; their under ſide glaucous. *Flowers* terminal, ſolitary, of a beautiful red. *Fruit* green, acid, ſmelling like rotten cheeſe, falling out of the *calyx* when quite ripe. The Malays, &c. eat it, as well as the young leaves, with fiſh and other food. The beautiful half-expanded *flowers* are worn as ornaments for the head, and are often imitated in gold. Rumphius ſays it is uſual to depreſs the ſtamens with two little pegs, forced croſs-wiſe through the piſtil.

2. S. *alba*. White-flowered Sonneratia. (Mangium caſeolare album; Rumph. Amboin. v. 3. 111. t. 73.)—Flowers in ſix, or more, ſegments, without petals? Leaves elliptical or roundiſh. Branches round.—Native of ſtony or rocky plains, overflowed by the tide, on the ſea-ſhore of the Molucca and neighbouring iſlands, flowering in Auguſt and September. Rumphius deſcribes this as a large, thick and rugged *tree*, like an oak, with ſpreading and curved branches, commonly laden with various paraſitical plants. The *branches* are round. *Leaves* ſmooth, brittle and ſucculent, with hardly any viſible veins, and of a rounder broader ſhape than the foregoing. *Flowers* two or three together at the end of each branch. *Calyx* green, in ſix, ſeven or eight diviſions. No mention is made of any *petals*. *Stamens* long, white, with brown *anthers*. *Style* very long, with a green *ſtigma*. *Fruit* depreſſed, as broad as the hand, internally dry, white, and granular, with an aſtringent, and ſlightly acid flavour, but no ſmell. It burſts at length into ſeveral portions, but does not fall off like the former, nor is it ſo generally eaten, except when dreſſed with fiſh. Rumphius ſo clearly diſtinguiſhes this ſpecies, which Gærtner miſtook for the former, and Linnæus confounded therewith under his *Rhizophora caſeolaris*, that though we have ſeen no ſpecimen, we have ventured to deſcribe it. What thoſe horn-ſhaped excreſcences are, which occupy the ſoil at ſome diſtance from the baſe of this tree, from a ſpan to a foot in length, and of a corky ſubſtance, as deſcribed by Rumphius, we can offer no conjecture.

3. S. *apetala*. Small-flowered Sonneratia. Buchanan in Symes's Embaſſy to Ava, octavo, v. 3. 313. t. 25.—Flowers in four ſegments; without petals. Leaves ovato-lanceolate. Branches round, pendulous.—Native of the moiſt inundated ſea-ſhores of the kingdom of Ava, near Rangoon, flowering in May. We have ſpecimens communicated by Dr. Roxburgh to lord Valentia. This is deſcribed as a moſt beautiful *tree*, reſembling our Weeping Willow, but taller, with ſcattered, pendulous, ſmooth, round, ſlender branches. *Leaves* few, oppoſite, ſtalked, ovato-lanceolate, entire, ſmooth, rather fleſhy, about three inches long, moſtly blunt, a little unequal at the baſe, hardly an inch broad. *Flowers* axillary and terminal, ſtalked, drooping, greeniſh, about an inch in diameter, with white ſtamens, the length of the *calyx*, but no *petals*. *Fruit* orbicular, depreſſed, of eight cells, with numerous angular *ſeeds*. The *ſtigma* is remarkable for its great ſize, and conical figure, hollow underneath, like a ſort of cap. The want of *petals* in this ſpecies induces us the more readily to believe, that they may alſo be wanting in the laſt, and that the accurate Rumphius has not merely by accident omitted to mention them.

SONNERSKARET, in *Geography*, a ſmall iſland on the E. ſide of the gulf of Bothnia. N. lat. 63° 25′. E. long. 21° 32′.

SONNET, Sonetto, in *Poetry*, a kind of compoſition properly contained in fourteen verſes; *viz.* two ſtanzas, or meaſures, of four verſes each, and two of three; the eight firſt verſes being all in two rhymes.

The ſonnet is of Italian origin, and Petrarch is allowed to be the father of it; it is held the moſt difficult and artful of all poetical compoſitions, as requiring the utmoſt accuracy and exactneſs. It is to end with ſome pretty ingenious thought: the cloſe muſt be particularly beautiful, or the ſonnet is defective.

In Malherb, and ſome other French poets, we meet with ſonnets, where the two firſt ſtanzas are not in the ſame rhyme; but they are held irregular; and, in effect, great part of the merit of theſe pieces conſiſts in a ſcrupulous obſervance of the rules.

Ronſard, Malherb, Maynard, and Gombaut, have compoſed abundance of ſonnets; but, among two or three thouſand, there are ſcarcely two or three worth much.

Paſquier obſerves, that Du Bellai was the firſt who introduced ſonnets into France. But Du Bellai himſelf ſays, that Merlin de S. Gelais firſt converted the Italian ſonnets into French.

Of twenty-three ſonnets which were written by our great poet Milton, that addreſſed to Henry Laws is one of the beſt; and yet this ſhews how difficult and unnatural the conſtruction of this ſpecies of poem is in the Engliſh language; whereas, from the great number of ſimilar terminations in the Italian tongue, and the ſucceſs of Petrarch, it has long been the favourite meaſure of Italy for ſhort compoſitions. However, Muratori thinks it extremely difficult for his countrymen to make a good ſonnet; and he compares this kind of poem to the bed of Procruſtes, where the legs of thoſe that were too ſhort were ſtretched, and thoſe too long were cut to the ſize of the bed.

Antonio a Tempo, a civilian at Padua, in his Treatiſe on Poetry, 1332, diſtinguiſhes ſixteen different kinds of ſonnet. Burney's Hiſt. Muſic, vol. ii. p. 324.

SONNEWALDE, in *Geography*, a town of Saxony; 10 miles S. of Luckau. N. lat. 51° 40′. E. long. 13° 38′.

SONNINO, a town of Campagna di Roma; 6 miles N. of Terracina.

SONNO, a town of Japan, in the iſland of Niphon; 18 miles N.W. of Iwata.

SONOKI, a town of Mingrelia; 45 miles S.E. of Anarghia.

SONORA, or Senora, a province of New Spain, ſituated between 35° and 27° N. lat. and 110° and 117° W. long.; bounded N. by New Mexico, W. by California, S. by Sinaloa and the gulf, and E. by Biſcay and New Mexico. Its greateſt length from N. to S. is about 420 miles, and its breadth from E. to W. 380 miles. The air is dry and pure, and the climate generally healthy, though near the gulf the ground is marſhy, and it is, in ſome of the diſtricts, inſalubrious. Sonora abounds in rich gold and ſilver-mines, particularly the former. Like Biſcay, it is deſtitute of timber, but it has ſome rich ſoil near the gulf. Its rivers are the Rio de l'Aſcenſion, which enters the gulf of California about N. lat. 31°, and the Rio Yaqui, which diſcharges itſelf into the ſame gulf at Guyamas, at N. lat. 28°. Its animals are the deer, cabrie, and bear, and large lizards, which are tamed by the inhabitants, and trained to catch mice. The population of Sonora may be eſtimated at 200,000 ſouls, conſiſting of Spaniards, Creoles, Metiſs, and Indians. The capital of Sonora is Ariſpaa, ſituated in N. lat. 21° and W. long. 111°, near the head of the river Yaqui; celebrated for the urbanity and hoſpitality of its inhabitants,

habitants, and for the large quantity of gold table utenſils uſed in their houſes; and having a population of 3400 perſons. The next cities in reſpect of magnitude are Sonora, S., and Terenate, N. of the capital. Sonora trades with New Mexico and Biſcay for the productions of thoſe different provinces, and with old Mexico, both by land and ſea, through the gulf of California. It is famous for its cheeſe, horſes, and ſheep. The governor is a brigadier-general, and his ſalary is 7000 dollars, in addition to his pay in the line. The regular military force of this province conſiſts of 900 dragoons, and 200 infantry, the latter being Indians called Opejas, and reckoned the beſt ſoldiers in New Spain. The profeſſed religion is the Catholic, and it belongs to the dioceſe of the biſhop of Durango. The ſeat of government is at Chihuahua.

SONORYA, a town of Hindooſtan, in Benares; 10 miles S. of Merzapour.

SONS HARMONIQUES, or fluted ſounds, a ſingular kind of ſound produced on the violin, tenor, and violoncello, by touching the ſtring ſlightly in its aliquot parts and harmonic diviſions, without preſſing the finger on the finger-board; by which means, that part of the ſtring ſounds, which is above the hand next to the nut, not the part touched by the bow. Theſe ſounds are very different in quality of tone from thoſe which would be produced, if the finger were preſſed down. As to the pitch of tone, the harmonics will give the fifth, when the third would be produced by the uſual means; the third, when the ſixth is expected, &c. The quality of tone acquired by this means is ſo much more ſweet than the common tones of the inſtrument, that the French have entitled them *notes flutées*, fluted notes. Rouſſeau ſays, that to form an accurate idea of theſe ſounds, it was neceſſary to hear Mondonville produce them on his violin, and Bernard on his violoncello, who could form a regular ſcale of theſe ſweet tones, which very much aſtoniſhed thoſe who did not know the theory. But we have heard Salomon perform this feat, this trick of youth, with a dexterity and taſte unknown to Mondonville.

As the principle on which this theory is founded depends on transferring the tone, produced by the bow, to that part of the ſtring next the nut, inſtead of that next the bridge, of which the bow prevents the vibration, the long diviſion of the ſtring, when touched ſlightly by the finger, ſeems to produce the higheſt note; and *è contra*.

We ſhall give, in the *Muſic Plates*, a table of harmonic ſounds, which will facilitate the practice of this ſeemingly eccentric ſcale. The firſt line, or ſtaff, will indicate the ſounds which would be produced in the common way; and the ſecond line, the correſpondent fluted note, when the ſtring is touched harmonically. All the ſounds of the trumpet marine are harmonics, which renders it difficult to produce certain ſounds upon that inſtrument. See NOISE.

SONSBECK, in *Geography*, a town of the duchy of Cleves; 11 miles S.S.E. of Cleves.

SONSECA, a town of Spain, in New Caſtile; 8 miles S. of Toledo.

SONSINO. See SONCINO.

SONSONATE. See *La* TRINIDAD.

SONTAG, a town of the duchy of Stiria; 3 miles N.W. of Fridau.

SONTAGBERG, a town of Auſtria, in which is a cloiſter of Benedictines; 5 miles N. of Bavarian Waidhoven.

SONTAGE, in our *Old Writers*, a tax of forty ſhillings laid upon every knight's fee, according to Stow, p. 284.

SONTHEIM, in *Geography*, a town of Germany, in the lordſhip of Limburg; 15 miles S.E. of Hall in Swabia.

SONTHEIM, *Maine*, a town of the duchy of Wurzburg, on the Maine; 3 miles N. of Kitzingen.

SONTHOFEN, or SUNTHOFEN, a town of Bavaria, in the biſhopric of Augſburg; 56 miles S. of Augſburg.

SONTHONNAX *de la Montagne*, a town of France, in the department of the Ain; 6 miles N.W. of Nantua.

SONTRA, a town of Germany, in the principality of Heſſe Rhinfens, on the Wohra; 28 miles S. of Caſſel. N. lat. 51° 5′. E. long. 9° 58′.

SONVICO, a town of Italy; 5 miles N. of Lugano.

SONUS, or NUMADUS, in *Ancient Geography*, a river of India, on this ſide of the Ganges, which had its ſource in the mountains, ran towards the eaſt, and bending its courſe towards the north-eaſt, diſcharged itſelf into the Ganges, a little below Jomanas, after a courſe of about 200 leagues. M. d'Anville ſuppoſes that this river is the Audomatis of Arrian; but as this river had its riſe among the Mondiadini, and ran into the Ganges, it could not be the ſame with the Sonus.

SONWARY, in *Geography*, a town of Hindooſtan, in Guzerat; 21 miles S. of Surat.

SONZAY, a town of France, in the department of the Indre and Loire; 12 miles N. of Tours.

SOO, a town of Japan, in the iſland of Ximo; 25 miles N.W. of Uxumi.

SOOBARUM, a town of Hindooſtan, in the circar of Cicacole; 10 miles N.W. of Viſigapatam.

SOOBKA, a town of Bengal; 13 miles S. of Boglipour.

SOOBOO, a town of Africa, in Bambarra; 10 miles W. of Sego.

SOOBRUDOOKI, a town of Africa, in Bondou; 20 miles S.W. of Fatteconda.

SOO-CHOO. See SOU-TCHEOU.

SOOCOO, in *Commerce*, a money of account at Bencoolen; 4 ſoocoos being = a dollar = 32 ſattalies, or ſatellers: this dollar is reckoned at 5*s.* ſterling.

SOODEREH, in *Geography*, a town of Hindooſtan, in Lahore; 15 miles N.N.E. of Ameenabad.

SOOE, a town of Hindooſtan, in Guzerat; 37 miles N.N.E. of Radunpour.

SOOHA, a town of Africa, in Bambarra, on the river Niger. N. lat. 13° 10′. W. long. 4° 52′.

SOOHAGEE, a town of Hindooſtan, in Boggilcund; 30 miles N.N.E. of Rewah.

SOOINS, a name given in the North to a kind of rural food, that has been found very beneficial in the ſcurvy. This food is prepared by putting ſome oatmeal into a wooden veſſel, and pouring hot water upon it, and continuing the infuſion till the liquor begins to taſte ſouriſh, *i. e.* till a fermentation comes on, which in a place moderately warm may be in the ſpace of two days. The water is then poured off from the grounds, and boiled down to the conſiſtence of a jelly.

SOOKA, in *Geography*, a town of Bengal; 42 miles W. of Silhet.

SOOKANG, a town of Africa, in Fooladoo. N. lat. 13° 35′. W. long. 8° 5′.

SOOKAPOORA, a kingdom of Japan.

SOOKJURAH, a town of Bengal; 33 miles W. of Nagore.

SOOKSOR, a town of Bengal; 6 miles N. of Calcutta.

SOOLARAM, a town of Hindooſtan, in the circar of Ellore.

SOOLOO, one of the Philippine iſlands, in the Eaſt Indian ſea, about 30 miles long and 10 broad, and containing 60,000 inhabitants, who are Malays, governed by a king or ſultan, with an ariſtocracy of about fifteen nobles, named "datoos," who form the greateſt part of the legiſlature, whoſe title is hereditary to the eldeſt ſon, and who ſit in council with the ſultan. This iſland enjoys a perpetual ſummer, and produces a great variety of fruit: it abounds with the tree called teak. Many Chineſe live on the iſland, and carry on great trade, ſending to Canton black and white ſwallows, wax, pearls, teepye, or pearl oyſter-ſhells, bird's-neſts, tortoiſe-ſhell, ſago, rattans, ſandal, and various dyeing woods, cinnamon, or caſſia, &c. At Sooloo, and many neighbouring iſlands, the pearl fiſhery has been carried on for ages, and is the principal ſource of their wealth. The dominions of Sooloo extend over the principal part of the archipelago of iſlands between Borneo and Mindanao, called the Sooloo Archipelago, and even on the north coaſt of the former iſland. Their religion is Mahometan, but in their morals they are faithleſs and cruel. The Engliſh Eaſt India company have an agent in this iſland. On the neighbouring ſea are ſome excellent pearl fiſheries; and abundance of edible bird-neſts are found, eſpecially in a ſmall iſland, or rock, to the S.W. of Sooloo; but the principal production is ſago. The ſituation is between Borneo and Mindanao, 42 miles S.W. from the latter. N. lat. 6°. E. long. 119°.

Sooloo *Archipelago*, a part of the Eaſtern Indian ſea, covered with a great number of ſmall iſlands, extending from the S.W. coaſt of Mindanao to the N.E. coaſt of Borneo.

SOOMA, a town of Japan, in the iſland of Niphon; 45 miles E. of Jedo.

SOOMGONG, a town of Hindooſtan, in Goondwana; 10 miles S. of Nagpour.

SOOMOONANG, a lofty range of mountains, which forms the boundary of Thibet on the ſouth, and divides it from Bootan.

SOONABATTY, a town of Hindooſtan, in Bahar; 40 miles E. of Doeſa.

SOONAJURA, a town of Hindooſtan, in Bengal; 50 miles W. of Silhet.

SOONAL, a town of Hindooſtan, in the country of Malwa, of conſiderable extent, of a ſquare form, and incloſed within a ſtone wall. Two wide ſtreets croſs one another, at right angles, in the middle of the town, which is the "Chowk." There are 32 villages in this pergunnah.

SOONAM, or Sunnam, a town of Hindooſtan, in the country of Delhi; 136 miles W.N.W. of Delhi. N. lat. 29° 57′. E. long. 75° 31′.

SOONAMOOKY, a town of Bengal; 13 miles N. of Biſſunpour. N. lat. 23° 18′. E. long. 87° 33′.

SOONDA, a ſmall country of Hindooſtan, near the weſt coaſt, between Canara and Concan, about 40 miles from north to ſouth, and 30 from eaſt to weſt. After the death of Tippoo, ſultan of Myſore, this country was aſſigned to the Mahrattas.

SOONGARES, a nation of Ruſſia, which, at the ſeparation of the Mongolian monarchy, formed one ſtock with the Derbetans, but afterwards parted, under two diſcordant brothers of their princely family. It was this horde which, in the 17th and 18th centuries, reduced to their ſubjection a great part of the other Kalmuck races, particularly the Khoſchot, Derbet, and Kho-it; and waged bloody wars with the Mongoles, as well as with the Chineſe empire itſelf, but which ended in their total ſubjugation and diſperſion. Previouſly to this unhappy period, they, together with the Derbets, numbered upwards of 50,000 bows, or fighting men, and paſſed in modern times for the braveſt, richeſt, and moſt powerful horde. Their ſeat was formerly about the Balkhaſh lake, and its rivers Tſchuy and Ily; and their moſt flouriſhing period was between the years 1696 and 1746. The towns of the eaſtern Bucharia and the great Kirghiſe horde were, about this time, tributary to them. They conquered Budala, the capital of the Dalai-lama, and raiſed conteſts in Siberia, where they made tributary ſome nations belonging to Ruſſia. On the death of their khan Galdan Zeren, a diſſolution of the horde enſued, occaſioned by diſputes concerning the ſucceſſion; when the Torgots, the Khoſchots, and Derbets, ſeparated from it. Many of the Soongarians diſperſed themſelves in the interior parts of Aſia, and quite into the Uſbeck towns; ſome thouſands of them fled into Siberia; when the generality accommodated themſelves to the Chineſe ſovereignty: and from their own ſtatements it appears, that ſcarcely 20,000 families of them and of the Derbetan nation are now remaining. The number of the Soongares, who at that time (1758) took refuge in Ruſſia, amounted to about 20,000 perſons. They were united with the Volgaic Kalmucks, but for the moſt part returned with them, in the year 1770, again into the Soongarey. Tooke's View of the Ruſſ. Emp. vol. i.

SOONGEY PESANG *Bay*, a bay on the weſt coaſt of Sumatra. S. lat. 0° 57′. E. long. 99° 50′.

SOONKY, a town of Hindooſtan, in Bahar; 15 miles W.N.W. of Arrah.

SOONWALLA, a town of Hindooſtan, in Berar; 17 miles W. of Akoat.

SOONYGONG, a town of Hindooſtan, in Goondwana; 60 miles N. of Ramteak.

SOOP. See Soup.

SOOPA, in *Geography*, a town of Hindooſtan, in Dowlatabad; 27 miles E. of Poorunder.

SOOPOUR, a town of Napaul, on the borders of Bahar; 120 miles N. of Patna.—Alſo, a town of Bengal; 30 miles S.E. of Nagore. N. lat. 23° 38′. E. long. 87° 48′.—Alſo, a town of Bengal; 45 miles N.W. of Midnapour.—Alſo, a town of Hindooſtan; 5 miles N.W. of Benares.—Alſo, a town of Hindooſtan, in Oude; 46 miles N.N.E. of Gooracpour. N. lat. 27° 20′. E. long. 84° 13′.

SOOPSUNDY, a town of Hindooſtan, in the Carnatic; 10 miles S.S.E. of Tanjore.

SOOR, or Shoor, a name given to the river Indus, between Attock and Moultan.

Soor. See Tsor.

SOORANGUR, a town of Hindooſtan, in the Oriſſa country, near the river Mahanada; the burial-place of an Engliſhman of the name of Elliot, who died on his way from Calcutta to Nagpour in the year 1778. Mr. Haſtings cauſed a monument to be erected on the ſpot to his memory; 200 miles E. of Nagpour.

SOORAPATEE, a kingdom of the iſland of Java, on the ſouth coaſt, eaſt of Panaraga.

SOORAPETTA, a town of Hindooſtan, in Golconda; 33 miles S. of Combamet.

SOORATPOUR, a town of Hindooſtan, in Bahar; 10 miles N.N.E. of Arrah.

SOOREAH, a town of Hindooſtan, in the circar of Ruttunpour; 28 miles S.S.E. of Ruttunpour.

SOORJEW, a name given to the Dewah, in Thibet.

SOORMA, a river of Aſia, which riſes in Meckley, and runs into the Burrampooter, near Sunerampour, in Bengal.

SOOROOT, an iſland in the Eaſtern Indian ſea, about 25 miles in circumference. N. lat. 2° 45′. E. long. 108° 36′.

SOORORE, a circar of Bengal, bounded on the north, eaſt, and ſouth, by Coſſimpour and Dinagepour; and on the weſt by Rajemal; about ten miles long, and from five to eight broad. Bydell ſeems the chief town.

SOORWALL, a town of Hindooſtan, in Bundelcund; 35 miles W. of Allahabad.

SOORY, a town of Bengal; 7 miles E. of Nagore. N. lat. 23° 55′. E. long. 87° 38′.

SOOSELA, a town of Africa, in Kullo. N. lat. 12° 21′. W. long. 8° 40′.

SOOSNEER, a pretty large town of Hindooſtan, in Malwa, belonging to Sindiah. See OUGEIN.

SOOSOOHOONAM, or SOESOEHOONAM, often called *Soeſoehoonam Materam*, from the place of the reſidence of the emperor of Java, a kingdom or empire, being the fourth, of the iſland of Java. This empire formerly comprehended the greateſt part of the iſland; that of "Cheribon" formed a part of it, and it was then very powerful: but ſince the Dutch eſtabliſhed themſelves there, it has loſt much of its importance. Nevertheleſs it remained undivided till about the middle of the laſt century, when the emperor found himſelf ſo much embarraſſed, in conſequence of the rebellion of Manko Boeni, a prince of the blood, that he made a ceſſion of his territories to the Company; who, in return, granted him half of it as their vaſſal, and promiſed him their protection; engaging, at the ſame time, never to make any one emperor of Java, who was not a prince of the imperial family. The empire being thus divided, the other half was, in the ſame manner, given to Manko Boeni, as the Company's vaſſal, under the title of ſultan, with the like promiſe of protection, and the like engagement never to nominate any other than princes of his family, as ſucceſſors to his dignity. This other half conſtitutes the fifth empire of Java. The capital of Soeſoehoonam is Jolo.

SOOSWARGUR, a town of Hindooſtan, in Sumbulpour; 32 miles W. of Sumbulpour.

SOOT, an earthy volatile matter, ariſing from wood, coals, and other fuel, along with the ſmoke, by the action of fire; or rather, it is the ſmoke itſelf, fixed and detained on the ſides of the chimney.

Soot is a collection of ſubſtances formed by the matter in the flame of inflammable bodies, but which have eſcaped perfect combuſtion, from not having ſufficient contact with the vital air. Hence it is that the ſoot may be burned over again, and hence likewiſe it is that when the combuſtion is very rapid and effectual, there is no perceptible ſmoke, becauſe all the inflammable matter is then deſtroyed; as in the cylinder lamps, violent fires, &c. This matter is always of a black colour, more or leſs browniſh, which colour it acquires from an oil that is burnt, and half reduced to the ſtate of coal. Its different qualities and appearances are owing to the nature of the inflammable ſubſtances which produce it, and the different manner in which they are burnt.

Chimney ſoot is a compound of black carbonaceous matter with a conſiderable quantity of carbonated ammonia, and probably ſome other ammoniacal ſalts; and hence it gives a ſtrong pungent ſmell of this alkali, when rubbed with quicklime. The analyſis of ſoot exhibits an oil, which may be extracted by diſtillation; a reſin, which may be taken up by alcohol, and which ariſes either from the imperfect alteration of the reſin of the vegetable, or the combination of vital air with the volatile oil. It likewiſe affords an oil, which is often formed by the decompoſition of mucus; and it is this acid, of great utility in the arts, for which the academy of Stockholm have deſcribed a furnace proper for collecting it. Soot likewiſe affords volatile ſalts, ſuch as the carbonate of ammonia, and others. A ſlight portion of fibrous matter is likewiſe volatilized by the force of the fire, and it is again found in the ſoot.

Soot is moſtly formed from the combuſtion or burning of common or pit-coal, and in general contains ſome portion of matters derived from animal ſubſtances: it is conſequently powerful, when applied as a manure. In the trials of ſir Humphrey Davy, it was found to afford ammoniacal ſalts by diſtillation, and to yield a brown extractive matter, of a bitter taſte, by means of hot water. It is likewiſe ſaid to contain an empyreumatic oil, but that its great baſis is charcoal, in a ſtate in which it is capable of being rendered ſoluble by the action of oxygen and water.

The ſoot which is formed either from vegetables or from coal, is good both for corn and graſs, eſpecially on cold moiſt grounds, or lands apt to be over-run with moſs. Many have found their account in ſtrewing it early over their green wheat and barley crops; but Mr. Ellis ſays, neither of them ought to be ſooted after the 25th of April, becauſe the wheat, and generally the barley, have then done gathering and branching, and are upon the ſpindle. He likewiſe thinks it proper to be ſown over young turnips, juſt after they have appeared. But care ſhould always be taken not to ſtrew it too thick, leſt its hot nature ſhould hurt the plants. Mr. Worlidge ſeems to think wood-ſoot the beſt; but Mr. Mortimer prefers that which is made from ſea-coal, of which about 40 buſhels are commonly allowed to an acre; though ſome grounds will require more: to which he adds, that it produces a very fine ſweet graſs, and deſtroys worms and weeds; and that it ought not to be ſown upon wheat till Candlemas, becauſe the long cold rains and ſnows are apt to waſh it in too ſoon; nor is it ſafe to lay it on later, leſt a drought ſucceed, and burn it up. See MANURE and TOP-*Dreſſings*.

However, Mr. Donaldſon obſerves, that this uſeful manure can be obtained in conſiderable quantities only from great cities, or large manufacturing towns. The price in London, whence great quantities are carried to the adjacent diſtricts, is eight-pence the buſhel. The ordinary allowance is from 25 to 35 buſhels an acre. Soot is uſed in many parts of England, as Middleſex, Buckingham, Glouceſter, Wilts, Lancaſhire, Yorkſhire, &c. The mode of application is chiefly as top-dreſſings for young clover, ſainfoin, and old worn-out meadows. The beſt ſeaſon for laying it on is in February or March. It is carefully ſpread over the field with the hand, and always ſucceeds beſt, if rain immediately enſues. But Mr. Marſhall recommends its being ſown before rain, when a ſhower waſhes it in, and will be of obvious ſervice; but that if it lie on the ſurface long without rain, there will be no benefit derived from it. A rich ſoil wants no ſoot, but a ſoil much out of heart wants 40 or 50 buſhels. In his Rural Economy of Norfolk, he ſays, that the time of ſowing it over the land is conſidered as very material. If it be ſown early, and the froſt catch it, its ſtrength is thereby lowered; if late, and no rain falls to waſh it in, it is thought to be rather injurious than beneficial to the crop of wheat. And it is not, in any caſe, found of much, if any, ſervice to the ſucceeding crop of barley.

The method of ſowing it is extremely ſimple; and, in the only inſtance he ſaw, the ſowing of ſoot practiſed there was very complete. A favourable opportunity being embraced, when the wind blew gently, and in the direction, or nearly in the ſame direction, as the lands or ridges lie; the ſame waggon which brought it from Norwich, and which, until the opportunity offered, had ſtood ſafe under cover, was drawn in a furrow againſt the wind; while a man, ſtanding on the outſide of the waggon, ſpread the ſoot, with a ſhovel, ſeveral yards wide on either ſide of him; the height of his ſituation at once enabling him to ſpread it wide and even. As he reached the windward end of the lands, the team wheeled round under the hedges, and took a freſh width. The quantity ſet on was forty buſhels an acre in this caſe.

Mr. Young, however, remarks, that, in general, thirty buſhels are uſed for a complete dreſſing; that is, when dung or ſome other manure has not been previouſly applied to the ſame crop, which is very frequently the practice, and the quantity of top-dreſſing is then diminiſhed to about one-half of a complete dreſſing. Of ſoot, a complete dreſſing, as above, coſts from 30*s.* to 36*s.* *per* acre. Soot is found to anſwer beſt on wheat in April. It likewiſe ſucceeds on peaſe or clover in the ſame month, and has a good effect ſown *with* barley, in the beginning of April, and harrowed in. A ſlight dreſſing of ſoot is uſed at any time in the ſpring, when grubs or worms appear to injure the young corn. The worms frequently make great havoc, by drawing the blades of young corn after them into their holes: this ſoot prevents beſt: ſoot thinly diſtributed on newly ſown turnips, *juſt before* they come up, prevents the fly or grub from injuring them, provided no rain falls to waſh it into the ſoil. Soot anſwers beſt on light, dry, chalky ſoils, and in moderately wet ſeaſons. It does little good on ſtrong or wet land, or in very dry ſeaſons, unleſs ſown earlier than uſual. The London ſoot from coals is rarely bought unmixed with cork-duſt, coal-aſhes, or ſweepings of the ſtreets; yet, even in this adulterated ſtate, it is found to anſwer much better than real country ſoot from wood.

And it is remarked, in the Agricultural Survey of Hertfordſhire, that about Stevenage they ſpread from 20 to 40 buſhels an acre, bringing it from London: it coſts 8*d.*, and the carriage 3*d.*, in all 11*d.* *per* buſhel. And Mr. Clarke of Sandridgebury, ſpreads from 35 to 40 buſhels an acre on wheat. But about Beachwood they ſow from 30 to 40 buſhels on wheat, in February or March, bought at 1*s.* a buſhel at London, and bring 160 buſhels in a waggon with four horſes. Around Hitchin, 40 buſhels are ſown on wheat. And a good deal is uſed at Watford, at the rate of 40 buſhels an acre. Alſo, about Barkway they have a very high opinion of it; 50 buſhels an acre, brought 30 miles from London, are ſeen on wheat to an inch. And it is ſtated, in addition, that the practice is univerſal through this country; inſomuch, that the queſtion is, whether there is a pariſh in it in which ſome men are not in the habit of uſing this manure from London.

On cabbage crops that have been ſown, it has been found that if, as ſoon as the plants appear diſtinctly above the ground, a ſurge of ſoot be drilled upon them, to the amount of from 10 to 12 buſhels the acre, it affords much ſecurity againſt the fly. And it has been ſuggeſted that this buſineſs may be cheaply and conveniently executed by a hopper and round of cups, ſimilar to Cook's, but larger, fixed to a frame ſimilar to that of the Northumberland drill. When employed for preventing the fly in drilled turnips, it ſhould be ſprinkled along the rows, from a ſcuttle, by the hand, or ſome ſuch mean, in the proportion of about twenty buſhels the acre.

But in reſpect to the application of this ſort of ſubſtance to land, it is remarked by Mr. Kiddle, in the fourth volume of Communications to the Board of Agriculture, that all manures that are laid on the ſurface of land cannot be laid on too early in the ſeaſon. Soot, for inſtance, is always recommended to be ſown on wheats or clovers, and graſs-lands, in the month of February, from a notion, that if ſown ſooner, they would exhauſt themſelves too ſoon. This, he thinks, abſurd reaſoning. No manure can be of any ſervice to the crop, which it is meant to advantage, until it reaches the roots: and what contributes more to ſave it than the winter rains, and the diſſolving of the ſnow? He has, in conſequence, always ſown the ſoot for wheat and clover, when he has been able to procure it, in the month of November or December, and always with ſatisfaction to himſelf. He laſt year ſowed with ſoot an incloſure of wheat of eight acres, part of which was ſown in the beginning of December, before the froſt ſet in, and a heavy rain ſucceeded the ſowing; on the remaining parts, owing to his not being able to procure more ſoot at that time, the ſowing was poſtponed until after the froſt was gone, in the month of February. The quantity ſown on an acre, in both inſtances, was equal; but the ſuperiority of the crop of wheat, where it was ſown early, might be diſcerned by the eye. He had the curioſity to have it thraſhed ſeparately, and found its increaſe beyond the other conſiderable. If he could procure ſoot at the time of ſowing wheat, he ſhould be under no apprehenſion of its anſwering then, if the land was worked for the wheat. Some years ſince, having bought a ſmall quantity of ſoot immediately after harveſt, he had the deſire to try its effects on the crop at that early ſeaſon, and having a pea-ſtubble which had been ploughed twice, and was deſigned for wheat, after ſowing as much of the land as he had ſoot for with wheat, he then had the ſoot ſown, and ploughed both in together. He owns he was anxious to ſee the ſucceſs of his experiment, as it was a novel one, as were his neighbours alſo who had ſeen it done. The remainder of the land was ſown with ſoot, as he was able to procure it. The wheat, where the ſoot was ſoon with it, kept the lead during the firſt months: this he did not wonder at, but expected it from its forcing quality; but he was very much pleaſed to ſee it continue to do ſo during the remainder of the ſeaſon, and at harveſt the ſuperiority in favour of it was eaſily to be ſeen.

Soot, in ſome diſtricts, as where the ſoil is rather inclining to be ſtrong and heavy, is far from being found a durable manure, though it commonly produces very ſtrong crops for the firſt year. And it is in other places more commonly applied over the graſs-lands than the tillage crops, being ſuppoſed more uſeful and proper in ſuch a manner of application. But it is not improbable but that it is a ſort of manure that may in general be the beſt fitted to be employed in its dry ſtate by being thrown into the ground at the ſame time with the ſeed, ſomewhat in the manner of powdered rape-cake, having the advantage of requiring no ſort of preparation when uſed in this way.

Some ſuppoſe that 20 buſhels of ſoot to the acre are nearly equal to 50 of the aſhes of either coals, wood, or peat. And the writer of the Middleſex corrected Agricultural Report remarks, that the ſmoke, conſiſting of the lighteſt particles of ſoot and coal, raiſed by the force of the aſcending current of rarefied air ariſing from 300,000 fires in the metropolis and its vicinity, is daily depoſited on the ſurrounding country; where the next rain waſhes it into the ſoil, and it promotes vegetation and the fertility of the land to a conſiderable degree.

The dyers make a conſiderable uſe of ſoot, for a kind of dun-colour; which, it is true, has no agreeable ſmell; but, in return, it has the property of ſaving clothes, and other ſtuffs, from moths.

Carbonated ammonia is extracted from it in the large way in ſeveral manufactories of this ſalt.

Soot *of Frankincenſe*, is the ſmalleſt and fineſt part of the incenſe called olibanum, or male incenſe; burnt after the manner of roſin, to make lamp-black.

Soot, *Wood*, was formerly regarded as a good medicine in many caſes, but the principles upon which it acted as ſuch were never well underſtood, till Boerhaave gave a regular analyſis of it. The directions he gives for the proceſs are theſe.

Chooſe the blackeſt and dryeſt wood-ſoot from the chimney of an oven, where nothing is baked but bread, and nothing burnt but vegetables; gather this in a dry day, and fill with it a glaſs retort almoſt up to the neck; clean the neck of the retort, and luting on a receiver, give a fire of 150°, and keep it up equably, a large quantity of tranſparent water will come over with conſiderable violence. When no more water will come over, cleanſe the receiver, and raiſing the fire to a little above 200°, there will then come over a whitiſh fat liquor; this alſo comes over with great violence, and the fire muſt be gradually increaſed, till no more of this will come. Change the receiver, and raiſe the fire to a yet greater degree, and a yellow, copious, volatile ſalt will come over, and ſtick all over the ſides of the new receiver. When no more of this ſalt will ariſe, increaſe the fire to the utmoſt that ſand can give, and with a heat of ſuppreſſion there will ariſe a black thick oil; when this is all come over, and the veſſels cooled, there will be found in the neck of the retort a ſalt, which could be raiſed no higher, even by that violent fire; and in the bottom of the retort there remains a black feculent matter, the upper ſurface of which is covered with a white ſaline cruſt, which, both in figure, colour, and the ſtructure of its ſtriæ, reſembles the common ſal ammoniac. If the milky liquor be rectified, it affords a very penetrating volatile ſpirit, and ſome ſharp volatile ſalt.

Here we are taught what the agitation of an open fire can move, change, expel, and drive through the air by burning; firſt in the form of ſmoke, then of flame, and laſtly of exhalation, and how high it is able to carry them; for a chimney is a kind of ſtill-head, converging in an open top, and ſoot is often carried up thirty or forty feet, or more, to the top of theſe, and after this a black ſmoke is diſcharged out of the orifice, which diſperſes in the air, and finally ſeems to vaniſh.

From his accurate analyſis of wood-ſoot, we may learn, ſays Boerhaave, that ſoot, which contains ſo many active principles, muſt be qualified for a powerful medicine. Pills of dry ſoot are found very beneficial in all cold diſtempers; the volatile ſalt of ſoot poſſeſſes the virtues of the volatile ſalts of animals. The ſalt which riſes laſt is recommended greatly by Hartman for giving relief in cancers; and this is very probable, ſince ſal ammoniac of the common kind, properly applied, is known to be of great uſe in caſes of running cancers. Soots of different fuels are not all to be ſuppoſed to poſſeſs the ſame virtues; that of pit-coal is found to be a ſubſtance of a very different kind from that of wood; and that of the common turf or peat, and of the oak-wood, have alſo been found, on experiment, to be very different.

Boerhaave very juſtly obſerves, that the ſoot from kitchen-chimneys, where the ſmoke muſt have been impregnated with the effluvia of the victuals, muſt be very different from pure wood-ſoot. Boerhaave's Chemiſtry.

Wood-ſoot was formerly directed in hyſteric caſes, and in different nervous diſorders, as an antiſpaſmodic and corroborant. It was uſed chiefly in the form of a ſpirituous tincture, in conjunction, commonly, with aſſa-fœtida, or other materials of ſimilar intention: the officinal tincture was drawn from two ounces of ſoot, and one of aſſa-fœtida, with a quart of proof ſpirit.

The virtues of the ſoot are extracted almoſt equally by proof ſpirit, rectified ſpirit, and water, each of which, if the ſoot is of a good kind, diſſolves about one-fourth of it.

The extracts, obtained by inſpiſſating the filtered ſolutions, are very bitter, and the ſpirituous extract retains moſt perfectly the peculiar flavour of the ſoot. Lewis.

Dioſcorides ſhews how to make a ſoot of butter, which was thought to have ſeveral uſes in medicine. The ſoot found in furnaces of glaſs-houſes is uſed by painters.

SOOTA, in *Geography*, a town of Japan, on the N. coaſt of the iſland of Sado.

SOOTEEAH, a town of Hindooſtan, in Bahar; 15 miles N.N.E. of Chuprah.

SOOTEREE, a town of Bengal; 12 miles S.E. of Ramgur.

SOOTICH, a town of Bengal; 15 miles N.N.E. of Kiſhenagur.

SOOTY, a town of Bengal; 30 miles N.E. of Calcutta.—Alſo, a town of Bengal; 27 miles N. of Moorſhedabad. N. lat. 24° 25′. E. long. 88° 11′.

SOPE. See Soap.

SOPEDIERO, in *Geography*, a town of Mexico, in New Biſcay; 140 miles S.S.W. of Parral.

SOPETRAN, a town of Spain, in New Caſtile; 10 miles N. of Guadalaxara.

SOPHA, in *Ancient Geography*, a town of Paleſtine, in the tribe of Zebulon, according to Epiphanius.

SOPHANITÆ, a people of Arabia Felix, placed by Ptolemy in the ſouthern part of that country.

SOPHAR, a town of Judea, in the tribe of Gad.

SOPHECLA, in *Geography*, a ſmall iſland in the gulf of Engia; 5 miles N.W. of Engia.

SOPHENA, Zoph, in *Ancient Geography*, a country of Aſia, in the Greater Armenia, N. of Meſopotamia and Comagene, between the mountains Maſius and Antitaurus, according to Strabo.

SOPHERA, in *Botany*. See Cassia and Sophora.

SOPHI, or Sofi, a title of quality, given to the emperor of Perſia; importing as much as wiſe, ſage, or philoſopher.

The title is by ſome ſaid to have taken its riſe from a young ſhepherd thus named, who attained to the crown of Perſia in 1370; others derive it from the *ſophoi*, or ſages, anciently called *magi*. Voſſius gives a different account of the word: *ſophi*, in Arabic, he obſerves, ſignifies wool; and he adds, that it was applied by the Turks out of deriſion to the kings of Perſia, ever ſince Iſhmael's time; becauſe, according to their ſcheme of religion, he is to wear no other covering on his head, but an ordinary, red, woollen ſtuff; whence the Perſians are alſo called *hazelbaſchs*, q. d. *red-heads*. But Bochart aſſures us, that ſophi, in the original Perſian language, ſignifies one that is pure in his religion, and who prefers the ſervice of God in all things: and derives it from an order of religious called by the ſame name.

The ſophis pride themſelves, and with ſome reaſon, on their illuſtrious extraction; the race being ſecond to none in the Eaſt. They are deſcended in a right line from Houſſein, ſecond ſon of Ali, Mahomet's couſin, and Fathima, Mahomet's daughter.

There is no prince in the world whoſe authority is more abſolute than that of the ſophi of Perſia; his power is not even limited by any laws he himſelf can make; but he ſuſpends, changes, and annuls them at pleaſure. See Sophis.

SOPHIA, or Sofia, in *Geography*, a city of European Turkey, in Bulgaria, built by Juſtinian on the ruins of the ancient Sardica. This is the capital of Bulgaria, and a ſangiacat; the ſee of a Greek archbiſhop, and of a Roman biſhop. It is commercial, populous, and well-built, but without walls; and the ſtreets are narrow, uneven, and dirty: 280 miles W.N.W. of Conſtantinople. N. lat. 42° 56′. E. long. 23° 14′.

Sophia *Chirurgorum*, in *Botany*, a name ſometimes given to a ſpecies of water-creſſes.

SOPHIAI, in *Geography*, a town of Ruſſia, in the government of Peterſburg; 16 miles S.S.E. of Peterſburg. N. lat. 59° 40′. E. long. 13° 14′.

SOPHIANA, a town of Perſia, in the government of Adirbeitzan, or Azerbijan; 24 miles N.W. of Tauris.

SOPHIENBERG, a town of Denmark, in the iſland of Zealand, near the coaſt of the Sound, with a royal palace; 13 miles N. of Copenhagen.

SOPHIENBURG, a town of Germany, in the principality of Culmbach; 5 miles S. of Bayreuth.

SOPHIENLUST, a town of Germany, in the county of Henneberg; 3 miles S. of Meinungen.

SOPHIS, or Sofees, denote a kind of order of religious among the Mahometans in Perſia, anſwering to what are otherwiſe called *derviſes;* and among the Arabs and Indians, *faquirs*.

Some will have them called ſophis, from a kind of coarſe camblet which they wear, called *ſouf*, from the city Souf, in Syria, where it is principally manufactured.

The more eminent of theſe ſophis are complimented with the title *ſcheik*, that is, *reverend;* much as in Romiſh countries the religious are called *reverend fathers*.

Sheick Sophi, who laid the firſt foundation of the grandeur of the royal houſe of Perſia, was the founder, or rather the reſtorer, of this order: Iſhmael, who conquered Perſia, was himſelf a ſophi, and greatly valued himſelf on his being ſo. He choſe all the guards of his perſon from among the religious of this order; and would have all the great lords of his court ſophis.

The king of Perſia is ſtill guard-maſter of the order; and the lords continue to enter into it, though it be now fallen under ſome contempt.

The vulgar ſophis are now chiefly employed as uſhers and attendants of the court; and ſome even as executioners of juſtice; the emperor laſt reigning would not allow them, according to cuſtom, to gird the ſword on him.

This neglect into which the ſophis are ſunk, has occaſioned the late emperor to diſuſe the title of *ſophi*, or *ſofi:* however, M. de la Croix is miſtaken, when he ſays, that they never bore it.

Sophis, *Sofees*, or *Suſi's*, the denomination of a ſect of modern philoſophers among the Perſians, whoſe name is derived either from the Greek word for a ſage, or from the woollen mantle which they uſed to wear in ſome provinces of Perſia. They ſeem, ſays ſir William Jones (Works, vol. iii. p. 130. 8vo. ed.) to have adopted that metaphyſical theology, which has been profeſſed immemorially by a numerous ſect of Perſians and Hindoos, which was carried into Greece, and which prevails, even at this time, among the learned Muſſulmans, who ſometimes avow it without reſerve. Their fundamental tenets are, that nothing exiſts abſolutely but God: that the human ſoul is an emanation from his eſſence; and, though ſeparated for a time from its heavenly ſource, will be finally reunited with it: that the higheſt poſſible happineſs will ariſe from its reunion; and that the chief good of mankind, in this tranſitory world, conſiſts in as perfect an *union* with the eternal Spirit, as the incumbrances of a mortal frame will allow: that, for this purpoſe, they ſhould break all *connection* with extrinſic objects, and paſs through life without *attachments*, as a ſwimmer in the ocean ſtrikes freely without the impediment of clothes: that they ſhould be ſtraight and free as the cypreſs, whoſe fruit is hardly perceptible; and not ſink under a load, like fruit-trees *attached* to a trellis: that, if mere earthly charms have power to influence the ſoul, the *idea* of celeſtial beauty muſt overwhelm it in extatic delight: that, for want of apt words to expreſs the divine perfections with the ardour of devotion, we muſt borrow ſuch expreſſions as approach the neareſt to our ideas, and ſpeak of *beauty* and *love* in a tranſcendent and myſtical ſenſe: that, like a *reed* torn from its native bank, like *wax* ſeparated from its delicious honey, the ſoul of man bewails its diſunion with *melancholy muſic*, and ſheds burning tears like the lighted taper, waiting paſſionately for the moment of its extinction, as a diſengagement from earthly trammels, and the means of returning to its only Beloved.

Such, in part, is the wild and enthuſiaſtic religion of the modern Perſian poets, eſpecially of the ſweet Hafiz, and the great Maulavi. Such is the ſyſtem of the Vedanti philoſophers, and beſt lyric poets of India; and, as it was a ſyſtem of the higheſt antiquity in both nations, it may be added to many other proofs of an immemorial affinity between them. The philoſophy of the Sofees ſeems alſo, in early times, to have prevailed amongſt the Jews, in Europe among the *Theoſophiſts* (ſee that article), as well as among the diſciples of the Vedanti ſchool in India. Sir William Jones has expreſſed with great preciſion the tenets of the Indian ſchool, nor do they differ from the doctrines maintained by the Sofees of the preſent day. The fundamental tenet of the Vedanti ſchool, ſays ſir W. Jones (Works, vol. iii. p. 239. 8vo. ed.) to which, in a more modern age, the incomparable Sancara was a firm and illuſtrious adherent, conſiſted not in denying the exiſtence of matter; that is, of ſolidity, impenetrability, and extended figure; but in correcting the popular notion of it, and in contending that it has no eſſence independent of mental perception; that exiſtence and perceptibility are convertible terms; that external appearances and ſenſations are illuſory, and would vaniſh into nothing, if the divine energy, which alone ſuſtains them, were ſuſpended but for a moment, an opinion which Epicharmus and Plato ſeem to have adopted, and which has been maintained in the laſt century, and in our own country, with great elegance and acuteneſs by Berkeley and others. The Sofees conſider themſelves, as we have above ſtated, immerſed in depravity by an union with matter, and in the figurative ſtyle of their poets, lament the ſeparation from their beloved, and ſolicit, with impatient ardour, a releaſe from a material and earthly bondage.

SOPHISM, Σοφισμα, in *Logic*, a captious and fallacious reaſoning; or an argument, which, with ſome ſubtlety, carries much appearance of truth, but little ſolidity. See Fallacy.

A ſophiſm is, properly, an argument falſe at bottom, and only invented to amuſe and embarraſs the perſon to whom it is uſed.

Logicians enumerate the following kinds of ſophiſm, *viz. ignoratio elenchi*, or a miſtake of the queſtion, *i. e.* when ſomething elſe is proved, which has neither any neceſſary connection nor inconſiſtency with the thing inquired, and conſequently gives no determination to the inquiry, though at firſt ſight it may ſeem to determine the queſtion; *petitio principii;* a circle; *non cauſa pro cauſa*, or the aſſignation of a falſe cauſe; *fallacia accidentis*, which pronounces concerning the nature and eſſential properties of any ſubject, according to ſomething which is merely accidental to it. *A dicto ſecundum quid ad dictum ſimpliciter*, arguing from that which is true in particular circumſtances, to prove the ſame thing true abſolutely, ſimply, and abſtracted from all circumſtances, and *vice verſâ:* the ſophiſms of compoſition and diviſion, when we infer any thing concerning ideas in a compounded ſenſe, which is only true in a divided ſenſe, and *vice verſâ:* and the ſophiſms ariſing from an abuſe of the ambiguity of words: to which may be added an imperfect enumeration, or falſe induction, when from a few experiments and obſervations, men infer general theorems and univerſal propoſitions. Watts's Logic, p. iii. c. 3. ſect. 1.

Theſe ſophiſtical modes of reaſoning, or logical quibbles, called by Ariſtotle Eriſtic ſyllogiſms, were introduced into the Megaric ſchool, founded by Euclid of Megara, (ſee his article,) by Eubulides of Miletus, who in that ſchool ſucceeded Euclid; but as they furniſhed merely examples of egregious trifling, they deſerve no farther notice. The Stoics alſo amuſed themſelves with quibbles and fallacies of the ſame kind with thoſe of the Megaric ſchool, of which the following example will be ſufficient. Protagoras the ſophiſt (ſee PROTAGORAS) agreed to inſtruct a young man in eloquence for a large ſum, one half of which was to be paid in hand, the other half upon his firſt ſucceſsful pleading in the courts. Neglecting to plead for a long time after Protagoras had completely inſtructed him in the art of rhetoric, the ſophiſt ſued him for the remaining moiety of his ſtipend. Each pleaded his own cauſe. Protagoras urged, that which way ſoever the cauſe was determined, the young man muſt complete the payment: for if the cauſe was determined *againſt* the defendant, the payment would be granted him by judgment; if *for* him, the payment would be due according to agreement. The young man, on the contrary, pleaded, that if the cauſe was determined *in his favour*, he ſhould be excuſed from the payment by the deciſion of the court; if *againſt* him, Protagoras, by his own agreement, could have no demand upon him. The ſubtlety of theſe pleas perplexed the judges; and, without coming to any determination, they diſmiſſed the court.

SOPHISMS, or *Sophiſtical Arguments*, among *Logicians*, are more particularly ſuch as are not in form, or are founded on equivocals.

As, *You have every thing you have not loſt; but you have not* loſt *horns, therefore you have horns.*

SOPHIST, Σοφιϛης, formed from σοφος, *wiſe*, or rather from σοφιϛης, *impoſtor*, *deceiver*, a perſon who frames ſophiſms; that is, uſes ſubtle arguments, with deſign to deceive thoſe whom he would perſuade or convince.

The term ſophiſt, which is now reproachful, was anciently honourable, and carried a very innocent idea. St. Auguſtine obſerves, it ſignifies a rhetor, or profeſſor of eloquence: ſuch as were Lucian, Athenæus, Libanius, &c. Suidas, and after him Olar. Celſius, in an expreſs diſſertation on the Greek ſophiſts, tells us, that the appellation was applied indifferently to all who excelled in any art or ſcience; whether divines, lawyers, phyſicians, poets, orators, or muſicians.

However, as rhetoricians often employed their art rather to vindicate what was falſe and unjuſt, than to ſupport truth and virtue, their conduct brought a diſcredit both upon themſelves and their profeſſion; and, therefore, the name *ſophiſt*, ſometimes confounded with that of *ſophiſter*, has been uſed in an ill ſenſe, to ſignify a ſpecious but falſe reaſoner, one ſkilled rather in the arts of cavilling than qualified to ſpeak well and accurately upon any ſubject.

Solon is the firſt who appears to have ever borne the appellation of ſophiſt, which is given him by Iſocrates; afterwards, it was ſcarcely ever given, except to philoſophers and declaimers.

In the time of Socrates, there was in Athens a large body of profeſſional preceptors of eloquence, diſtinguiſhed by the appellation of ſophiſts. By the mere pomp of words, theſe men made a magnificent diſplay of wiſdom, upon a ſlight foundation of real knowledge; and they taught an artificial ſtructure of language, and a falſe method of reaſoning; by means of which they were able, in argument, to make the worſe appear the better cauſe. Whilſt they arrogated to themſelves the merit of every kind of learning, they publicly practiſed the art of diſputing with plauſibility on either ſide of any queſtion, and profeſſed to teach this art to the Athenian youth. By theſe impoſing pretenſions, they collected, in their ſchools, a numerous train of young men, who followed them in hope of acquiring thoſe talents, which would give them influence and authority in popular aſſemblies. In ſuch high repute were theſe ſophiſts, that they were literally ſupported, not only by contributions from their pupils, but by a regular ſalary from the ſtate; and were in many inſtances diſtinguiſhed by public honours, and employed in offices of magiſtracy. Of their enmity to Socrates, we have given an account under his biographical article.

The title *ſophiſta* was in great credit among the Latins in the twelfth century, and in the time of St. Bernard; but it began to loſe ground in Greece as early as Plato's time; on account of Protagoras and Gorgias, who made a ſordid traffic of it, by ſelling eloquence for money. Hence Seneca calls the ſophiſts quacks, or empirics.

Cicero ſays, that the title *ſophiſti* was in his time given to ſuch as profeſſed philoſophy with too much oſtentation, in order to make a trade of it, by running from town to town, to retail their deceitful ſcience. A ſophiſt, therefore, was then, as now, a rhetor, or logician, who makes it his buſineſs to enſnare and perplex people, by frivolous diſtinctions, vain reaſonings, and captious diſcourſes.

Nothing has conduced more to the increaſing of the number of ſophiſts than the contentious ſchool-philoſophy: people are there taught to puzzle and obſcure the truth, by barbarous unintelligible terms; as, antipredicaments, great and little logicals, quiddities, &c.

The title ſophiſt was given to Rabanus Maurus, by way of eminence. John Hinton, a modern Engliſh ſcholaſtic writer, endeavoured alſo to procure the ſplendid title of ſophiſt.

SOPHISTICATION, in *Chemiſtry*, *Alchemy*, &c. a term particularly applied to the counterfeit works of fraudulent alchemiſts, who uſe indirect means of whitening copper, gilding ſilver, and giving other ſuperficial tinctures to metals; as alſo of making augmentations, by divers mixtures, and other illegal operations, to delude thoſe at whoſe expence they are employed.

Hence the term is alſo applied to merchandizes, and other goods adulterated, mixed, or altered, by the deceit of the ſeller.

SOPHOCLES, in *Biography*, a celebrated tragic poet, was born at Athens about the year 497 B.C. He received an education in every way ſuitable to his rank in life; and it appears that he was but a youth, when the monuments of the victory over Xerxes were fixed up at Salamis, and then he went at the head of a chorus of noble birth, whoſe ſong of triumph he led by the ſtrains of his lyre. He firſt applied himſelf to lyric poetry; but the fame acquired by Æſchylus, the author, or at leaſt the great reformer, of Grecian tragedy, induced him to try his powers in that ſpecies of compoſition; and in his 28th year he ventured to contend with that veteran for the theatrical prize. He obtained the victory, which was followed by the retreat of his rival, who left him the undiſputed maſter of the tragic ſtage. The improvements introduced by Sophocles were ſo great, that he has generally and juſtly been regarded as the father of the regular tragedy. "He brought," ſays the critic, "a third interlocutor to the two who before alone appeared on the ſcene at once; he intereſted the chorus in the ſubject of the piece; he reduced the turgid and unnatural diction of Æſchylus to the proper ſtandard of heroic dignity; and invented that artful conſtruction of fable and developement of incidents, which contribute ſo much to the intereſt of a dramatic performance." In theſe points he was ſuperior to his younger competitor Euripides; and upon the whole, he appears to have ſtood at the head of his claſs, in the judgment both of Greek and Roman critics. Cicero terms him a *divine poet;* and he is highly commended by Dionyſius of Halicarnaſſus, for preſerving the dignity of his characters, and dwelling rather on the more noble and generous affections, than on the mean and debaſing paſſions. Theſe praiſes ſhew that his works were regarded as the moſt perfect example of tragedy, in the higheſt ſenſe of the word. Sophocles was a ſtateſman, as well as a tragedian, and entruſted with very important civil and military employments. He retained his faculties to the laſt, and continued to write tragedies to an advanced age; and when his unnatural ſons, on account of ſome neglect in his domeſtic affairs, applied to the magiſtrates to put him under their guardianſhip, as having outlived his underſtanding, he appeared in court, an advocate in his own cauſe, and reciting his Œdipus at Colonus, which he had juſt finiſhed, appealed to the judges and auditors, if that were the work of the dotard deſcribed by his own children. The ſentence was pronounced unanimouſly in his favour, and he was carried home with every mark of triumph. The benignity of his character acquired him a number of friends, his attachment to whom, and his moderate wiſhes, cauſed him to decline the invitations of the kings who were deſirous of drawing him to their courts. He paid every token of reſpect to the memory of his rival Euripides, thus demonſtrating that he was incapable of the meanneſs of jealouſy. He lived to the great age of 90, and is ſaid even at that age to have died with joy, on obtaining the prize for his laſt tragedy. Above a hundred pieces have been attributed to him by ſome ancient writers, of which, however, only ſeven have reached our times. Of theſe, both ſeparately and collectively, many editions have been made. Among the moſt eſteemed are Johnſon's, 3 vols. 8vo. Oxon. et Lond.; Capperonier's, Par. 4to.; Brunck's, 2 vols. royal 8vo. 1786; and Muſgrave's, Oxon. 2 vols. 8vo.

SOPHONE, in *Ancient Geography*, a country of Aſia, ſituated in the place where the Tigris re-appears, after having been under ground for the ſpace of 25 miles, according to Juſtin.

SOPHORA, in *Botany*, a name of moſt whimſical origin. *Sophera* is, according to Proſper Alpinus, the Egyptian denomination of a ſpecies of *Caſſia*, the Linnæan *C. Sophera*, nearly related to the genus before us. Linnæus, in his *Hortus Cliffortianus*, 156, ſpelling it *Sophora*, calls it a *genus ſophorum*, or of wiſe men; as teaching that ſeparate ſtamens, in the papilionaceous family, if ever the limits of that family can be determined, afford ſo deciſive a mark of diſcrimination, as almoſt to exclude the plants furniſhed with ſuch, from the ſame natural claſs, or order, with thoſe whoſe filaments are combined. The ſoundneſs of the doctrine may make us tolerate the conceit.—Linn. Gen. 204. Schreb. 275. Willd. Sp. Pl. v. 2. 499. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 2. Juſſ. 351. Lamarck Illuſtr. t. 325. Gærtn. t. 149, tomentoſa. (Edwardſia; Saliſ. in Tr. of Linn. Soc. v. 9. 298. Ait. Hort. Kew. v. 3. 1.)—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, ſhort, oblique; gibbous on the upper ſide; its tube turbinate, angular; limb bell-ſhaped, abrupt, with five teeth. *Cor.* papilionaceous, of five petals. Standard oblong, ſtraight, dilated upwards, deflexed at the ſides, various in length. Wings two, as long as the ſtandard, or longer, with a lobe at the baſe. Keel of two petals, ſimilar to the wings and about the ſame length, their lower edges cloſe together, boat-like. *Stam.* Filaments ten, inſerted into the tube of the calyx, diſtinct, parallel, rigid, awl-ſhaped, about the length of the corolla, and lodged in its keel, deciduous; anthers ſmall, oval, incumbent. *Piſt.* Germen ſuperior, oblong, ſlender, nearly cylindrical; ſtyle the ſize and ſhape of the ſtamens; ſtigma ſimple, obtuſe. *Peric.* Legume very long and ſlender, of one cell, and two imperfect valves, ſwelling at each ſeed, ſo as to become beaded; often angular or winged. *Seeds* numerous, roundiſh, large, poliſhed.

Eſſ. Ch. Calyx bell-ſhaped, oblique, five-toothed; turbinate at the baſe. Corolla papilionaceous. Legume beaded, ſcarcely burſting, with many ſeeds.

We have under Edwardsia (ſee that article) expreſſed an opinion unfavourable to the permanency of that genus of Mr. Saliſbury's, though we have many reaſons for wiſhing we could admit it; nor does our deciſion at all interfere with the propriety of the name. Our reaſons will appear preſently. The genus of *Sophora* is, nevertheleſs, commodiouſly diviſible into two ſections, by the ſituation of the infloreſcence, but this can make no generic diſtinction, unleſs it were ſupported by ſome character in the fructification, ſuch as the learned editors of the *Hortus Kewenſis* thought they had found in the legume; but it is overſet by a new ſpecies before us; ſee n. 5.

Section 1. *Cluſters terminal, elongated.*

1. S. *tomentoſa.* Downy Sophora. Linn. Sp. Pl. 533. Willd. n. 5. Ait. n. 1. (S. occidentalis; Linn. Sp. Pl. 533. Willd. n. 6. S. arboreſcens, &c.; Trew's Ehret, 27. t. 59. Colutea zeylanica argentea tota; Herm. Lugd.-Bat. 169. t. 171. Galega? n. 1; Browne Jam. 289. t. 31. f. 1.)—Stem arboreous. Leaflets numerous, roundiſh-elliptical, very obtuſe, downy as well as the calyx.—Native of the Eaſt and Weſt Indies. Long cultivated in our ſtoves, but it has ſeldom flowered. The *branches*, *ſtalks*, *foliage*, and *infloreſcence*, are more or leſs clothed with ſhort, denſe, hoary pubeſcence. *Leaves* a ſpan long, of ſix or ſeven pair, with an odd one, of ſtalked, elliptical, coriaceous *leaflets*, all nearly equal and uniform, above an inch long; ſometimes their upper ſurface is ſmooth, and the whole of the plant much leſs downy than uſual. *Stipulas* none. *Cluſters* terminal, ſolitary, ſtalked, ſimple, generally a foot long, compoſed of very numerous, large, elegant, pale-yellow *flowers*. *Legume* three or four inches in length, beaded, two-edged, ſlightly downy, often interrupted here and there by a failure in the impregnation of ſome of the *ſeeds*, which, when perfect, are the ſize of a large pea, globular, brown, diſcharged finally by the decay, and partial ſplitting of the valves.

2. S. *heptaphylla.* Seven-leaved Sophora. Linn. Sp. Pl. 533. Willd. n. 8. (Anticholerica; Rumph. Amboin. v. 4. 60. t. 22.)—Stem ſhrubby. Leaflets about ſeven, elliptical, acute; downy beneath.—Native of the Eaſt

Indies, on ſandy or rocky ſea-coaſts. Rumphius deſcribes it as about the ſize of a Privet-buſh, but with a thicker trunk. He ſays there are ſeven, eight, or nine pair of *leaflets*, beſides an odd one; dark green above; downy and grey beneath; hardly two inches long, about one broad. Linnæus deſcribes ſeven ſmooth *leaflets* in all. The *flowers* are yellowiſh. *Legumes* beaded. Having ſeen no ſpecimen, we forbear all further deſcription; only excluding, without heſitation, the *Fruticulus ſinenſis, ſenæ ſylveſtris folio*, &c. Pluk. Amalth. append. t. 451. f. 10. (See the next ſpecies.) The *root* and *ſeeds* of the plant of Rumphius are celebrated by him as ineſtimable remedies for dangerous bilious colics.

3. S. *japonica*. Japaneſe Sophora. Linn. Mant. 68. Willd. n. 7. Ait. n. 2. Thunb. Jap. 178. Andr. Repoſ. t. 585. Jacq. Hort. Schoenbr. v. 3. 55. t. 353.—Stem arboreous. Leaflets ovato-lanceolate, acute, ſmooth. Cluſters compound, panicled.—Native of Japan and China. Introduced by the celebrated cultivator Mr. James Gordon, in 1753. It has been nearly as long cultivated about Paris, where it was called *l'arbre inconnu des Chinois*. This is a tall and handſome hardy deciduous *tree*, with elegant, ſmooth, pinnate *leaves*, whoſe *leaflets* are about an inch and a half long, and half an inch broad, acutely pointed. *Flowers* ſmaller than thoſe of Laburnum, of a pale greeniſh-yellow, almoſt white, compoſing numerous, branched, ſpreading *cluſters*, collected into large, terminal, upright *panicles*. *Legumes* pendulous, two or three inches long, turgid, ſmooth. By Jacquin's figure the withered *ſtamens* ſeem permanent. Perhaps Plukenet's Amalth. t. 451. f. 10, cited with doubt by Linnæus for *S. heptaphylla*, may belong to this.

4. S. *alopecuroides*. Fox-tail Sophora. Linn. Sp. Pl. 533. Willd. n. 4. Ait. n. 3. (Glycirrhiza ſiliquis nodoſis, quaſi articulatis; Buxb. Cent. 3. 25. t. 46. Ervum orientale alopecuroides perenne, fructu longiſſimo; Dill. Elth. 136. t. 112. f. 136.)—Stem herbaceous. Leaflets elliptic-oblong, obtuſe; ſomewhat ſilky beneath, when full grown.—Native of the Levant, hardy in our gardens, where it was cultivated in the days of Miller and Sherard, flowering in July and Auguſt. The *root* is perennial, creeping extenſively. *Stems* annual, herbaceous, ſimple, leafy, about two feet high. *Leaflets* numerous, about an inch long, green, ſparingly pubeſcent. *Cluſters* ſimple, ſolitary at the top of each ſtem, without much of an elongated ſtalk, compoſed of numerous, pale, greeniſh-white, ſweet-ſcented *flowers*, larger than thoſe of the common *Galega officinalis*. *Calyx* nearly ſmooth. *Legume* ſlender, ſomewhat ſilky. Dillenius noticed the ten diſtinct *ſtamens;* and he aſſerts that to make the plant flower freely, the roots muſt be confined in a pot.

5. S. *flaveſcens*. Siberian Sophora. Ait. ed. 1. v. 2. 43. ed. 2. n. 4. Willd. n. 3.—"Stem herbaceous. Leaflets ovate-oblong, nearly ſmooth."—Native of Siberia; introduced here in 1785, by Mr. John Bell. A hardy perennial, flowering from May to July. We have ſeen no ſpecimen. Willdenow ſays it is like the preceding, but entirely ſmooth. *Leaflets* ſix pair, with an odd one, ovato-lanceolate, bluntiſh. *Calyx* obſcurely toothed. Mr. Saliſbury recommends the ſeparation of theſe two laſt from *Sophora*, on account of their permanent *ſtamens;* but it ſeems to us that *S. japonica* connects them with the original ſpecies, both by that character, and ſomewhat of habit, or aſpect.

Section 2. *Cluſters lateral, ſhorter than the leaves.*

6. S. *macrocarpa*. Great-ſeeded Sophora.—Leaflets elliptic-oblong, nearly ſmooth. Cluſters axillary, very ſhort. Legume ſilky, two-edged, tumid, without wings.—Native of Chili, where it is commonly known by the name of *Mayo*. We received fine ſpecimens from the late abbè Cavanilles, in 1804. The *ſtem* is arboreous. *Branches* roundiſh, knotty; ſilky when young. *Leaves* deciduous, about a finger's length, compoſed of from ſix to nine pair of, not exactly oppoſite, obtuſe, rigid *leaflets*, three quarters of an inch long, beſides an odd one, all green; ſhining, and ſparingly downy, above; paler, and rather ſilky, beneath. *Cluſters* towards the ends of the branches, axillary, ſimple, compoſed of four or five large yellow *flowers*, whoſe partial ſtalks are about the length of the common one, all ſilky, as well as the *calyx*. *Stamens* occaſionally permanent. *Legume* from three to five inches long; when young compreſſed, two-edged, and finely ſilky; where the *ſeeds* ripen, they form large oval ſwellings, almoſt as big as a bullace plum, partly deprived of their downineſs, and marked with a ſlight ridge along each ſide, as in *S. tomentoſa*, but quite deſtitute of angles, wings, or other inequalities. In infloreſcence, habit, and aſpect of the *flowers*, this ſpecies accords exactly with all the following ones, while its *legume* is that of the original *Sophoræ*. We conceive, therefore, that it overſets the genus *Edwardſia*, to which, if that genus exiſts at all, the preſent plant ſhould belong, and yet its *legume* is neither quadrangular nor winged, nor is there any character in the fructification at all different from *Sophora*.

7. S. *nitida*. Silky-leaved Sophora.—Leaflets elliptic-oblong, ſilky on both ſides. Cluſters axillary, very ſhort. Legume hairy, with four prominent angles.—Gathered by Commerſon, in the iſle de Bourbon. An elegant ſilky *ſhrub* or *tree*. *Leaves* two or three inches long, compoſed of from eight to twelve pair of *leaflets*, half the ſize of the laſt, beautifully ſilky, as well as their ſtalks; brighter beneath. The *flowers* are paſt in our ſpecimen; their *ſtalks* are much like the laſt, but more hairy, with larger, more permanent, oppoſite *bracteas*. Half-ripe *legumes* about four inches long, rather ſlender, beaded, their four thick prominent angles much more hairy than the interſtices, which ſhould ſeem to become quite ſmooth as the oval parts, encloſing the *ſeeds*, are more enlarged.

8. S. *tetraptera*. Four-winged Sophora. Ait. ed. 1. v. 2. 43. Willd. n. 1. J. Mill. Ic. t. 1. Curt. Mag. t. 167. Lamarck f. 3. Roem. and Uſt. Mag. faſc. 12. t. 1. (Edwardſia grandiflora; Saliſ. Tr. of Linn. Soc. v. 9. 299. Ait. Hort. Kew. v. 3. 1.)—Leaflets elliptic-oblong, ſilky on both ſides. Cluſters lateral. Legume ſlightly hairy, with four membranous crenate wings.—Diſcovered in New Zealand, by ſir Joſeph Banks, and brought in 1772 to this country, where it thrives well againſt a ſouth or weſt wall, in the open air, with only the protection of a mat in winter, flowering about May or June. Few ſhrubs are more ornamental. The ſilky *leaves* are much like the laſt, but rather larger. *Flowers* about ſix together, in ſilky-ſtalked, drooping cluſters; each *flower* near two inches long. The brown *ſtalks* and *calyx* are ſtrikingly contraſted with the golden *petals*, whoſe ſtandard is ſhorter, and of a fuller yellow, than the reſt. *Legume* three or four inches long, each tumid part, where a ſeed is lodged, bordered, at each ſide of the ſuture, with two parallel wings, the whole legume being ſomewhat compreſſed, and not uniformly winged in four directions, like that of *Lotus tetragonolobus*. The baſe or tube of the *calyx* is, in this ſpecies, broader, or more dilated, than in moſt of the reſt, beſides having ten ribs. But we find it preciſely analogous to the ſame part in *S. tomentoſa*, and others, where it always has a different colour, texture, or appearance, from the limb.

9. S. *chryſophylla.* Golden-leaved Sophora. (Edwardſia chryſophylla; Saliſ. Tr. of Linn. Soc. v. 9. 299. t. 26. f. 1.)—Leaflets obovate, emarginate, ſilky. Cluſters lateral. Legume . . . . .—Gathered in the Sandwich iſlands, by Mr. Menzies. The *leaflets* are thrice as broad as in the foregoing; *flowers* yellow, about half the ſize of that ſpecies. Nothing is known reſpecting the *legume.*

10. S. *microphylla.* Small-leaved Sophora. Ait. ed. 1. v. 3. 43. Willd. n. 2. Lamarck f. 1. Jacq. Hort. Schoenbr. v. 3. 10. t. 269. (S. tetraptera; Forſt. Prodr. 32. Linn. Suppl. 230.)—Leaflets numerous, roundiſh-obovate, ſomewhat ſilky. Cluſters lateral. Legume with four membranous crenate wings.—Diſcovered by Banks, Forſter, and others, in New Zealand. Introduced in 1772 to the notice of Britiſh cultivators. It is uſually treated here as a greenhouſe ſhrub, though marked as hardy by Mr. Aiton, flowering in May and June. The younger Linnæus, like Forſter, confounded this with *S. tetraptera,* n. 8, though our native ſpecimen, from the latter, is marked *microphylla.* It differs eſſentially from *tetraptera,* though their *legumes* are ſimilar, in having *flowers* not above half ſo large, and eſpecially in the rounded figure, and ſmall ſize, of its numerous *leaflets,* whoſe ſilky pubeſcence, moſt conſpicuous on their under ſide, is ſilvery, not of a tawny or golden hue, even after long keeping.

For other ſpecies, formerly referred to this genus, ſee Ormosia and Podalyria.

Sophora, in *Gardening,* contains plants of the herbaceous, flowery, perennial, and ſhrubby exotic kinds, of which the ſpecies (as ſome have reckoned them) cultivated are, the wing-podded ſophora (S. tetraptera); the ſmall-leaved ſhrubby ſophora (S. microphylla); the fox-tail ſophora (S. alopecuroides); the blue ſophora (S. auſtralis); the dyer's ſophora (S. tinctoria); the white ſophora (S. alba); the downy ſophora (S. tomentoſa); the occidental ſophora (S. occidentalis); the ſhining-leaved ſophora (S. japonica); the vetch-leaved ſophora (S. capenſis); the golden-flowered ſophora (S. aurea); and the round-leaved ſophora (S. myrtillifolia.)

Method of Culture.—The firſt five ſorts are hardy, and may be increaſed by ſeeds, or parting the roots. The ſeeds ſhould be ſown in the ſpring, in pots of fine mould; and when the plants are come up, they ſhould be removed into ſeparate pots, till they have obtained ſufficient ſtrength, when they may be planted out where they are to grow. The roots may likewiſe, in many of the ſorts, be parted at the ſame ſeaſon, and planted in pots, or where they are to remain. The firſt and ſecond ſorts may alſo be raiſed from cuttings and layers, planted or laid down at the ſame ſeaſon. Theſe, when planted againſt a wall, ſo as to be protected from the froſt in winter, ſucceed very well.

But all the other ſorts are tender, and require the protection of the hot-houſe or ſtove. They are increaſed by ſowing the ſeed in the early ſpring, in pots filled with fine mellow light mould, and plunging them in the hot-bed under glaſſes, or in the bark-bed. When the plants have advanced a little in growth, they ſhould be removed into ſeparate pots, filled with ſoft loamy mould, being well watered, and replunged in the bark-bed till freſh rooted; being afterwards managed as other exotic ſtove plants, with but little water. They likewiſe ſometimes ſucceed by layers and cuttings, treated in the ſame manner.

It may be noticed, that the firſt ſorts afford variety in the borders, and among potted plants; and the latter in ſtove collections, where heat is required. Many of the tender ſorts are very elegant plants, proper for affording ornament and curioſity in ſuch ſituations.

SOPHRONISTÆ, σωφρονισται, among the Athenians, were ten officers, appointed to take care that the young men behaved themſelves with ſobriety and moderation.

SOPHRONISTERIUM, σωφρονιστηριον, among the Athenians, a houſe of correction, like our Bridewell.

SOPIANÆ, in *Ancient Geography,* a town of the Lower Pannonia, upon the route from Sirmium to Carnuntum, between Antiana and Manſuetianus, according to the Itinerary of Antonine.

SOPIO, a name uſed by ſome of the old writers for opium, from its ſoporific virtue.

SOPOLO, in *Geography,* a town of Turkiſh Albania; 32 miles S.S.E. of Valona.

SOPORARIÆ Arteriæ, a name given by ſome authors to the carotid arteries.

SOPORIFIC, or Soporiferous, a medicine that has the faculty of procuring ſleep. Such are opium, laudanum, &c.

The word is formed from the Latin *ſopor, ſleep.* The Greeks, in lieu of it, uſe the word *hypnotic.*

SOPOROUS, Sleepy, or *Drowſy diſeaſes,* a term by which medical writers expreſs the lethargy and coma, and ſome others even the carus and apoplexy.

SOPPAU, in *Geography,* a town of Sileſia, in the principality of Jagerndorf; 5 miles N. of Jagerndorf.

SOPPY, a town on the N.W. coaſt of the iſland of Morty. N. lat. 2° 40′. E. long. 128° 15′.

SOPRA, Ital. *above, upper:* as *nelle parte di ſopra,* in the upper parts; *di ſopra,* above; *contrapunto ſopra il ſoggetto,* counterpoint above the ſubject. See Soggetto.

SOPRANO, in *Italian Muſic,* means ſupreme, or the higheſt vocal part. Its clef is that of the tenor or C clef on the firſt line. Muſic for a ſoprano or treble voice in Italy, is always written in the C clef on the firſt line, thence called the ſoprano clef. The treble or G clef, in which we write vocal treble parts, is called by the Italians, *chiave di violino,* the violin clef, and only uſed for the higheſt parts of inſtrumental muſic.

SOPRON, in *Geography.* See Edenburg.

SOQUA, a town of the duchy of Warſaw; 60 miles N. of Warſaw.

SOR, a river of France, which runs into the Agout, ſix miles below Caſtres.

Sor. See Tsor.

SORA, in *Botany,* the name given by the people of Guinea to a kind of ſhrub which they uſe in medicine, boiling it in water, and giving the decoction in caſes of pain of any kind.

The leaves of this ſhrub are of the ſize and ſhape of thoſe of ſenna; they ſtand upon ſhort footſtalks, and are woolly underneath. Philoſ. Tranſ. No. 231.

Sora, in *Ancient Geography,* a town of Arabia Deſerta, on the confines of Meſopotamia. Ptolemy.—Alſo, a town of India, on this ſide of the Ganges, according to Ptolemy, who gives it the title of "Arcati Regia."—Alſo, the name of a town of Phœnicia. Steph. Byz.—Alſo, a town of Italy, in Latium, towards the N.E., upon the Lixis. According to Livy, it belonged to the Samnites.

Sora, in *Geography,* a town of Naples, in Lavora, the ſee of a biſhop, immediately under the pope; 31 miles N.N.W. of Sezza. N. lat. 41° 47′. E. long. 13° 36′.

SORACTES, in *Ancient Geography,* mountains of Italy, in Etruria, on the confines of the country of the Faliſci, and in the vicinity of the Tiber.

SORÆ, a people of India, who dwelt in the vicinity of Carmania and Gedroſia, near the river Caberon, according to Pliny.—Alſo, a people of India, on this ſide of the Ganges, counted among the Nomades by Ptolemy, who places them between the mountains Bitigus and Diſathrus.

SORÆI, a people of Africa, in Mauritania Cæſarienſis. Ptolemy.

SORAGNA, in *Geography*, a town of the duchy of Parma; 13 miles N.N.W. of Parma.

SORAMIA, in *Botany*, Aubl. Guian. t. 219. Juſſ. 433. See Mappia.

SORANUS, in *Medical Hiſtory*, one of the moſt able of the phyſicians of the *methodic* ſect, according to the opinion of Cælius Aurelianus, and the one who put the finiſhing hand to that ſyſtem, was a native of Epheſus. His father's name was Menander, and that of his mother Phœbe. He ſtudied medicine, and afterwards practiſed it at Alexandria, but at length he ſettled at Rome, and was in conſiderable repute in that metropolis in the reigns of Trajan and Adrian. His character, indeed, ſeems to have been highly eſtimated; for he was in favour with all parties. Even Galen, who was violent in his oppoſition to the *Methodiſts*, and abuſed Theſſalus with ſome acrimony, ſpeaks favourably of the knowledge of Soranus, and bears his teſtimony, from experience, to the efficacy of ſome of his remedies. Soranus compoſed ſeveral works, none of which have come down to us in their proper form; but as Cælius Aurelianus, in his treatiſe “De Morbis Acutis et Chronicis,” every where acknowledges himſelf to be a tranſlator from the Greek of Soranus, that work may be conſidered as in ſubſtance the production of the latter.

Some confuſion prevails among medical writers, who miſtake Soranus the Methodiſt for two other phyſicians of the ſame name. The firſt of theſe was alſo a native of Epheſus, but poſterior to the Methodiſt. He was the author of a good treatiſe on the diſeaſes and organs of generation of women, which was printed at Paris in 1556, under the title of “De Utero et Muliebri pudendo libellus,” together with ſome pieces of Rufus, the Epheſian. This fragment is ſo accurate in point of anatomical deſcription, as to leave a regret that the other writings of this phyſician are loſt. The third of theſe phyſicians of the name of Soranus, was ſurnamed *Melotas*, from the town in Cilicia, where he was born. There is, however, no very authentic record of him extant; and the only work aſcribed to him, which is entitled “Iſagoge ſaluberrima in Artem medendi,” and was printed at Baſle, 1528, and Venice, 1547, is maintained by Voſſius to be the work of a poſterior Latin writer, and not of any of the three perſons named Soranus. See Le Clerc, Hiſt. de la Med. Eloy Dict. Hiſt.

SORARUM, in *Geography*, a town of Hindooſtan, in the circar of Cicacole; 10 miles W. of Coſſimcotta.

SORAS, a town and juriſdiction of Peru; 60 miles S. of Guamanga.—Alſo, a town of Italy, in the Feltrin; 8 miles W.S.W. of Feltri.

SORAU, or Zyory, a town of Sileſia, in the principality of Ratibor; 18 miles E. of Ratibor. N. lat. 50° 1′. E. long. 18° 40′.

SORAW, or Zarow, a town of Luſatia, and one of the moſt ancient towns in the country, ſurrounded with walls in the year 1207. It has manufactures of cloth, and a conſiderable trade in linen and yarn; 25 miles S.S.E. of Guben. N. lat. 51° 37′. E. long. 15° 10′.

SORBA, a town of France, in the department of Jemappe, and chief place of a canton, in the diſtrict of Corté. The canton contains 2000 inhabitants.

SORBAIT, Paul de, in *Biography*, a phyſician of eminence, was a native of Hainault, in the Low Countries. Having finiſhed his courſes of claſſical and philoſophical ſtudies, he commenced that of medicine, which he appears to have concluded by taking the degree of doctor in that faculty at Vienna, where he ultimately ſettled. He obtained a high reputation for medical ſkill and erudition; and, in 1655, was appointed to the principal profeſſorſhip of medicine in the univerſity of that metropolis, the duties of which he executed with conſiderable celebrity, until the year 1679. While he was engaged in his courſe of this year, he was honoured with the appointment of phyſician to the dowager empreſs Eleanor, and at the concluſion of it, relinquiſhed altogether his academical avocations. His merits were ſtill farther rewarded by the office of counſellor and ſuperintendant of the public health, and by his elevation to the dignity of a knight of the kingdom of Hungary. He died in April 1691, at an advanced age. He left ſeveral works, namely, a body of medical practice, firſt publiſhed at Nuremberg, in 1672, folio, with the title of “Univerſa Medicina, tam Theorica quam Practica, nempè Iſagoge Inſtitutionum Medicarum et Anatomicarum, &c.” This work was republiſhed at Vienna in 1680, and again after his death, in 1701, with the new title of “Praxeos Medicæ auctæ, et a plurimis typi mendis ab ipſo Auctore caſtigatæ, Tractatus VII. &c.” “Nova et aucta Inſtitutionum Medicarum Iſagoge,” 1678, 4to. “Commentaria et Controverſiæ in omnes Libros Aphoriſmorum Hippocratis,” 1680. In the preceding year he publiſhed an account of the plague, which had committed dreadful ravages in Vienna, having deſtroyed, he affirms, not leſs than 76,921 perſons. Its title was “Conſilium Medicum, ſive Dialogus Loimicus de Peſte Viennenſi,” 1697; and he publiſhed the ſame work, in German, in 1680. He was author alſo of “A Treatiſe on Midwifery,” in the German language. Eloy Dict. Hiſt. de la Med.

SORBECKE, in *Geography*, a river which riſes in Weſtphalia, and runs into the Rhur, about two miles S. of Neheim.

SORBELLONI, in *Biography*, a ſecond rate Italian opera ſinger in *ſoprano*, who arrived here in 1761; and who, from the mere ſweetneſs of his voice, free from vulgarity, was always much applauded. He was here at the ſame time as Paganini, and performed the part of ſerious man in the burlettas of the time.

SORBIERE, Samuel, was born in 1615, at St. Ambroix, in the dioceſe of Uſez. He was educated by his maternal uncle, an eminent Calviniſt miniſter at Niſmes. He came to Paris in 1639, and being diſguſted, for ſome reaſons not now known, with the ſtudy of theology, he took up that of medicine. In 1642 he went to Holland, where, beſides purſuing his medical ſtudies, he materially aſſiſted in the tranſlation of Camden's Britannia, and alſo More's Utopia. He married, in Holland, the daughter of one of his townſmen, and went to Leyden, with the intention of ſettling in his profeſſion. In 1648 he publiſhed, under his own name, a French verſion of a treatiſe of Gaſſendi, entitling it “Diſcours ſceptique ſur le Paſſage du Chyle, et le Mouvement du Cœur.” Returning to France in 1650, he was made principal of the college of Orange, and there printed a Diſcourſe on the true cauſe of the troubles of England, and a letter on the deſigns of Cromwell. He conformed to the Catholic religion in 1653, after which his life was chiefly ſpent as an author, with a view, it is ſaid, of attempting to obtain penſions, in which he was very ſucceſsful, having laid under contribution cardinal Mazarin, Lewis XIV., and the popes Alexander VII. and Clement IX. He viſited England in 1664, and on his return he publiſhed an account of what he had obſerved, which was ſo free in its ſtrictures, that he was for a time exiled by a *lettre de cachet*. Sorbiere was likewiſe author of a work entitled “Lettres et Diſcours ſur divers Matières curieuſes,”

curieuſes," which contributed to his temporary reputation. He died in 1670, and a Sorberiana was publiſhed after his death, containing ſentiments ſuppoſed to have dropt from him in converſation. His writings exhibit a cauſtic and ſatirical ſpirit, and the learning which they diſplay is neither original nor ſolid. He was intimately connected with Hobbes and Gaſſendi, on whom he impoſed himſelf as a profound thinker.

SORBIODUNUM, in *Ancient Geography*. See Sorviodunum.

SORBOE, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 59° 5'.

SORBOLE, a town of Sweden, in Weſt Bothnia; 10 miles S.W. of Umea.

SORBONNE, Robert de, in *Biography*, founder of the famous theological college which bears his name, was born in 1201, of an obſcure family at Sorbon, in the dioceſe of Rheims. Being educated at Paris, and having taken his degree of doctor, he devoted himſelf to preaching, in which he became ſo celebrated, that the king made him his chaplain and confeſſor. Having become a canon of Cambray in 1251, the recollection of the difficulties which he had experienced in the courſe of his own ſtudies, ſuggeſted to him a plan for facilitating to poor ſcholars the means of proceeding to graduation. This was to form a ſociety of ſecular eccleſiaſtics, who, living in common, and provided with a regular maintenance, ſhould read lectures gratuitouſly. With the aſſiſtance of his friends, he founded the college called the Sorbonne, which was particularly conſecrated to the ſtudy of theology, and its conſtitution has ſerved as a model for that of all colleges ſince erected in that country. Sorbonne afterwards added to this foundation a college for the languages and philoſophy, under the name of the College of Calvi, or the Little Sorbonne. He was made canon of Paris in 1258, and roſe to ſuch a height of reputation, that princes looked to him on many important occaſions as the arbitrator in their diſputes. He died in 1274, at the age of 73, and left conſiderable property to his college. He was author of ſeveral works on theological ſubjects, which are preſerved in MS. in the library of the great college of which he was the liberal founder.

Sorbonne, or Sorbon, the houſe or college of the faculty of theology, eſtabliſhed in the univerſity of Paris.

It was founded in 1256, by St. Louis, or rather by Robert de Sorbonne, his confeſſor and almoner; firſt canon of Cambray, and afterwards of the church of Paris; who gave his own name to it, which he himſelf took from the village of Sorbon, or Serbon, in the department of the Ardennes, near Sens, ſix miles N. of Rethel, where he was born.

The foundation was laid in 1250, afterwards the king gave him all the houſes he had in the ſame place, in exchange for ſome others in another.

The college has been ſince magnificently rebuilt by the cardinal de Richelieu. The deſign of its inſtitution was for the uſe of poor ſtudents in divinity.

There were lodgings in it for thirty-ſix doctors and bachelors of the houſe; who were ſaid to be of the *ſociety of the Sorbonne*. Thoſe admitted into it without being doctors were ſaid to be of the *hoſpitality of the Sorbonne*. Six regent doctors held lectures every day, for an hour and half each: three in the morning, and three in the afternoon.

Sorbonne has been alſo uſed in the general for the whole faculty of theology at Paris, becauſe the aſſemblies of the whole body were held in the houſe of the Sorbonne: and becauſe the bachelors of the other houſes of the faculty, as the houſe of Navarre, &c. came thither to hold their *ſorbonnique*, or act, for being admitted doctors of divinity.

SORBUS, in *Botany*, a word uſually derived by critics from *ſorbeo*, to ſuck in; becauſe its fruit *Sorbum*, the Sorb-apple, or Service, ſee Service-tree, is not eatable till the pulp becomes quite ſoft, ſo as to be ſucked rather than bitten. De Theis, however, goes to the recondite ſources of Celtic learning for its origin; *Sormel*, the name of the fruit in that language, being, as he ſays, formed of *ſor*, harſh or rude, and *mel*, an apple.—Linn. Gen. 250. Schreb. 338. Willd. Sp. Pl. v. 2. 1008. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 204. Juſſ. 335. Lamarck Illuſtr. t. 434.—Claſs and order, *Icoſandria Trigynia*, Linn. Nat. Ord. *Pomaceæ*, Linn. *Roſaceæ*, Juſſ.

This genus, conſiſting, in moſt authors, of three ſpecies, *S. aucuparia*, *hybrida*, and *domeſtica*, we refer, without ſcruple, as in the *Flora Britannica*, to Pyrus; ſee that article, n. 24, 25, 26. See alſo Mespilus.

Sorbus, in *Gardening*, contains plants of the ornamental tree kind, among which the ſpecies cultivated are, the mountain-ſervice, mountain-aſh, quicken-tree, roan-tree (S. aucuparia); the true ſervice, or ſorb (S. domeſtica); and the baſtard ſervice, or mountain-aſh (S. hybrida).

In the firſt ſort the leaves make a pretty variety, when mixed with other trees in plantations: it is alſo handſome when in flower, and in the autumn, when in fruit; but the blackbirds and thruſhes are ſo fond of it, that they devour it before it is well ripe.

In the ſecond ſort there are varieties in the fruit; as with apple-ſhaped fruit; with pear-ſhaped fruit; with oval fruit; with turbinated fruit; and with compreſſed fruit.

Method of Culture.—Theſe plants are all capable of being raiſed from ſeed, and alſo by layers; but the firſt is the beſt method. The ſeeds, when well ripened in the autumn, ſhould be ſown on ſmall beds of light fine ground in the nurſery, either in drills or over the ſurface, covering them in to the depth of about an inch. When the plants riſe in the following or ſecond ſpring, they ſhould be kept clear from weeds, and when of a year's growth, be planted out in nurſery rows, to remain till of a proper ſize for planting out. But the ſecond ſort is ſometimes ſown in large pots, and forwarded in a hot-bed, ſo as to be ſooner fit for planting out in nurſery rows, as in one year, or a ſhort ſpace of time.

In the layer method, ſome of the beſt trees ſhould be cut down near to the ground while young, by which ſhoots will ſoon be made and ſent off, which ſhould be laid down in the uſual way in the autumn or ſpring ſeaſons, where they readily ſtrike root, and become proper for being planted out in nurſery rows in about one year.

In order to continue any particular variety, this method muſt conſtantly be adopted. Alſo, in cultivating the ſecond ſort, for the purpoſe of fruit, the beſt method is by grafting or budding upon ſtocks of any of the ſorts raiſed as above, or upon pear-ſtocks.

Theſe trees, in rearing, ſhould be trained for ſtandards, each with a ſingle upright ſtem, in the nurſery, till from three to ſix or eight feet high, when they are proper for any plantation, and may be tranſplanted as required. And they may be introduced in any large ſhrubbery or other ornamental plantation, and in thoſe of foreſt-trees. Some of the domeſtic ſervice-tree ſort may alſo be introduced as fruit-trees in gardens and orchards, principally as ſtandards, but occaſionally in eſpaliers, &c. in both of which modes they ſhould be planted and managed as apple and pear-trees, permitting the ſtandards to ſhoot freely above into full heads; the others being regulated according to their order of training. They will produce plentiful crops of fruit annually, after ſome time, to gather in autumn. In gathering of which for the table, it is proper to lay ſome in the fruitery, or other place, a little time, to mellow and become ſoft and tender; in which ſtate it is eatable, and of an agreeable taſte and flavour.

Some of theſe ſorts of trees, as the firſt and laſt kinds, are very ornamental in pleaſure-ground plantations, and large ſhrubberies, both in their leaves and fruit. The other ſort may alſo be occaſionally introduced with good effect in particular ſituations.

SORCERER'S ISLAND, in *Geography*, a ſmall iſland in the Atlantic, near the coaſt of Africa, where the Negroes come yearly to ſacrifice to their deities, near the mouth of the Rio Grande.

SORCERY, the crime of witchcraft, or divination, by the aſſiſtance of evil ſpirits. See MAGIC and MAGICIAN.

Some hold ſorcery to be properly what the ancients call *ſorti-legium*, or divination by means of *ſortes*, or *lots*. Lord Coke, 3d Inſt. fol. 44, deſcribes a ſorcerer, *qui utitur ſortibus, et incantationibus dæmonum*.

Sorcery is pretended to have been a thing formerly very common; at leaſt the credulity of thoſe ages made it paſs for ſuch; and people ſuffered frequently for it.

This ſuppoſed crime was made felony by 33 Hen. VIII. c. 8, and 1 Jac. I. c. 12; but this abſurd law was very properly repealed by an act of George II. See CONJURATION.

SORCY, in *Geography*, a town of France, in the department of the Meuſe, ſituated on the Meuſe; 3 miles S.E. of Commercy.

SORDE, or SORDES, a town of France, in the department of the Landes, on the gave of Oleron; 9 miles E. of Bayonne.

SORDES, a term applied to the matter diſcharged from ulcers in horſes, when it is rather viſcid or glutinous. This matter is frequently of a browniſh-red colour, ſomewhat reſembling the grounds of coffee, or grumous blood mixed with water. *Sordes*, *ſanies*, and *ichor*, are all of them terms which imply a diſcharge much more fetid than purulent matter, and none of them are altogether free from acrimony; but that which is generally termed *ichor* is by much the moſt acrid of them, being frequently ſo ſharp and corroſive, as to deſtroy large quantities of the neighbouring parts.

SORDINO, Ital., SOURDINE, Fr., a mute, or little machine placed on the bridge of a violin or violoncello to enfeeble or deaden the tone, by impeding the vibration of the whole inſtrument. The French never uſe this machine, and the Italians but ſeldom, at preſent.

SORDITIES, in *Surgery*, putrid pus of bad quality.

SORDUN, in *Geography*, a town of France, in the department of the Seine and Marne; 3 miles S.E. of Provins.

SORE, a town of France, in the department of the Landes, and chief place of a canton, in the diſtrict of Mont-de-Marſan; 27 miles N. of Mont-de-Marſan. The place contains 1450, and the canton 3409 inhabitants, on a territory of 420 kiliometres, in 4 communes.

SORE, among *Sportſmen*, denotes a buck of the fourth year.

SOREL, a buck of the third year.

SOREL, in *Botany*. See SORREL.

SOREL, in *Geography*, a cape on the N. coaſt of the iſland of Jerſey; 7 miles N.E. of St. Helier.

SORELLE, a town of Lower Canada, ſituated at the mouth of a river of the ſame name, which runs from lake Champlain into the St. Lawrence. It was laid out about the year 1787, and on an extenſive plan, with very wide ſtreets, and a large ſquare; but at preſent it contains only 100 houſes, which are all very indifferent, and widely ſeparated from one another. This is the only town on the St. Lawrence, between Montreal and Quebec, in which Engliſh is the predominant language. The inhabitants conſiſt principally of loyaliſts from the United States, who took refuge in Canada. The chief buſineſs carried on here is that of ſhip-building; ſeveral veſſels are annually launched from 50 to 200 tons burthen, which are floated down to Quebec, and there rigged. The river of Sorelle is deep at its mouth, and affords good ſhelter for ſhips from the ice, at the breaking up of winter: it is not navigable far beyond the town, even in boats, on account of the rapids; 24 miles N.N.E. from Montreal. Weld's Travels, vol. i.

SORENTO, or SORRENTO, a ſea-port town of Naples, in Principato Citra, ſituated on the brink of the ſteep rocks that overhang the bay of the ſame name, and preſenting an enchanting aſpect. The mountains of Vico and Maſſa, between which it lies, ſhelter it from the W. and S. winds. Its ſtreets are narrow; but this is no inconvenience in a warm climate, where carriages are not uſed, nor any communication with the metropolis practicable by land. Of all the places in the kingdom, this enjoys the moſt delightful climate, for which it was renowned in ancient times. Silius Italicus extols its ſoft and wholeſome zephyrs: "Zephyro Suorentum molle ſalubri." At preſent it enjoys ſhady groves, excellent water, fruit, fiſh, milk, butter, the fineſt veal, the beſt wine, and every neceſſary of life at an eaſy rate. Its population conſiſts of about 15,000 inhabitants, being half the population of the whole plain. Theſe are goldſmiths, mariners, or fiſhermen. The women are employed in breeding ſilk-worms, and weaving the ſilk which they draw from them. It is an archiepiſcopal ſee, of which the biſhops of Stabia, Vico, Equenſe, and Maſſa, are ſuffragans. Some abbies are alſo ſubſervient to it.

According to Hyginus, it was built by the Greeks; and was called Syrenetum, or Surenetum, from its having been the reſidence of the ſyrens Leucoſia and Ligia. However this be, it was anciently the abode of the Oſci, Opici, and Picentini, whoſe capital it was, and afterwards a Roman colony, and a municipal city, as we may conclude from a multitude of antique marbles. Its numerous ruins of edifices ſhew that the town is much reduced from its ancient ſtate. It was formerly adorned with ſeveral magnificent temples, among which were thoſe of Juno and Diana; but the moſt ſplendid of them was that built by Pollius, in honour of Hercules, and which Statius has depicted in all the charms of poetry. The place where this temple ſtood is now called corruptly Polo, and ſome traces are ſtill ſeen of thoſe of Ceres, Neptune, and Apollo. Beſides the fruits and wines for which Sorrento is famous, it was alſo celebrated among the ancients for its beautiful earthen veſſels, eſpecially as goblets or drinking cups. Pliny very much applauds them, and Martial prefers them to thoſe of the moſt valuable materials, and of the moſt exquiſite workmanſhip. Sorrento values itſelf upon having been the birthplace of the celebrated grammarian L. Craſſitius Paſides, mentioned by Suetonius in his treatiſe "De illuſtribus Grammaticis;" of the learned Bernardin Rota; and of the renowned Torquato Taſſo; 15 miles S. of Naples. N. lat. 40° 40′. E. long. 14° 24′.

The bay of Sorrento is three miles wide: a ſemicircular chain of woody mountains incloſes a rich and beautiful plain, rather ſloping towards the ſea, full of white buildings peeping out of the groves. This creſcent terminates in a ſtraight line to the ſea, by a bold coaſt of black perpendicular rocks. This probably formed a portion of a circle, half of which broke off and ſunk into the waves, and probably the whole was once the crater of a volcano. The whole ſoil of the plain is cineritious, and its rocks conſiſt of a ſtrong blue lava, except near the eaſt end, where they are of a ſofter piperino kind. The encircling mountains are compoſed of regular calcareous layers; and the materials of the lower ground are without doubt volcanical.

SOREX, or Shrew, in *Natural Hiſtory*, a genus of the Mammalia Feræ claſs and order, of which the following is the generic character: there are two upper fore-teeth, which are long and bifid; the lower fore-teeth are from two to four; the intermediate ones are ſhorter; there are ſeveral tuſks on each ſide; the grinders cuſpidate. (See the article Shrew.) Seventeen ſpecies are enumerated in Gmelin's laſt edition of the Linnæan genera, which are as follow.

Species.

Cristatus; Creſted Shrew. The noſtrils in this ſpecies are caruncalate; the tail is ſhort. It inhabits North America. The whole animal is four inches long, and the tail an inch and a quarter: it feeds on roots, and reſembles the mole in its face and ſnout.

Minutus; Minute Shrew. The ſnout of this ſpecies is very long, and it has no tail. It inhabits Siberia, in moiſt woods, under the roots of trees: it makes its neſt of lichen, collects ſeeds, runs and burrows quickly; it bites, has the voice of a bat, and weighs about a drachm.

Aquaticus; Aquatic Shrew. In this ſpecies the hind-feet are palmate; fore-feet are white; the tail is ſhort and white. It is an inhabitant of North America, and is the ſize of a mole.

Moschatus. Feet palmate, tail flattened, thickeſt in the middle. This is called the muſky ſhrew; it inhabits about the lakes of Volga and Tanais; burrows under the banks, with an entrance into the water; feeds on flags and fiſh; the body of the animal is ſeven inches long, and the tail is eight.

* Bicolor; Water Shrew. The tail of this ſpecies is of the mean length; it is nakediſh; the body is blackiſh, beneath it is cinereous; the toes are fringed. It inhabits Europe and Siberia, near ſwamps and rivers; ſwims eaſily, often under water: the female has ten teats, and brings forth nine young at a time; it makes a noiſe like the chirp of a graſshopper; the body of the animal is four inches long, and the tail two.

Murinus; Murine Shrew. The tail is of a middle length; the body is brown, feet and tail cinereous. It inhabits Java, and is the ſize of a mouſe.

* Araneus; Fetid Shrew. The tail of this ſpecies is of the middle length; the body beneath is whitiſh. It inhabits almoſt every part of Europe, and in the northern climates of Aſia; it lives in old walls, ſtables, yards, granaries, out-houſes, ſwamps, and pools; it feeds on corn and inſects; it ſmells of muſk; is killed, but not eaten, by cats; the voice is ſhrill; it runs much ſlower than a mouſe; brings five or ſix young ones in ſpring and ſummer; it is ſeldom ſo long as three inches. There are two varieties. 1. Head, and upper parts, duſky; ſides browniſh ruſty. This is found in Hudſon's Bay and Labrador. 2. The upper parts are of a duſky grey, and underneath the animal is of a yellowiſh-white.

Surinamensis; Surinam Shrew. The tail of this ſpecies is half as long as the body; the body above is cheſnut, beneath white and yellowiſh-grey. It is found, as its ſpecific name denotes, at Surinam.

Pusillus; Timid Shrew. Ears rounded; tail ſhort, a little fringed at the ſides. It inhabits the northern parts of Perſia, in holes which it burrows; it is three inches and a half long; the body is of a dark grey above, and the belly is paler.

Brasiliensis. The body of this ſpecies is brown, the back is black, with three ſtripes. It inhabits Braſil, is about five inches long, with a tail of two inches in length.

Exilis. The tail of this is very thick in the middle, tapering to each end. It inhabits Siberia; it is the ſmalleſt of quadrupeds, ſcarcely weighing half a drachm; it is like, though of a darker colour, the S. araneus.

Cæruleus; Blue Shrew. The tail is of a mean length; the upper parts are of a pale blue; the belly is lighter; the legs and feet are white. It inhabits Java, and the other Eaſt Indian iſlands, feeds on rice, ſmells ſtrongly of muſk, is eight inches long, with a tail about half that length.

Mexicanus: Mexican Shrew. The tail is ſhort; the fore-feet are three-toed; the hind-feet have four toes. It is found in New Spain; burrows in vaſt numbers, feeds on roots and ſeeds; the fleſh is good; it is about nine inches long.

Albipes; White-footed Shrew. Tail ſlender, hairy; upper parts duſky-aſh; feet, belly, and teeth, white.

Quadri-caudatus; Square-tailed Shrew. The tail, as its ſpecific name denotes, is ſquariſh; the head and upper parts are of a duſky-aſh; the belly is paler; the fore-teeth are brown.

Luri-caudatus; Carinate Shrew. The tail is taper, keeled underneath; head and upper parts duſky-aſh, belly whitiſh; fore-teeth brown, a white ſpot behind each eye.

Unicolor. The tail is compreſſed at the baſe; the body is of an uniform duſky-aſh. It is obſerved by Gmelin, that the laſt four, deſcribed as diſtinct ſpecies, are probably only varieties of the S. araneus. They are all found near Straſburg.

SOREY, in *Geography*, a town of France, in the department of the Meuſe; 3 miles S.S.E. of Commercy.

SOREZE, a town of France, in the department of the Tarn; 12 miles S.S.W. of Caſtres.

SORG, a town of Germany, in the principality of Anſpach, on the Schwarzach; 8 miles E. of Schwabach.

SORGANO, a town of the iſland of Sardinia; 38 miles E. of Boſa.

SORGE, George Andreas, in *Biography*, a voluminous writer on muſic, and a compoſer, born in 1703, and who died in 1778. In Gerber there is a liſt of his works.

SORGENFREY, or Sans Souci, in *Geography*, a town of Denmark, in the iſland of Zealand, with a royal palace; 6 miles N. of Copenhagen.

SORGHUM, in *Botany*, a name of oriental or barbarous origin, but venerable for its antiquity.—"Perſ. Ench. v. 1. 101." Purſh v. 1. 78. (Sorgum; Mich. Gen. 35. Mieg. Act. Helvet. v. 8. 131. Holcus; Brown Prodr. Nov. Holl. v. 1. 198.)—Claſs and order, *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume of two ovate, concave, coriaceous, unequal valves, inflexed at the margin, ſingle-flowered. *Cor.* of two membranous, ovato-lanceolate, rather unequal valves, hairy at the edges; the innermoſt rather the ſmalleſt, cloven, bearing from its fiſſure a twiſted awn, twice the length of the glume itſelf. Nectary a thin, awl-ſhaped, villous ſcale. *Stam.* Filaments three, capillary; anthers cloven at each end, prominent. *Piſt.* Germen ovate, poliſhed; ſtyles two, capillary, ſhort, ſpreading; ſtigmas oblong, feathery. Some flowers, elevated on ſtalks, have neither awn nor piſtil. *Peric.* none, except the permanent, hardened, cloſed calyx. *Seed* ſolitary, oval, tumid, concealed in the hard poliſhed calyx, out of which the awn of the corolla projects.

Eſſ. Ch. Calyx of two valves, ſingle-flowered. Corolla of two valves; the inner one cloven and awned. Nectary villous. Seed encloſed in the hardened calyx. Some flowers male, ſtalked, without an awn.

We have under the article Holcus adverted to the preſent genus, which requires to be ſeparated therefrom, and is in itſelf important, on account of its economical uſes. What are its genuine ſpecies, we do not completely undertake to determine, nor how far thoſe which are deſcribed are diſtinct, authors having been obliged to recur to *colour* in their definitions. "They are annual graſſes, of quick growth, and of a very large bulk, abounding with ſaccharine juice, as much as the ſugar-cane, at leaſt in Italy." Profeſſor Arduino ſhewed the writer of this, at Padua in 1787, good ſugar and treacle procured from his *Holcus Cafer*, hereafter mentioned. See Sm. Tour on the Continent, ed. 2. v. 3. 10. The ſtalks of the ripe panicles of ſome of the ſpecies make brooms, or even carpet and clothes-bruſhes of a very good quality. The following will ſerve to exemplify the genus in queſtion.

S. *Dora.* Common Indian-millet. (Holcus Dora; Mieg. Act. Helvet. v. 8. 125. t. 4. f. 3. Holcus Sorghum; Linn. Sp. Pl. 1484. Willd. Sp. Pl. v. 4. 929. Ait. Hort. Kew. v. 5. 430. Arduin. Olc. o Sorg. 19. t. 4. f. 1. Milium indicum; Matth. Valgr. v. 1. 370.)—Panicle ovate, compact, erect. Glumes downy. Seeds ſlightly compreſſed.—Native of the Eaſt Indies. Cultivated in the ſouth of Europe. The *root* is annual, conſiſting of innumerable fibres. *Stem* erect, round, jointed, leafy, from ſix to ten feet high, as thick as the finger or thumb. *Leaves* ſheathing, reed-like, lanceolate, ſmooth, with a ſtrong mid-rib, and many fine lateral, oblique, parallel ones. *Panicle* terminal, from four to twelve inches long, very much branched, cloſe, of innumerable downy *flowers*, on zig-zag or curved ſtalks. *Seeds* roundiſh, various in colour, uſually yellow or reddiſh. This is the moſt general ſpecies, under which indeed many of the reſt have been confounded; but ſome of them, by their ſuperior merits, have ſuperſeded it in cultivation.

S. *bicolor.* Two-coloured Indian-millet. (Holcus bicolor; Linn. Mant. 301. Willd. Sp. Pl. v. 4. 929. Ait. Hort. Kew. v. 5. 430. Arduin. Olc. o Sorg. 29. t. 6. H. Sorghum; Mieg. Act. Helvet. v. 8. 129. t. 4. f. 4?)—Panicle erect, ſomewhat lobed. Glumes ſmooth, black. Seeds globoſe, white.—Said to be a native of Perſia. Sufficiently diſtinct from the former, by the above characters.

S. *cernuum.* Drooping Indian-millet. (Holcus cernuus; Willd. Sp. Pl. v. 4. 930. Arduin. Olc. o Sorg. 14. t. 3. f. 1, 2.)—Panicle compact, curved downward as it ripens. Glumes downy. Seeds globoſe.—Cultivated in Arabia, Syria, and various parts of the Levant, being probably a native of India. It is remarkable for its deflexed, or pendulous *panicle* of *ſeed*, whoſe ſtalk cannot be made ſtraight without breaking. The *ſtem* is five or ſix feet high. *Leaves* ſmooth. *Seeds* very white, ſcarcely compreſſed.

S. *caffrorum.* Caffres Indian-millet. (Holcus caffrorum; Thunb. Prodr. 20. Willd. Sp. Pl. v. 4. 930. H. Cafer; Arduin. Olc. o Sorg. 5. t. 1.)—Branches of the panicle ſpreading every way, deflexed. Glumes downy. Awns deciduous. Seeds globoſe.—Native of the Cape of Good Hope. Rather larger than moſt of the preceding, with a ſpreading, drooping-branched *panicle*. *Seeds* more expoſed than in the others. Profeſſor Arduino recommends this much for culture, on account of its abundant crop; the goodneſs of the grain for poultry; and the copious ſaccharine juices of the *ſtems*. We preſume his plant and Thunberg's to be the ſame, but have no proof.

S. *ſaccharatum.* Yellow-ſeeded Indian-millet. Purſh n. 1. (Holcus ſaccharatus; Linn. Sp. Pl. 1484. Willd. Sp. Pl. v. 4. 930. Ait. Hort. Kew. v. 5. 430. Arduin. Olc. o Sorg. 22. t. 4. f. 2. Mieg. Act. Helvet. v. 8. 119. t. 4. f. 1. Sorgum; Rumph. Amboin. v. 5. 194. t. 75. f. 1.)—Panicle erect, with ſlender, drooping, lax branches. Glumes hairy. Male flowers very few, withering.—Native of the Eaſt Indies. The more diſperſed *flowers*, on the long, ſpreading, drooping, whorled branches of the *panicle*, readily mark this ſpecies.

S. *nigrum.* Coal-black Indian-millet. (Holcus niger; Arduin. Olc. o Sorg. 20. t. 9.)—Panicle ovate, erect, with ſpreading denſe branches. Glumes and ſeeds black.—Nothing is ſaid of the native country, or particular qualities, of this ſpecies, which is one of the largeſt of the genus. The *leaves* are long and broad, conſpicuous for their white rib. *Panicle* ſomewhat pyramidal, not near ſo denſe as that of the firſt ſpecies, but the *flowers* are thickly ſet on its ſpreading, ſlightly deflexed, branches.

SORGUE, or *Pont de Sorgue*, in *Geography*, a town of France, on the river Sorgue; 6 miles from Avignon.—Alſo, a river of France, which riſes from the fountain of Vaucluſe, and runs into the Rhone, by ſeveral mouths, at and near Avignon.

SORI, a town of the Ligurian republic; 9 miles S.E. of Genoa.

SORIA, a town of Spain, in Old Caſtile, near the ſource of the Duero, built near the ruins of the ancient Numantia. This town, which ſuffered much during the Mooriſh wars, was repeopled in the beginning of the 12th century, by order of Alonſo, king of Caſtile; 116 miles N.N.E. of Madrid. N. lat. 41° 47′. W. long. 2° 35′.

SORIANG, a river on the W. coaſt of the iſland of Celebes, which runs into the ſea, S. lat. 3° 9′. E. long. 119° 48′.

SORIANO, Francesco, in *Biography*, a great canoniſt, and critic of the muſic of his time, was maeſtro di cappella of St. Peter's church at Rome, and in 1610 publiſhed one hundred and ten canons upon the chant to the hymn "Ave Maris Stella," for three, four, five, ſix, ſeven, and eight voices. Reſolutions of theſe canons in ſcore, with remarks, by Zacconi, 1625, in manuſcript, were in the poſſeſſion of the late reſpectable theoriſt and hiſtorian, P. Martini, who, among his other muſical curioſities, communicated to us this manuſcript, which impreſſed us with a much higher opinion of the patience than the genius of Soriano. Few maſters, except himſelf, could perhaps have compoſed theſe canons, but many muſt have thought that the loſs to muſic would not have been very great, if they had never been compoſed. Baptiſt Doni, an enemy to learned muſic, and a great advocate for the recitative and melodies for a ſingle voice, which were now advancing into favour, ſays (Tratt. della Muſ. Scenica, Op. omn. tom. ii. p. 129.) that though Soriano was generally allowed by muſicians to be a learned contrapuntiſt, he never had genius ſufficient to invent a ſingle air that was beautiful or pleaſing; on which account he applied himſelf to the compoſition of elaborate fugues and canons: as in poetry, thoſe who have no original ideas or invention can write acroſtics and anagrams, by which they become only rhymers, not poets; ſo canoniſts ſhould be called contrapuntiſts, not muſicians.

Soriano, in *Geography*, a town of the Patrimonio; 6 miles E.S.E. of Viterbo.—Alſo, a town of Naples, in Calabria Ultra; 6 miles E.S.E. of Mileto.

SORIBOA, a town of Peru, in the dioceſe of Truxillo, and juriſdiction of Chacapoyas.

SORICINA, a town of Italy, in the department of the Upper Po; 12 miles N. of Cremona.

SORIGO, a town of Italy, in the department of the Lario; 27 miles N. of Como.

SORIN, a river of France, which runs into the Rhone, at Roanne.

SORITES, Σωρειτης, formed from σωρος, *cumulus*, *heap*, in *Rhetoric*, &c. a kind of argument, in which ſeveral middle terms are choſen to connect one another ſucceſſively in ſeveral propoſitions, till the laſt propoſition connects its predicate with the firſt ſubject. Whence Cicero calls it *ſyllogiſmus acervatus*, an *accumulative ſyllogiſm*.

Such was that merry argument of Themiſtocles, to prove, that his little ſon, under ten years old, governed the whole world. Thus: "My ſon governs his mother; his mother me; I the Athenians; the Athenians the Greeks; Greece commands Europe; Europe the whole world: therefore my ſon commands the whole world."

This method of diſputing prevailed much among the Stoics; eſpecially with Zeno and Chryſippus; but it is very ſophiſtical.

SORITO, in *Geography*, a town of Naples, in Calabria Ultra; 5 miles E.S.E. of Mileto.

SORIVA, a town of Italy, in the Feltrin; 6 miles W. of Feltri.

SORKEY, a town of Hindooſtan, in Bahar; 15 miles W. of Rotaſgur.

SORLECHEU, a town of France, in the department of the Jemappe; 6 miles E.N.E. of Aveſnes.

SORNAC, a town of France, in the department of the Correze, and chief place of a canton, in the diſtrict of Uſſel. The place contains 1453, and the canton 5647 inhabitants, on a territory of 205 kiliometres, in 8 communes.

SORNI, a name given by ſome of the chemical writers to iron.

SORNZIG, in *Geography*, a town of Saxony, in the circle of Leipſic; 3 miles S. of Mugeln.

SORO, a river of Portugal, which runs into the Tagus, near Salvaterra, in the province of Eſtremadura.

SOROCEPHALUS, in *Botany*, ſo named by Mr. Brown, from σωρος, *a heap*, and κεφαλη, *the head*, alluding to the aggregate, or crowded, heads of flowers.—Brown Tr. of Linn. Soc. v. 10. 139. Ait. Hort. Kew. v. 1. 202.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juſſ. Brown.

Eſſ. Ch. Corolla four-cleft, regular. Stamens in the concave tips of the ſegments. Nectary four ſcales beneath the germen. Stigma vertical. Nut ſuperior. Involucrum of from three to ſix leaves, permanent, containing one, or a very few, flowers. Common receptacle naked.

Shrubs, with wand-like branches. Leaves ſcattered; either thread-ſhaped or flat, undivided; the lowermoſt only being occaſionally bipinnatifid. Involucrums nearly ſeſſile, with a ſolitary bractea, collected into a capitate terminal ſpike, ſometimes ſubtended by imbricated bracteas. Flowers purpliſh. *Brown.*

Mr. Brown deſcribes eight ſpecies, all natives of ſouthern Africa. Two are in the Engliſh gardens.

Section 1. *Spike nearly naked. Involucrum from one to three-flowered. Nut entire at the baſe, on a very ſhort ſtalk. Leaves thread-ſhaped, undivided.*

1. S. *ſetaceus*. Briſtle-leaved Sorocephalus. Br. n. 1.—"Involucrum ſingle-flowered. Leaves ſetaceous, incurved, hairy, as well as the branches."—Gathered by Dr. Roxburgh, at the Cape of Good Hope. An erect *ſhrub*, with ſtraight umbellate *branches*. *Leaves* numerous, an inch, or rather more, in length, with a briſtly faded point; the lower ones leſs incurved. *Head* terminal, ſeſſile, ovate, the ſize of a black cherry. Lower part of the *corolla* looſely downy; its ſegments bearded. *Stigma* ovate, ſomewhat conical.

2. S. *ſalſoloides*. Salt-wort Sorocephalus. Br. n. 2.—"Involucrum ſingle-flowered. Leaves triangular-thread-ſhaped, incurved, ſmooth."—From the ſame country. *Roxburgh*. Erect, very much branched. Youngeſt *branches* finely downy. *Leaves* half an inch long, furrowed above, with an acute point, nearly of their own colour. *Head* rather ſmaller than the former, accompanied underneath by a few minute lanceolate *bracteas*. *Corolla* bearded with ſhort hairs. *Stigma* erect, or ſlightly inclined.

3. S. *imberbis*. Beardleſs Sorocephalus. Br. n. 3.—"Involucrum three-flowered. Segments of the corolla, as well as the points of the bracteas, ſmooth."—Gathered by Mr. Niven, near the Cape of Good Hope. Much branched; the young *branches* downy. *Leaves* ſmooth, an inch long, moderately ſpreading, ſcarcely incurved, ſharp-pointed; furrowed above. *Head* on a ſhort ſtalk, terminal, nearly globoſe, the ſize of the firſt ſpecies. *Bracteas* lanceolate, fringed, with a ſmooth awl-ſhaped point. Lower part of the *corolla* bearded. *Style* ſtraight. *Stigma* club-ſhaped, equal.

4. S. *ſpatalloides*. Curve-ſtyled Sorocephalus. Br. n. 4.—"Involucrum three-flowered, ſomewhat ſtalked. Segments of the corolla bearded."—Found by Mr. Niven, near Franche-hoek, at the Cape of Good Hope. An upright *ſhrub*, with umbellate, finely downy, *branches*. *Leaves* ſcarcely an inch long, moderately ſpreading; hairy when young. *Heads* either ſolitary, or two or three together, ovate or oblong, the ſize of a hazel-nut, on ſhort ſtalks. *Bracteas* lanceolate, acute, downy; ſometimes ſmoothiſh at the point. *Corolla* bearded with long hairs. *Style* generally incurved at the point, in which caſe the *ſtigma* is ſomewhat unequal; but if the *ſtyle* be nearly ſtraight, it is ovate and equilateral.

Section 2. *Spike with more or leſs of a general involucrum. Partial involucrum with from four to ſix flowers. Nut emarginate at the baſe.*

5. S. *tenuifolius*. Slender-leaved Sorocephalus. Br. n. 5.—"Leaves thread-ſhaped, very ſhort. Heads of few flowers. Corolla with a feathery beard; its innermoſt ſegment nearly naked."—Gathered by Mr. Niven, in moiſt ſituations near Breed river, at the Cape of Good Hope. A *ſhrub* three or four feet high, with ſmooth, reddiſh, leafy *branches*; ſomewhat villous when young. *Leaves* imbricated, roughiſh, ſharp-pointed, not half an inch long; the younger ones hairy. Aggregate *head* terminal, ſeſſile, the ſize of a pea, compoſed of from two to four partial *heads*. Partial *involucrums* ſomewhat imbricated; their leaflets lanceolate, bearded, ſmoothiſh at the points. *Corolla* very deeply four-cleft, equal. *Style* ſtraight. *Stigma* ovate, erect, equilateral.

6. S. *lanatus*. Woolly Sorocephalus. Br. n. 6. Ait. n. 1. (Protea lanata; Thunb. Diſſ. n. 30. t. 3. Willd. Sp. Pl. v. 1. 519.)—Leaves triangular-thread-ſhaped; furrowed above. Heads of many flowers. All the ſegments of the corolla with feathery beards.—Native of Swartland, and other mountainous tracts, about the Cape of Good Hope. Sent to Kew garden, by Mr. Maſſon, in 1790. It flowers from June to September. An upright *ſhrub*, with ſomewhat umbellate, ſtraight, leafy, minutely downy *branches*. *Leaves* imbricated, from five to eight lines long. *Head* the ſize of a large hazel-nut, ſeſſile, globoſe, ſolitary; the partial ones very cloſely crowded, each of from five to eight

flowers. *Involucrums* of from five to ſeven narrow-lanceolate bearded leaves. *Corolla* equal, deeply divided. *Style* ſtraight, with a thick equilateral *ſtigma*. *Nut* finely downy, with a thin, brown, ſlightly rugged, ſhell; its ſtalk very ſhort. The *leaves* are occaſionally roughiſh or ſmooth, their keel rounded or acute.

7. S. *imbricatus*. Imbricated Sorocephalus. Br. n. 7. Ait. n. 2. (Protea imbricata; Thunb. Diſſ. n. 45. t. 5. Linn. Suppl. 116. Willd. Sp. Pl. v. 1. 527. Andr. Repoſ. t. 517.—Leaves lanceolate; rough underneath. Baſe of the corolla clothed with glandular hairs. *Stigma* club-ſhaped.—Found on hills at the Cape of Good Hope. Sent to Kew, by Mr. Maſſon, in 1794. Mr. Hibbert alſo obtained it from his collector there, Mr. Niven. This has the habit of the foregoing, but the *leaves* are lanceolate, near an inch long; hairy beneath, and at the edges; ſmooth above. *Head* ſeſſile, ovate or oblong, either ſolitary, or compoſed of two or three crowded together; with a common *involucrum*, of many lanceolate coloured leaves. Each partial *involucrum*, of four lanceolate hairy leaves, uſually contains four flowers. *Corolla* ſlender, purpliſh; its ſegments bearded, with a long denſe tuft of white hairs, as is likewiſe the *germen*. *Style* ſtraight. *Stigma* a little gibbous. *Nut* oblong, brown, very ſmooth and ſhining.

8. S. *diverſifolius*. Various-leaved Sorocephalus. Br. n. 8.—"Leaves ſpatulato-lanceolate; ſmooth underneath: the lowermoſt doubly pinnatifid. Corolla bearded throughout. Stigma cylindrical."—Gathered by Mr. Niven, on ſtony hills near *Goud Rivier*, at the Cape of Good Hope. A ſmooth *ſhrub*, whoſe *ſtem* is from two to ſix feet high, either ſimple or divided, ſtraight, erect, as thick as a ſwan's quill; downy in the upper part. *Lower leaves* two inches long, twice three-cleft, channelled; the reſt imbricated, bluntiſh, ſcarcely concave, hardly half an inch in length. *Head* ſeſſile, ſolitary, ovate, obtuſe, the ſize of a ſmall plum.

SOROCHINSKAIA, in *Geography*, a fortreſs of Ruſſia, in the government of Upha, on the Samara; 80 miles N.W. of Orenburg.

SOROE, a town of Denmark, in the iſland of Zealand, ſurrounded by three freſh-water lakes. In this place is a royal academy, endowed with the revenues of a rich convent, which was diſſolved at the revolution; 35 miles S.W. of Copenhagen. N. lat. 55° 27′. E. long. 11° 30′.—Alſo, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 70° 30′.

SOROOMAN, a town of Arabia, in the province of Oman; 110 miles S.W. of Julfa.

SOROTO, a town of Thibet; 70 miles W.N.W. of Cha-tcheou.

SORRANCES, among *Farriers*, ſignify two things; *viz.* either an ill ſtate, or habit, of a horſe's body, ariſing from ſome part diſeaſed; or a looſening and ſolution of the continuity of the parts; which, according to the various circumſtances of it, acquire new names, as fracture, wound, ulcer, rupture, convulſion, cramp, excoriation, &c.

Sorrance-*Water*, a name given by our farriers to a ſolution of vitriol, and ſome other ingredients, in vinegar; a medicine much eſteemed in many of the diſeaſes of horſes. It is prepared in the following manner.

Take Roman vitriol, and roach-alum, of each an ounce and a half; verdigris, an ounce; copperas, two ounces: reduce all theſe to powder together, and put them into a two-quart bottle, into which pour a quart of the ſtrongeſt and beſt wine-vinegar; this is to be ſet in balneo Mariæ. The ſhort way of doing which by the farrier, is this: he puts a wiſp of hay into the bottom of the kettle, and then tying ſome pieces of lead or iron about the neck of the bottle, to make it heavy enough to ſink in water, it is ſet upon the hay ſo, as to ſtand very upright; then three notches are cut lengthwiſe in the cork to give paſſage to ſome of the vapours when the bottle is heated, that it may not burſt. When every thing is thus prepared, ſo much cold water is to be put into the kettle, that the neck of the bottle may ſtand two or three inches above it; the kettle is then to be ſet over the fire, and the water is to be made to boil, and kept boiling about half an hour, the bottle being at times taken out, and thoroughly ſhaken. When the ſalts are thus thoroughly diſſolved in the vinegar, the whole is to be kept for uſe.

The method in which they uſe it is this: take an earthen pan, which will hold about twelve quarts; let this be filled with urine that has been made by ſound, healthy, and young perſons; the ſtaler the urine is, the better it is for uſe, and it ought indeed always to ſtand, at leaſt, three weeks before it is uſed. It is proper for the farrier, therefore, always to keep a quantity of this ready, and when the water is to be uſed, half a pint of it is to be mixed with a quart of the urine; or, if it be required ſtronger, more of the water is to be added: theſe are to be thorougly mixed together, and the legs, or other affected part of the horſe, bathed with it with ſoft rags twice a-day.

The virtues of this water are highly extolled: it is ſaid to cure the malanders in two or three times dreſſing; it is alſo a ſovereign remedy for the mange, either dry or wet, and for the rat-tails, ſcratches, gourded or ſwelled legs and heels, and it alſo cures horſes when the greaſe is fallen into their heels, as the farriers expreſs it. The farcy is alſo ſaid to be often cured by a long continuance in the uſe of it, purging the horſe two or three times, at different diſtances of time, during the time of his being under cure by the water. They alſo find it a good cleanſer and healer of foul ulcers, and that it prevents the breeding of proud-fleſh and worms in wounds, and drives away a flux of humours that were falling upon any part. They uſe it alſo in clefts and cracks of the heels, and in windgalls, eſpecially in the prevention of the laſt, by its repellent qualities. The green water alone is an excellent remedy for fiſtulas, cankers, and the galled backs of horſes; diſpoſing ſuch ſorrances, as they are called, not to feſter, rot, and grow worſe, as all greaſy and oily medicines do, but cleanſing them, and preparing the way to a very ſound and ſtanding cure.

SORREL, Acetosa, in *Botany*, *Gardening*, and the *Materia Medica*. See Rumex.

Sorrels, *Indian Red*, and *Indian White*, or *Syrian Mallow*, in *Botany*, are ſpecies of *Hibiſcus*; which ſee.

Sorrel, *Wood*, in *Botany*, *Gardening*, and the *Materia Medica*. See Oxalis.

Sorrel, *Common* and *Curled*, in *Agriculture*, troubleſome weeds in meadows and paſture lands; alſo the latter in cultivated arable ground, where neither horſes nor neat cattle will eat it, which, of courſe, renders it neceſſary to be eradicated. This is moſtly accompliſhed by rooting it out, or frequently cutting the ſtalks over juſt below the ſurface of the land. It has often the title of curled dock. See Weeds.

Sorrel, in the *Manege*, is uſed for a reddiſh colour. The mane ought to be red or white, in a horſe of this colour. It is diſtinguiſhed, according to the degrees of its deepneſs, into a *burnt* ſorrel, and a *bright* or *light* ſorrel. Generally ſpeaking, it is a ſign of a good horſe.

Sorrel, *Salt of*, in *Chemiſtry*, the native ſuper-oxalat of potaſh, contained in the juice of this plant. See OXALIC *Acid*.

SORREL-*Tree*, in *Botany*. See ANDROMEDA.

SORRO, in *Geography*, a town of Africa, in Beeroo; 85 miles S.W. of Walet.

SORROINSU, a town of the department of Liamone, or iſland of Corſica; the canton of which contains 1528 inhabitants.

SORS, a town of the iſland of Sardinia; 10 miles N.N.E. of Saſſari.

SORSELE, a town of Swediſh Lapland, in the lapmark of Pitea; 105 miles W. of Pitea. N. lat. 65° 33°. E. long. 17° 20′.

SORSOKEN, a ſea-port town in the S.E. part of the iſland of Luçon.

SORT, a town of Spain, in the province of Catalonia; 18 miles W. of Urgel.—Alſo, a ſea-port town of Africa, in the country of Tripoli, ſituated on the coaſt of the Mediterranean, in the gulf of Sidra. N. lat. 30° 28′. E. long. 16° 55′.

SORTES, LOTS, in *Antiquity*, a method of deciding dubious caſes, where there appears no ground for a preference; by referring the deciſion to chance; as in caſting of dice, drawing of tickets, &c.

The ſortes, or lots, were of ancient uſe among the Jews; and in the books of the Old Teſtament we meet with divers ſtanding and perpetual laws, and divers particular commands, preſcribing and regulating the uſe of them. Thus, the Scripture informs us, that the lot fell on St. Matthias, when a ſucceſſor to Judas in the apoſtolate was to be choſen. Our Saviour's garment itſelf was caſt lots for.

The SORTES *Præneſtinæ* were famous among the Greeks. The method of theſe was to put a great number of letters, or even whole words, into an urn; to ſhake them together, and throw them out; and whatever ſhould chance to be made out in the arrangement of the letters, &c. compoſed the anſwer of this oracle.

Cicero, de Divin. lib. ii. § 41, ſays, that a variety of predictions were inſcribed on pieces of wood, which were kept in a box or cheſt; and one of theſe drawn out by a child, after the box was ſhaken, contained the anſwer ſought. He alſo informs us, how theſe fragments of wood were firſt diſcovered; but he obſerves, "Tota res eſt inventa fallaciis, aut ad quæſtum, aut ad ſuperſtitionem." In lieu of this, another kind of ſortes was introduced into Greece and Italy; which was, to take ſome celebrated poet, as Homer, Euripides, or Virgil, to open the book, and whatever firſt preſented itſelf to the eye upon opening, was taken for the ordinance of heaven. This made what they called the *ſortes Homericæ*, and *ſortes Virgilianæ;* which ſucceeded to the uſe of the *ſortes Præneſtinæ*.

The bath *kol* among the Jews was much of the ſame kind, differing only in this circumſtance, that the Jews took their oracle from the firſt words which they heard any body pronounce; the Heathen, from the firſt they caſt their eyes upon, on opening Homer, &c. in which they endeavoured to diſcover a meaning ſuitable to the matter concerning which they inquired.

This ſuperſtition paſſed from Paganiſm into Chriſtianity; and the Chriſtians took their ſortes out of the books of the Old and New Teſtament. The firſt paſſage that preſented itſelf upon opening a book of Scripture, was eſteemed the anſwer of God himſelf.

If the firſt paſſage did not happen to be any thing to the purpoſe for which the ſortes were conſulted, another book was opened; till a paſſage was met with that might be taken for an anſwer. This was called *ſortes ſanctorum*. St. Auguſtine (Epiſt. ad. Jan. 109.) does not diſapprove of this method of learning futurity, provided it be not uſed for worldly purpoſes.

Gregory of Tours adds, that the cuſtom was firſt to lay the Bible on the altar, and to pray the Lord, that he would diſcover by it what was to come to paſs. Inſtances of the uſe of the ſortes ſanctorum are very frequent in hiſtory. Heraclius, M. Fleury tells us, in his war againſt Choſroes, to learn where he ſhould take up his winter-quarters, purified his army for three days, and then opened the Goſpels, and found the place appointed for his winter-quarters was in Albania.

Gilbert of Nogent informs us, that, in his time, (that is, about the beginning of the 12th century,) the cuſtom was, at the conſecration of biſhops, to conſult the ſortes ſanctorum, to learn the ſucceſs, fate, &c. of their epiſcopate.

The practice is founded on a ſuppoſition, that God preſides over the ſortes, and on Prov. xvi. 33. "The lot is caſt into the lap; but the diſpoſing thereof is of the Lord."

In effect, many divines hold that the lot is conducted in a particular manner by Providence; that it is an extraordinary manner in which God declares his will by a kind of immediate revelation. The ſortes ſanctorum, however, were condemned by the council of Agda, in 506, at the time they were beginning to take footing in France, &c.

SORTILEGE, SORTILEGIUM, a kind of divination by ſortes, or lots.

SORTING *Sheep-Stock*, in *Agriculture*, the practice of carefully chooſing, ſorting, collecting, and putting together, thoſe which are the moſt proper and beſt ſuited for the purpoſe of breeding, or any other uſe that may be in the contemplation of the grazing farmer. It is a practice which has hitherto, for the moſt part, only prevailed among the larger and better kinds of ſheep-farmers, but which ought to be every where attended to where good ſheep-ſtock is wanted, and good management with them to be purſued. It, however, requires great care and attention in the execution, in order to perform it in a proper manner; but, when well conducted, amply repays the judgment and ſkill of the ſtock-farmer. The proper introduction of new and approved breeds has done much in bettering this ſort of ſtock, by promoting a more ſpirited attention to the ſubject, and inculcating the neceſſity of a more careful ſelection; as, ſince this has been the caſe, very evident improvements have taken place in the forms and diſpoſitions of ſheep, as well as in the quality of their wool.

The utmoſt care and attention are conſtantly demanded in the ſelection of ſuch ſheep as are to be bred from; and as it would require a great length of time to correct and remove the errors and bad conſequences that might ariſe from any neglect in ſo important and eſſential a matter, the ſheep-maſter ſhould always himſelf be, as much as poſſible, employed in the buſineſs. He ſhould take care that the ewe tegs, or young ewes, be very fully and ſtrictly examined in the mouths, to ſee that they are not chopped or defective in ſuch parts; their make ſhould be ſeen to be proper and handſome in all points, and their wool of a ſuperior quality; the ſtaple being well ſuited to the paſture or nature of the keep, rather ſhort than long, as ſhort wool is commonly thick, and kindly for the ſheep; but when too long, it is apt to be thin, and to draw too much nouriſhment from the animal, without affording the neceſſary warmth and protection in the winter ſeaſon. Theſe ſorts of ſheep ſhould in all caſes be ſorted down, or refuſed, as it is called, in a very cloſe manner; and when there are not more than are wanting to put the ram to, and many of theſe are defective, all ſuch ſhould be fattened or ſold, and their places ſupplied by the beſt of the old ewe-ſtock, which would otherwiſe be ſent away. This is not generally practiſed, but it is evident that a well-formed or perfect old ewe muſt be better for breeding from, than ſuch young ones as are ill-formed or imperfect in their ſhape.

There are different periods for the ſorting or ſelecting of ſheep-ſtock; as the time when the ewes are arranged and put into different claſſes for the rams, the ſeaſon of lambing, &c.: in each of which, the defects and imperfections of them may be diſcovered without much difficulty. But the moſt proper time of all, according to ſome, is in the early ſpring, as about the beginning of March, as then the ſoft, the long, the coarſe wool, and all other imperfections in the ewes, are the moſt conſpicuous, and readily detected, and thoſe of the beſt forms, qualities, and diſpoſitions, may be the moſt fitly drawn off and preſerved; as ſuch ſheep as are capable of ſupporting themſelves, and of looking well under the difficulties of a ſevere winter ſeaſon, muſt in general be the moſt deſerving of the breeding ſheep-farmer's attention; while ſuch as have wintered badly will not unfrequently ſhew a good diſpoſition in the ſummer ſeaſon. In theſe caſes, where imperfections are diſcovered, the ſheep ſhould either be drawn off, put out, and lambed by themſelves, or a private mark ſet upon them; and the ewes and lambs ſold or made fat. Thus, the number of bad ill-formed ſheep, that ought not to be kept, are conveniently reduced and completely got rid of, which, if they or their lambs were ſuffered to blend and intermix with the well-formed ſheep, the ſtock would be in danger of being contaminated. It is the common practice in moſt caſes, to only ſelect or ſort the ſheep once in the year; but with good managers they are had under hand two or three times in the ſame ſpace of time; and whenever a ſheep is ſeen with any ſort of defect, it is immediately marked, and ſent to be made fat.

Many make this ſorting, or inſpection, ſo late as the beginning of the autumn, but an earlier performance of the buſineſs is evidently preferable, in order that the defective ſtock may be put to fatten in proper time.

The manner of performing the buſineſs is commonly by pounding the ſheep in a ſmall number at a time, ſo that the ſheep-farmer may be able to examine them at once, without the danger of being diſtracted or confuſed by having too many expoſed to his view, and conſequently be incapable of diſtinguiſhing the properties of their forms, and other qualities which ought to be particularly attended to in forming his deciſion. In the execution of this work, the farmer, his ſhepherd, or looker, are provided with ochre, or ſome other material, for giving the defective ſheep the uſual private mark, in order that they may be known from the perfect part of the flock, and be diſpoſed of accordingly. This marking, or *tivering*, as it is called in ſome places, is performed differently, according to circumſtances, as the purpoſes the ſheep are to be put to, and the number of lambs the ewes have had. It is well done ſometimes alſo to have the ſheep marked with pitch, according to their ages. See TIVERING.

The defects which are chiefly to be taken notice of in the ſorting of ſheep in this intention, are thoſe of bad ſhape, as the head being thick or too long, the body too long and narrow, without ſufficient roundneſs, the feet and bones too large, the cheſt too much confined, the want of ſtraightneſs in the back, too great a length in the legs and neck, the ſheep being too large for the paſture or keep, their not handling in a proper manner, the wool bad, as too coarſe or too long and picky, or coming off, waxy, or hempy, the ſheep being louſy, ſtruck with the fly, gally, thick pelted, and ſcurvy, their being hog-chopped, that is, having the lower jaw ſhorter than the upper one, by which their feeding properly is prevented, the mouths large, cauſing the loſs of the cud in rechewing their food, &c. By ſorting and ſelecting ſheep as free as poſſible from defects of theſe kinds, the beſt ſheep-ſtock may be procured, provided the true form be properly underſtood and conſtantly kept in mind, without ſuffering it to be injured in any way by the admiſſion of improper qualities at any time, or under any circumſtances.

The ſorting or ſelection of ſheep in this intention, may perhaps be a little different in different caſes; but wherever a good ſtock is aimed at, the breeding ſheep-farmer ſhould of courſe ſelect that breed, whatever it may be, which is moſt ſuited to his circumſtances and purpoſes, and which the moſt nearly approaches towards the ſtate of perfection in its form and other properties, or which poſſeſſes that particular kind of improvement which he is in want of, being conſtantly well aware what conſtitutes ſuch ſtates in the animal. The parts of his ſtock which are deficient, or do not fully come up to or poſſeſs ſuch properties, are always to be ſorted out and rejected, being ſold or turned off for the purpoſe of fattening, both in the ewes and the lambs, as they might be in danger of accidentally injuring the ſtock. Good breeding ſheep-farmers are alſo at all times cloſely on the watch to have none but thoſe of ſuperior qualities, and to take advantage of any accidental improved variety which may anſwer their intentions. The full proper culling or ſelecting and ſorting of the younger part of the ewe-ſtock, is in all caſes a material point in having good ſheep-ſtock, and one which is never to be neglected. The careful breeder ſhould indeed continually have his eyes upon his flock, to ſee that there are no faulty animals continued in it, eſpecially in any material degree, as much may be effected in this way, and the trouble of ſorting be conſiderably leſſened. See BREEDING, LIVE-STOCK, and SHEEP.

The practice of ſorting ſheep is not, however, uſeful only for the purpoſe of breeding, but may be beneficially employed in other intentions. The ſorting of ſheep, according to their ages, ſizes, kinds, and other qualities, is often highly important and advantageous in the ſtocking of paſture lands, as it enables the ſheep-farmer to do it with greater propriety and correctneſs, as well as with a greater profit in the improvement of the ſtock. See STOCKING *Paſture Land.*

Sheep are likewiſe ſorted with very much benefit for the different purpoſes of ſtore-feeding, lambing, fattening, and other ſorts of management with them.

But however beneficial the practice may be in theſe ſeveral intentions, as well as in ſome others, it is probable that it has hitherto been attempted only in a few inſtances, and in many of thoſe in much too ſlight and inattentive a manner; it is, notwithſtanding, of the utmoſt neceſſity and importance in the management of this ſort of live-ſtock, and when once well underſtood and properly performed, cannot fail of producing very advantageous effects, and much improvement in the buſineſs of ſheep-farming.

SORTINSKOI, in *Geography*, a town of Ruſſia, in the government of Tobolſk; 72 miles S.S.W. of Berezov.

SORTOWITZ, a town of Pruſſia, in the palatinate of Culm; 10 miles N. of Culm.

SORVIODUNUM, or SORBIODUNUM, in *Ancient Geography*, a town of the iſle of Albion, upon the route from Calleva to Vrioconium, in paſſing by Muridunum between Brige and Vindocladia, according to the Itinerary of Antonine; Calleva being Silcheſter, Muridunum, being Eggerton, Vrioconium being Wroxeter, Brige being Broughton, Vindocladia near Cranburn, and Sorbiodunum being Old Sarum.

SORUNDO, in *Geography*, a town of Sweden, in Sudermanland; 20 miles S.S.W. of Stockholm.

SORUS, in *Botany* and *Vegetable Phyſiology*, from σωρος, *a heap*, is a term recently introduced, for the aſſemblage of capſules in Ferns, which had hitherto been called a dot, ſpot, or line, according to its particular figure. (See FILICES.) The *Sori* in many kinds of *Polypodium* and *Aſpidium* are very much elevated, or prominent, well anſwering to this appellation, which is indeed, in every caſe, more correct and leſs exceptionable than the terms it ſuperſedes. In an early ſtate, the *Sori* are little more than ſpots, more or leſs opaque, or quite pellucid, in whoſe homogeneous ſubſtance nothing can be diſcerned of the myſtery of impregnation, though certainly performed there. Whether that myſtery takes place before the ſhape of each particular capſule is developed, we cannot determine, though it appears moſt probable; for if the *Sori* ſwell at all, they do not ſeem to fail afterwards. If they do not come to perfection, they remain in their original ſtate, of a ſcarcely conſpicuous dot.

SORUT, in *Geography*, a circar of Hindooſtan, in Guzerat; 120 miles long, and 40 broad.

SORWY, a river of Monmouthſhire, which runs into the Edwith.

SORY, in *Natural Hiſtory*, the name of a foſſile ſubſtance, much ſpoken of by the ancients, but erroneouſly ſuppoſed to be now loſt.

It is a firm and not brittle ſubſtance, though of a ſpongy and cavernous ſtructure, and is conſiderably heavy. It is found in maſſes of no regular ſhape or ſize, ſome being roundiſh, others angular or flatted, and ſome of the ſize of a walnut, others of many pounds weight. It feels very harſh and rough to the touch, and is covered with no inveſtient coat or cruſt, but ſhews its natural ſurface, which is always corrugated or wrinkled, and uſually full of ſmall protuberances and cavities, and when broken, is found to be of a rugged and ſpongy ſtructure within.

Its natural colour is a ruſty black, but it is ſometimes reddiſh, and ſometimes blueiſh: and is commonly ſtained, in different places, with ſpots of a blueiſh or ruſt colour, when black; and of a greeniſh hue, when it is of a reddiſh colour: in the places where it is free from theſe, it is uſually ſomewhat bright and ſparkling. It is of an acrid and diſagreeable taſte, and of a ſtrong and nauſeous ſmell; put into the fire it burns to a deep purple; and if boiled in water a great part of it becomes diſſolved in it; and this may again be ſeparated from the water by evaporation and cryſtallization, and then appears in the form of pure blue vitriol, forming regular rhomboidal cryſtals, and tinging iron to a copper colour, on being firſt wetted, and then rubbed upon it.

It is found in many parts of the Turkiſh dominions, particularly in Gallo-Græcia; as alſo in ſome parts of Germany. In this country it is boiled for the blue vitriol it contains. In Turkey it is mixed with lime, and made into a paſte with water, which is laid on ſuch parts of the body as they would eradicate the hair from, and effects that purpoſe in a very few minutes. In the eaſtern nations, where it is thus uſed, it is known by the name of ruſma.

The ancients uſed it externally to take off pimples, and put a piece of it into a hollow tooth, as a remedy for the tooth-ache. There can be no doubt of their ſory being the ſame ſubſtance with this; ſince Dioſcorides has deſcribed it to be blackiſh in colour, full of ſmall cavities, moiſt on the ſurface, (as ours always is in moiſt weather,) and of a diſagreeable taſte and ſmell.

This ſubſtance, as alſo the chalcitis, miſy, and melanteria, are all properly ores of vitriol, the particles of thoſe ſalts being ſo perfectly blended in them, as not to be at all diſtinguiſhable to the naked eye, yet being always regularly ſeparable from them by water, which is to the ſaline ores what fire is to thoſe of the metalline kind. Hill's Hiſt. of Foſſ. p. 606.

SORYGAZA, in *Ancient Geography*, a town of India, on the banks and on the other ſide of the Ganges, towards the eaſtern coaſt. Ptolemy.

SOS, in *Geography*, a town of France, in the department of the Lot and Garonne; 10 miles S.W. of Nerac.—Alſo, a town of Spain, in Aragon; 30 miles W. of Jaca.—Alſo, a river of Spain, in Aragon, which runs into the Sinca, near Monçon.

SOSA, a town of Saxony, in the circle of Erzgebirg; 22 miles S.S.W. of Chemnitz.

SOSE, a river of Germany, which runs into the Ruhme, 9 miles E. of Nordheim.

SOSES, a town of Spain, in Catalonia; 6 miles S.W. of Lerida.

SOSIBES, in *Ancient Geography*, a people who inhabited the environs of Aſiatic Sarmatia, and who are comprehended, by Julius Capitolinus, in the number of thoſe who had conſpired againſt the Roman empire, under Marcus Antoninus the philoſopher.

SOSIGENES, in *Biography*, a Peripatetic philoſopher, and ſkilful aſtronomer, was brought from Egypt by Julius Cæſar, with the view expreſsly of aſſiſting him in reforming the calendar. The philoſopher, by tolerably accurate obſervations, diſcovered that the year was 365 days and 6 hours; and to make allowance for the odd hours, he invented the intercalation of one day in four years; and the duplication of the ſixth day before the calends of March was the intercalary day: and hence the year in which this took place was called Biſſextile. This was called the Julian year, the reckoning by which commenced in the 45th year B.C., and continued till it gave place to ſomething more accurate, and a ſtill farther reformation under pope Gregory XIII. Soſigenes was author of a commentary upon Ariſtotle's book "De Cœlo."

SOSIPPUS PORTUS, in *Ancient Geography*, a port of Arabia Felix, on the coaſt of the Arabian gulf, between Muſa Emporium and Pſeudocelis, according to Ptolemy.

SOSNINSKAIA, in *Geography*, a town of Ruſſia, in the province of Novgorod; 32 miles N. of Novgorod.

SOSNITZA, a town of Ruſſia, in the government of Novgorod Sieverſkoi; 32 miles S.S.W. of Novgorod Sieverſkoi. N. lat. 51° 30′. E. long. 32° 46′.

SOSNOPA, a town of Ruſſia, in the government of Perm; 48 miles S. of Oſa.

SOSNOVOI, an iſland of Ruſſia, in the river Angara; 96 miles N.N.W. of Ilimſk.

SOSNOVSKOI, a town of Ruſſia, in the government of Kolivan. N. lat. 55° 50′. E. long. 85° 44′.

SOSPELLO, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the diſtrict of Monaco; divided by a ſmall river into two parts. The town contains 2990, and the canton 5512 inhabitants, on a territory of 142½ kiliometres, in 4 communes. It is the ſee of a biſhop, united with Vintimiglia; containing four churches, one of which is a cathedral, and two convents; 10 miles N.E. of Nice.

SOSPIRO, Ital., *Soupir*, Fr., a crotchet reſt in *Muſic*. See CHARACTERS and TIME-TABLE.

Sospiro, *Al Canone*. See Canone *al Soſpiro*.

SOSSINATI, in *Ancient Geography*, a name given to one of the four claſſes of mountaineers in the iſle of Sardinia, who took up their abode in caverns. Strabo.

SOSSIUS, a river on the ſouthern coaſt of Sicily, between the town Pintia and the mouth of the river Iſbarus. Ptolemy.

SOSTENUTO, in *Italian Muſic*, *Soutenu*, Fr., ſuſtained, continuing ſounds and uniting them to each other, in oppoſition to *ſpiccato*, detached. See Legato.

SOSTI, in *Geography*, a town of Naples, in Calabria Ultra; 10 miles S. of Squillace.

SOSTRATUS, in *Biography*, the moſt eminent architect of his time, was a native of Gnidos, in Leſſer Aſia, and flouriſhed in the third century before the Chriſtian era. The patronage which he met with, cauſed him to be denominated the friend of kings; and he was particularly in favour with Ptolemy Philadelphus, ſovereign of Egypt. He is celebrated in hiſtory likewiſe for the *terraces*, ſupported on arcades, which adorned his native city; and the famous *Pharos*, the light-houſe of Alexandria, which was reckoned one of the wonders of the world. He tranſmitted his name to poſterity by an inſcription on this light-houſe, in the Greek language, of which the tranſlation is, "Soſtratus of Gnidos, the ſon of Dexiphanes, dedicates this to the gods, the protectors of navigators."

SOSVA, in *Geography*, a river of Ruſſia, which riſes in the government of Tobolſk, N. lat. 61° 10′. E. long. 59° 54′, ſoon after enters into the province of Ekaterinburg, and takes a ſouthern courſe to lat. 59°, then bends its courſe eaſterly, and loſes itſelf in lake Phelim, in the government of Tobolſk, N. lat. 59° 15′. E. long. 63° 54′.—Alſo, a river of Ruſſia, which runs into the Oby, 40 miles S. of Berezov.

SOSZNIZOWITZ, or Saszinkowitz, a town of Sileſia, in the principality of Oppeln; 35 miles S.E. of Oppeln. N. lat. 50° 14′. E. long. 18° 28′.

SOTA DE PALANA, a town of the iſland of Cuba; 100 miles S.W. of Havanna.

SOTCHEOU, a town of Corea; 403 miles E. of Peking. N. lat. 40° 9′. E. long. 124° 34′.

SOTELLO, a town of Spain, in Old Caſtile; 30 miles S. of Burgos.

SOTER, in *Biography*, pope, a native of Fondi, in the Campagna of Rome, was elected to the Roman ſee on the deceaſe of Anicetus, in the year 168. During the period that he ruled the church, the hereſy of the Montaniſts made its appearance, and he is ſaid to have compoſed a book againſt their doctrines; but as the title is not known, the fact itſelf is liable to much doubt. Four decretals have been aſcribed to him, but they are generally regarded as ſpurious. He died in 176, and he has been enrolled among the martyrs by modern writers, but no ancient one gives him that title. He is, however, generally commended for the contributions which he cauſed to be raiſed for the relief of the poor brethren in foreign countries, and particularly for thoſe who were condemned to the mines, on account of their faith.

SOTERIA, formed from σωτηρ, *ſaviour*, in *Antiquity*, ſacrifices offered to the gods, in gratitude for their having delivered a perſon from danger. See Sacrifice.

The term is alſo applied to poetical pieces compoſed for the ſame end. Orpheus is the firſt who appears to have compoſed ſoteria.

Our Latin poets give the ſame name to poems in Latin verſe, written to give thanks to God, or the ſaints, for having preſerved them on any occaſion. F. Petavius being delivered from a dangerous diſeaſe, by the interceſſion, as he ſuppoſed, of St. Genevieve, compoſed that fine piece in honour of that ſaint, ſtill extant under the title of "Soteria."

SOTERUS, in *Ancient Geography*, a port of the Arabian gulf, according to Diodorus Siculus.

SOTI, in *Geography*, a town of Africa, in the country of Whidah; 18 miles W. of Sabi.

SOTIRA, in *Ancient Geography*, a town of Aſia, in Aria. Ptol.—Alſo, a town of Aſia, in Cappadocia, Pliny.—Alſo, a town of Parthia. Arrian.

SOTIRELLA, a name given by ſome to a compound medicine, in form of a hard maſs, and conſiſting of opium, and ſome other narcotics, with camphor, wood-ſoot, and nutmeg. It is deſcribed in the Auguſtan Diſpenſatory, and is intended to be put into hollow teeth, as a remedy for the tooth-ache.

SOTO, Dominic, in *Biography*, a learned Spaniſh eccleſiaſtic, was born at Segovia in 1494. His father was a gardener, and his circumſtances being of a very humble nature, he deſtined his ſon for the ſame occupation; but having learned the elements of inſtruction, he officiated in the duties of ſacriſtan in a village church, and at length rendered himſelf qualified to ſtudy philoſophy at the univerſity of Alcala. He afterwards completed his ſtudies at Paris; and on returning to Spain, entered into the Dominican order. He was employed as a profeſſor in different univerſities, and publiſhed commentaries on the Ariſtotelian philoſophy. In 1545 he was deputed as a theologian to the council of Trent, and was one of the perſons to whom was committed the office of recording deciſions of the aſſembly, and drawing up its decrees. He was a frequent and able ſpeaker in the council, and maintained the propoſition, "that the reſidence of biſhops is of divine right." The emperor Charles V., in 1549, offered him the biſhopric of Segovia, which he refuſed. He was, however, perſuaded to take the office of judging between Las Caſas and Sepulveda, in their conteſt reſpecting the Indians, which he determined in favour of the former. He then retired to Salamanca, where he died in 1560. His chief works are, "De Juſticia et Jure;" "De Tegendis Secretis;" "De Pauperum Cauſa;" "De Cavendo Juramentorum Abuſu."

SOTOVENTO, in *Geography*, a name applied to the Leſſer Antilles in the Weſt Indies. Among theſe, the chief may be reckoned Trinidad, Margaretta, Curaſſoa, and Tortugas.

Sotovento *Lobos*, or *Leeward Iſland of Sea-Wolves or Seals*, an iſland on the coaſt of Peru; 7 leagues from Barlevento Lobos, or Windward iſland of ſea-wolves. It is about 6 miles in circuit, and 15 miles from Cape Aguja.

SOTTEGHEM, a town of France, in the department of the Scheldt, and chief place of a canton, in the diſtrict of Audenaerde. The place contains 1508, and the canton 14,603 inhabitants, on a territory of 77½ kiliometres, in 14 communes.

SOTTERN, a lake of Sweden, in the province of Nericia; 14 miles S.E. of Orebro.

SOTTEVAST, a town of France, in the department of the Channel; 9 miles W. of Valognes.

SOTTEVILLE, a town of France, on the ſouth ſide of the Seine; 3 miles S. of Rouen.

SOTTO Voce, in *Italian Muſic*, implies a degree of *piano*, or ſoft, and ſubdued voice; which is ſometimes expreſſed by *mezzo forte*, and *mezza voce*, half piano.

SOU, in *Commerce*. See Sol.

Sou, or *So-tcheou*, in *Geography*, a town of China, of the ſecond rank, in Chen-ſi. N. lat. 39° 38′. E. long. 98° 44′.

SOUADI, or Soually, a town of Egypt, on the eaſt ſide of the Nile; 23 miles S. of Abu Girgé. This burgh is governed by a cachef; and weſt of it are two Coptic monaſteries, ſituated at the entrance of the deſert. Their churches are ornamented with Corinthian pillars, with a croſs in the middle of the capital; and they are paved with red granite, covered with hieroglyphics. Their architecture is ſaid by Savary to indicate the decline of taſte among the Greeks. They are thought to have been built by the empreſs Helena. On the ſpace between them are ſtrewed antique marbles. Theſe remains point out the ſcite of Crocodilopolis, or the ſacred city of this name, which was far from the river, and which Ptolemy places after Aphroditopolis, or the city of Venus.

SOUADY, or Sohar, a ſmall iſland in the Arabian ſea, near the coaſt of Oman. N. lat. 24° 14′.

SOVANA, a town of Etruria, the ſee of a biſhop; 45 miles N.N.W. of Rome.

SOUANANPOUR, a town of Hindooſtan, in Golconda; 10 miles S. of Hydrabad.

SOVANOCALCHI, in *Ancient Geography*, a people of Aſiatic Sarmatia, upon the banks of the Euxine ſea. Ptolemy.

SOUBES, in *Geography*, a town of France, in the department of the Herault; 3 miles N. of Lodeve.

SOUBIZE, a town of France, in the department of the Lower Charente; 3 miles W. of Rochefort.

SOUC, a town of Thibet; 360 miles N.N.E. of Laſſa. N. lat. 33° 18′. E. long. 94° 24′.

SOUCTOU, a mountain of Thibet. N. lat. 32° 18′. E. long. 84° 19′.

SOUCY, a town of France, in the department of the Yonne; 19 miles S. of Provins.

SOUDAH, a rocky deſert country of Africa, between Tripoli and Fezzan.

SOUDAN, from *Souda* or *Suda*, which ſignifies in Arabic *black*, a name given by the Moors and Arabs to Negroland, or Nigritia; and ſometimes more particularly to the empire of Hauſſa, or Houſſa. Abulfeda includes the whole lower part of Africa, ſouth of the Great Deſert and Egypt, under the denomination of Belad Soudan, or the country of Soudan. With him Soudan is the ſouthern quarter of the globe; and d'Herbelot alſo allows it a wide range. See Negroland.

SOUDE ST. CROIX, a town of France, in the department of the Marne; 10 miles W. of Vitry.

SOVEIB, a town of the Arabian Irak, on the Euphrates; 20 miles N.W. of Baſſora.

SOUE-KI, a town of China, of the third rank, in Quang-tong; 30 miles S.W. of Hoa.

SOVEL, a ſmall iſland in the Chineſe ſea, near the coaſt of Tonquin. N. lat. 11° 2′. E. long. 105° 25′.

SOUE-OUIE-CHAN, a town of Corea; 30 miles N.W. of Long-kouan.

SOVERDEM, a town of Italy; 3 miles N. of Belluno.

SOVEREIGN, Supreme, the chief and higheſt Being, or the Almighty; a term, in ſtrictneſs, only applicable to God.

The word is French, *ſouverain;* which Paſquier derives farther from the Latin *ſuperior*, the firſt in any thing; or he who is ſuperior to the reſt. Hence,

In the ancient French cuſtoms we meet with ſovereign maſter of the houſehold; ſovereign maſter of the foreſts; ſovereign maſter of the treaſury. Under Charles VI. the title ſovereign was given to bailiffs and ſeneſchals, with regard to their ſuperiority over prevots, and chatelains.

Sovereign, with regard to ſubjects, is applied to kings and princes, who are ſupreme and independent.

The authority of a ſovereign is only bounded by the law of God, of nature, and the fundamental laws of the ſtate. See King. See Sovereignty, *infra.*

Sovereign is alſo a title given to ſuch as are inveſted with certain rights and prerogatives, which belong only to ſovereigns; as the power of coining money, ſending agents to diets, to treat of war and peace, &c.

In which ſenſe the feudatories of the empire, and the tributaries of the grand ſignior, are called ſovereigns.

Sovereign is alſo applied to courts and judges, who have a power from a prince to decide the proceſſes of his ſubjects without appeal, or in the laſt reſort.

At Paris, under the old regime, there were five ſovereign companies: the parliament, the chamber of accounts, the court of aids, the grand council, and the court of monies.

In England we have but one ſovereign court, which is the houſe of lords.

Sovereign, in *Engliſh Coinage*, a gold coin of 20*s.* value, equal to the double ryal, which was coined by order of Henry VII. in the year 1485; and this was accompanied by the double ſovereign of 40*s.* Henry VIII., in 1527, added to the gold denominations ſovereigns of 22*s.* 6*d.*, and ryals of 11*s.* 3*d.*, angels of 7*s.* 6*d.*, and nobles at their old value of 6*s.* 8*d.* In 1546 the ſame prince, after raiſing the value of ſilver, and making it to gold as 1 to 5, ſtruck ſovereigns of the former value of 20*s.*, and half-ſovereigns in proportion. Upon the union of the crowns, James I. of England gave the ſovereign the name of unite, it being then of 20*s.* value. The ſovereign, which had been commonly termed the "broad-piece," under the Commonwealth aſſumed the uninvidious name of the twenty-ſhilling piece, which it retained till ſupplanted by that of the guinea, which was proclaimed in 1663, and to paſs for 20*s.* But it never went for leſs than 21*s.* by tacit and univerſal conſent. Pinkerton's Eſſ. on Medals, vol. ii.

SOVEREIGNTY, in *Political Economy*, denotes that public authority, which commands in civil ſociety, ordering and directing what each is to perform, in order to obtain the end of its inſtitution. This authority belonged originally and eſſentially to the body of the ſociety, to which each member ſubmitted, and ceded the rights he received from nature, to conduct himſelf in every thing as he pleaſed, according to the dictates of his own underſtanding, and to do himſelf juſtice. But the body of this ſociety does not always retain this ſovereign authority: it frequently truſts it to a ſenate, or to a ſingle perſon. This ſenate, or this perſon, is then the ſovereign. (See Sovereign, *ſupra.*) It is evident that men form a political ſociety, and ſubmit to laws, ſolely for their own ſafety and advantage. The ſovereign authority is then eſtabliſhed, only for the common good of all the citizens; and it would be abſurd to think that it could change its nature, on its paſſing into the hands of a ſenate, or a monarch. Flattery, therefore, cannot diſown, without rendering itſelf equally ridiculous and odious, that the ſovereign is only eſtabliſhed for the ſafety of the ſtate, and the advantage of ſociety.

A good prince, a wiſe conductor of ſociety, ought to have his mind impreſſed with this great truth, that the ſovereign power is only entruſted with him for the ſafety of the ſtate, and for the happineſs of all his people; that he is not permitted to ſeek himſelf in the adminiſtration of affairs, to propoſe his own ſatisfaction, or his private advantage; but that he ought to direct all his views, all his ſteps, to the great advantage of the ſtate and people who have ſubmitted to him. How noble a ſight is it, ſays the admirable Vattel, to ſee a king of England acquaint his parliament with all his principal operations; aſſure that body, the repreſentatives of the nation, that he propoſes no other end but the glory of the ſtate, and the happineſs of his people; and affectionately thank all who concur with him in ſuch ſalutary views! Certainly a monarch, who makes uſe of this language, and proves his ſincerity by his conduct, is, in the opinion of the wiſe, the only great man. But for a long time a baſe flattery has, in moſt kingdoms, cauſed theſe maxims to be forgotten. A crowd of ſervile courtiers without difficulty perſuade a proud monarch, that the nation was made for him, and not he for the nation. He ſoon conſiders the kingdom as his patrimony, and his people as a herd of cattle, from which he may obtain riches, and diſpoſe of them ſo as beſt to anſwer his views, and gratify his paſſions. From thence ariſe thoſe fatal wars, undertaken by ambition, reſtleſſneſs, hatred, and pride: from thence thoſe oppreſſive taxes, diſſipated by luxury, or ſquandered upon miſtreſſes and favourites: from thence, in fine, are important poſts given by favour, while public merit is neglected, and every thing that does not immediately intereſt the prince, abandoned to miniſters and ſubalterns. Who can obſerve, in this unhappy government, authority eſtabliſhed for the public welfare? A great prince will be on his guard, even againſt his virtues. Let us not ſay, with ſome writers, that private virtues are not the virtues of kings; the maxim of ſuperficial politicians, or of thoſe who are very inaccurate in their expreſſions. Goodneſs, friendſhip, gratitude, are ſtill virtues of the throne; and would to God they were to be always ſo! But a wiſe king does not, without diſcernment, give himſelf up to their impreſſions. He cheriſhes them, he cultivates them in his private life; but in ſtate-affairs he liſtens only to juſtice and ſound politics. And why? becauſe he knows that the government was truſted to him only for the happineſs of ſociety; and that, therefore, he ought not to conſult his own pleaſure in the uſe he makes of his power. He tempers his goodneſs with wiſdom. He gives to friendſhip his domeſtic and private favours; he diſtributes poſts and employments according to merit; public rewards to ſervices done to the ſtate. In a word, he uſes the public power only with a view to the public welfare. All this is comprehended in the fine ſaying of Lewis XII., "A king of France does not revenge the injuries of a duke of Orleans."

A political ſociety is a moral perſon, as it has an underſtanding and a will, of which it makes uſe for the conduct of its affairs, and is capable of obligations and laws. When, therefore, a people confer the ſovereignty on any one perſon, they inveſt him with their underſtanding and will; and make over to him their obligations and rights, ſo far as relates to the adminiſtration of the affairs of ſtate, and the exerciſe of the public authority; thus the ſovereign, or conductor of the ſtate, becoming the ſubject, in which reſide the obligations and rights relative to government, in him is found the moral perſon, who, without abſolutely ceaſing to exiſt in the nation, acts from thence forwards only in and by him. Such is the origin of the repreſentative character attributed to the ſovereign. He repreſents the nation in all the affairs it was capable of managing as ſovereign. It does not debaſe the dignity of the greateſt monarch to attribute to him this repreſentative character; on the contrary, nothing can make him ſhine with greater luſtre: for by this means the monarch unites, in his own perſon, all the majeſty that belongs to the entire body of the nation.

The ſovereign, thus clothed with the public authority, with every thing that conſtitutes the moral perſonality of the nation, is under the obligations of that nation, and inveſted with its rights.

Every thing that concerns the general duties of a nation towards itſelf, particularly regards the ſovereign. He is the depoſitary of the empire, and of the power of commanding whatever relates to the public welfare: he ought, therefore, as a tender and wiſe father, and as a faithful adminiſtrator, to watch for the nation, to take care of preſerving it, to render it more perfect, to better its ſtate, and to ſecure it, as much as he is able, from every thing that threatens its ſafety, or its happineſs.

The prince derives his authority from the nation; and it is exactly equal to what they have entruſted him with. If the nation has ſimply and ſtrictly inveſted him with the ſovereignty without limitation, or diviſion, he is ſuppoſed to be inveſted with all the prerogatives, without which the ſovereign command, or authority, could not be exerted in the manner moſt conducive to the public welfare. Theſe are called *regal prerogatives*, or *the prerogatives of majeſty*.

But the ſovereign power is limited and regulated by the fundamental laws of the ſtate: thoſe laws ſhew the prince the extent and bounds of his power, and the manner in which it ought to be exerted. The prince is, therefore, ſtrictly obliged not only to reſpect, but alſo to ſupport them. The conſtitution and the fundamental laws are the plan on which the nation has reſolved to endeavour the obtaining of happineſs: the execution is entruſted to the prince. If he religiouſly follows this plan; if he regards the fundamental laws as inviolable and ſacred rules, and knows that the moment he deviates from them, his commands become unjuſt, and are no leſs than a criminal abuſe of the power with which he is entruſted. He is, in virtue of this power, the guardian and defender of the laws; and being obliged to puniſh any one who ſhall preſume to violate them, he himſelf ought not to trample them under his feet.

While the laws of a ſociety, over which a ſovereign preſides, ſubſiſt, he ought religiouſly to maintain and obſerve them. This is no leſs his true intereſt than his duty. But in explaining this ſubmiſſion of the prince to the laws, Vattel obſerves, that he is above all civil penal laws. The majeſty of a ſovereign will not ſuffer his being puniſhed like a private perſon; and his employments are too ſublime to admit of his being troubled, under the pretence of a fault that does not directly concern the government of the ſtate. His perſon, therefore, ſhould be regarded as inviolable. Nevertheleſs, this high attribute of ſovereignty is no reaſon why a nation ſhould not curb an inſupportable tyrant, call him even to an account, reſpecting in his perſon the majeſty of his rank, and withdraw itſelf from his obedience. To this indiſputable right a powerful republic owes its birth. The tyranny exerciſed by Philip II. in the Netherlands, excited thoſe provinces to riſe: ſeven of them, cloſely confederated, bravely maintained their liberties, under the conduct of a hero of the houſe of Orange; and Spain, after ſeveral vain and deſtructive efforts, acknowledged them ſovereign and independent ſtates. If the authority of the prince is limited and regulated by the fundamental laws, the prince, on leaving the bounds preſcribed him, commands without any right, and even without a juſt title: the nation, then, is not obliged to obey him, but may reſiſt his unjuſt enterprizes. As ſoon as he attacks the conſtitution of the ſtate, the prince breaks the contract which bound the people to him; the people became free by the act of the ſovereign, and ſee nothing in him but an uſurper who would load them with oppreſſion. This truth is acknowledged by every ſenſible writer, whoſe pen is not enſlaved by fear, or rendered venal by intereſt. But ſome celebrated authors maintain, that if the prince is inveſted with the ſupreme command in a full and abſolute manner, nobody has a right to reſiſt him, much leſs to curb him, and that the nation has no reſource left but to ſuffer and obey with patience. This is founded upon the ſuppoſition that ſuch a ſovereign need not give an account to any perſon of the manner in which he governs; and that if the nation might controul his actions and reſiſt him, where they were found to be unjuſt, his authority would no longer be abſolute; which would be contrary to this hypotheſis. They ſay, that an abſolute ſovereign poſſeſſes completely all the political authority of the ſociety, in which nobody can oppoſe him; if he abuſes it, he does ill, indeed, and wounds his conſcience, but that his commands are not the leſs obligatory, as being founded on a lawful right to command: that the nation, by giving him abſolute authority, had reſerved nothing to itſelf, and had ſubmitted to his diſcretion, &c. We might ſatisfy ourſelves with anſwering, that in this light there is not any ſovereign who is completely and fully abſolute. But in order to remove all theſe vain ſubtilties, let us remember the eſſential end of civil ſociety: is it not to labour in concert for the common happineſs of all? Is it not with this view that every citizen ſtrips himſelf of his rights, and reſigns his liberty? Was it in the power of the ſociety to make ſuch uſe of its authority as to deliver up itſelf, and all its members, without relief, to the diſcretion of a cruel tyrant? No, certainly, ſince it had no right itſelf, if it was diſpoſed to it, to oppreſs a part of the citizens. When it, therefore, conferred the ſupreme and abſolute government, without an expreſs reſerve, it was neceſſarily with the tacit reſerve, that the ſovereign ſhould uſe it for the ſafety of the people, and not for their ruin. If he becomes the ſcourge of the ſtate, he degrades himſelf; he is no more than a public enemy, againſt whom the nation may and ought to defend itſelf; and if he has carried his tyranny to the utmoſt height, why ſhould even the life of ſo cruel and perfidious an enemy be ſpared? Who preſumes to blame the Roman ſenate, that declared Nero an enemy to his country?

But it is of the utmoſt importance to obſerve, that this judgment can only be paſſed by the nation, or by the body by which it is repreſented; and that the nation itſelf cannot make any attempt on the perſon of the ſovereign, but in caſes of extreme neceſſity, and when the prince, by violating the laws, and threatening the ſafety of his people, puts them in a ſtate of war againſt them. The perſon of the ſovereign, the very intereſt of the nation declares ſacred and inviolable; but not that of an unnatural tyrant, and an enemy of the public. We ſeldom ſee ſuch monſters as Nero.

As ſoon as a nation acknowledges a prince for its lawful ſovereign, all the citizens owe him a faithful obedience. He can neither govern the ſtate, nor perform what the nation expects from him, if he is not punctually obeyed. Subjects then have no right, in doubtful caſes, to queſtion the wiſdom or juſtice of their ſovereign's commands; this examination belongs to the prince: his ſubjects ought to ſuppoſe, if there be a poſſibility of doing it, that all his orders are juſt and ſalutary: he alone is accountable for the evil that may reſult from them.

In the mean time, this ought not to be entirely a blind obedience. No engagement can oblige, or even authorize, a man to violate the laws of nature. All authors who have any regard to conſcience, or modeſty, agree, that a perſon ought not to obey ſuch commands as are evidently contrary to the laws of God. Thoſe governors of places, who bravely refuſed to execute the barbarous orders of Charles IX. to the famous St. Bartholomew, have been univerſally praiſed; and the court did not dare to puniſh them, at leaſt openly. "Sire," ſaid the brave Orte, governor of Bayonne, in his letter, "I have communicated your majeſty's command to your faithful inhabitants and warriors in the garriſon; and I have found there only good citizens and brave ſoldiers: not one hangman; therefore, both they and I moſt humbly entreat your majeſty, to be pleaſed to employ our arms and lives in things that are poſſible, however hazardous they may be, and we will exert ourſelves to the laſt drop of our blood." The count de Tende, Charney, and others, replied to thoſe who brought them the orders of the court, that they had too great a reſpect for the king, to believe that ſuch barbarous orders came from him.

It is not eaſy to determine in what caſes a ſubject may not only refuſe to obey, but even reſiſt a ſovereign, and by force repel force. However, when the injuries, which ſociety ſuffers, are manifeſt and atrocious; when a prince, without any apparent reaſon, is reſolved to deprive us of life, or of thoſe things, the loſs of which would render life bitter, who can diſpute our right to reſiſt him? Self-preſervation is not only a law of nature, but an obligation impoſed by nature, and no man can entirely and abſolutely give it up to another. And though he might give it up, can he be conſidered as having done it by his political engagements, when he entered into ſociety only to eſtabliſh his own ſafety upon a more ſolid baſis? The welfare of ſociety does not require ſuch a ſacrifice; and as Barbeyrac well obſerves in his notes on Grotius, "If the public intereſt requires, that thoſe who obey ſhould particularly ſuffer ſomething; it is not leſs for the public intereſt that thoſe who command, ſhould be afraid of carrying their patience to the utmoſt extremity." The prince who violates all laws, who obſerves no meaſures, and who would in his tranſports of fury take away the life of an innocent perſon, ſtrips himſelf of his royalty, and is no more than an unjuſt and outrageous mortal, againſt whom his people are allowed to defend themſelves. But he who, after having loſt all the ſentiments of a ſovereign, diveſts himſelf even of the appearances and exterior conduct of a monarch, degrades himſelf; he no longer retains the ſacred perſon of a ſovereign, and cannot retain the prerogatives attached to his ſublime character. However, if this prince is not a monſter, if he is furious only from a juſt paſſion, and is ſupportable to the reſt of the nation; the reſpect we ought to pay to the tranquillity of the ſtate is ſuch, and the reſpect of ſovereign majeſty ſo powerful, that we are ſtrictly obliged to ſeek every other means of preſervation, rather than to put his perſon in danger. Every one knows the example ſet by David: he fled; he kept himſelf concealed, to ſecure himſelf from Saul's fury; and more than once ſaved the life of his perſecutor. When the reaſon of Charles VI. of France was ſuddenly diſordered by a fatal accident, he in his fury killed ſeveral of thoſe who ſurrounded him: none of them thought of ſecuring his own life, at the expence of that of the king; they only endeavoured to diſarm him, and to make him maſter of himſelf: they did their duty like brave men and faithful ſubjects, in expoſing their lives, to ſave that of this unfortunate monarch. We owe this ſacrifice to the ſtate and to ſovereign majeſty. Furious from the diſorder of his organs, Charles was not guilty; he might recover his health, and again become a good king.

We ſhall here further obſerve, that a ſovereign is undoubtedly allowed to take miniſters, to eaſe him in the painful office of government; but he ought never to abandon his authority to them. Miniſters ought only to be inſtruments in the hands of the prince; he ought conſtantly to direct them, and continually endeavour to know whether they follow his inſtructions. Miniſters, however, who undertake this charge, become reſponſible to the ſtate for their conduct; for the advice which they are ſuppoſed to give to the ſovereign, and for the meaſures which they adopt and purſue. Vattel's Law of Nations, b. i. ch. 4.

SOVERICK, in *Geography*, formerly known by the name of *Sauro*, a town of the pachalic of Orfa, a pachalic which is almoſt entirely encircled by the windings of the Euphrates and the river Khabour, and occupying a conſiderable portion of the moſt barren part of Meſopotamia. The town is ſituated, according to Niebuhr, in N. lat. 37° 48′, and contains about 500 inhabitants, with three moſques, and a ſtrong caſtle. The country to the ſouth of the parallel of Soverick is, for the moſt part, flat, ſandy, and uncultivated, and inhabited by tribes of wandering Arabs, who pitch their tents on the banks of the rivers, and in the vicinity of ſprings. From Soverick to Diarbekir it is more mountainous, and better inhabited.

SOUF, or VOSTANI, the middle diſtrict of Egypt, between the Bahira and Said.

SOUFFEL, a river of France, which runs into the Rhine, four miles below Straſburg.

SOUFFLEUR, Fr., the bellows-blower of an organ.

SOUFFLOT, JAMES-GERMAIN, in *Biography*, an eminent architect, was born in 1714 at Irancy, near Auxerre. His father, an advocate in parliament, deſtined him for his own profeſſion, and ſent him, while very young, to Paris for education; but he felt a taſte and inclination for the ſcience of architecture. Having been employed for ſome time in that art at Lyons, he went into Italy, where, by his talents and induſtry, he was admitted one of the king's penſioners. It being reſolved that ſeveral public buildings ſhould be erected at Lyons, he was recommended to undertake a part of the work, by the director of the French academy at Rome; and the conſtruction of the exchange and the hoſpital was committed to him. The noble ſimplicity of the hoſpital, together with its excellent adaptation to the object for which it was intended, were univerſally admired, and raiſed him to high reputation as an artiſt. He was, after this, employed to build the concert-room and theatre of the ſame city. He next travelled into Italy, and on his return he ſettled at Paris, where he was ſucceſſively made controller of the buildings at Marly and the Tuilleries, member of the academies of architecture and painting, knight of St. Michael, and intendant of the royal buildings. In 1757 he laid the foundation of the church of St. Genevieve, of which he was able only to finiſh the portal, the nave, and the towers. In this buſineſs he ſubjected himſelf to ſome ſevere criticiſm, eſpecially with reſpect to the poſſibility of erecting the intended dome upon the baſes deſigned to bear it; though ſome exact calculations juſtified his plan. The criticiſms and unfriendly remarks of his rivals were more than his temper, naturally irritable, could bear; and he died, partly of chagrin, in the year 1780, at the age of 67. Beſides the public works already mentioned, he executed many others, which diſplay the powers of a great artiſt; and after his death, M. Dumont, profeſſor of architecture, publiſhed a book of Deſigns, which he had left behind him, under the title of "Elevations et Coupes de quelques Edifices de France et d'Italie, deſignèes par feu M. Soufflot, Architecte du Roi, et gravèes par ſes Ordres." Though Soufflot was rough and haſty in his manners, he was kind and friendly; whence he obtained the name of *le Bourru Bienfaiſſant*.

SOUFFRIERE BAY, in *Geography*, a bay on the eaſt coaſt of the iſland of Dominica. N. lat. 15° 31′. W. long. 61° 17′.

SOU-FONG, a town of China, of the third rank, in Kiang-nan; 47 miles S.W. of Ngan-king.

SOUGH, in *Agriculture*, a covered drain of any ſize, but commonly of the more large kind. Sough drains are moſt commonly employed in the buſineſs of ſpring-draining, though occaſionally in other modes. See SPRING-*Drain* and SPRING-*Draining*.

SOUGH, otherwiſe called an *Adit*, in *Mineralogy*, is a paſſage like a vault cut out under the earth, to drain the water from the mines.

In a canal, it denotes a ſmall culvert or leading.

SOUHAITOU, in *Geography*, a town of Thibet; 28 miles W.N.W. of Yolotou Hotun.

SOUI, a city of China, of the ſecond rank, in Hou-quang; 527 miles S. of Peking. N. lat. 31° 48′. E. long. 112° 40′.

SOUI-CHONTO, a town of Chineſe Tartary, in the country of Hami. N. lat. 41° 8′. E. long. 94° 37′.

SOVIESE, a town of European Turkey, in Moldavia; 44 miles W. of Birlat.

SOUI-KI, a town of China, of the third rank, in Quang-tong; 30 miles N. of Louy.

SOUILLAC, a town of France, in the department of the Lot, and chief place of a canton, in the diſtrict of Gourdon. The place contains 1654, and the canton 8158 inhabitants, on a territory of 182½ kiliometres, in 10 communes.

SOUILLY, a town of France, in the department of the Meuſe, and chief place of a canton, in the diſtrict of Verdun. The place contains 792, and the canton 7528 inhabitants, on a territory of 230 kiliometres, in 21 communes.

SOUIN-HING, a town of China, of the third rank, in Hou-quang; 20 miles E.S.E. of Tſin.

SOUI-PING, a town of China, of the third rank, in Ho-nan; 17 miles W.N.W. of Yun-hing.

SOUI-TCHEOU, a city of China, of the firſt rank, in Se-tchuen, at the conflux of the rivers Yan and Kincha; 850 miles S.W. of Peking. N. lat. 28° 40′. E. long. 104° 23′.

SOUI-TE, a city of China, of the ſecond rank, in the province of Chen-ſi, on the Voutin river; 337 miles W.S.W. of Peking. N. lat. 37° 38′. E. long. 109° 34′.

SOUI-YANG, a town of China, of the third rank, in Se-tchuen; 20 miles N.N.E. of Tſun-y.

SOUKAPURA, a kingdom on the ſouth coaſt of the iſland of Java.

SOUKENE, a town of Africa; 130 miles S. of Tripoli.

SOUKERKE, a town of France, in the department of the Lys; 5 miles N.W. of Bruges.

SOUKETON, a river of New Hampſhire, which runs into the Merrimack, N. lat. 42° 48′. W. long. 71° 30′.

SOU-KISE, a town of China, in Hou-quang, on the river Lo; 55 miles N.N.W. of Pao-king.

SOUL, ANIMA, a ſpirit adapted to an organized body. See SPIRIT and BODY.

Many of the ancient philoſophers aſſerted an ANIMA *Mundi* (which ſee), a ſoul which moved and animated the machine of the univerſe, and gave action to all natural cauſes. This doctrine Plato handles very fully in his Timæus. (See PLATONISM.) For the doctrine of the Stoics on this ſubject, ſee STOICS. See alſo PHERECYDES.

The ancient Indians, who poſſibly derived their notions of God and providence from the Perſian Zoroaſter, conceived God to be the ſoul of the world, a rational and intellectual light, from which all good is derived, and the chief ſeat of whoſe divinity is the ſun. Their notion of divine providence, deduced from that of the ſoul of the world, probably extended no farther than that this principle is neceſſarily the firſt ſpring of all motion, life, and enjoyment; and fell far ſhort of that wiſe and gracious voluntary ſuperintendance, which is the Chriſtian idea of Providence.

Others have given particular ſouls to all the heavenly bodies, the ſun, ſtars, earth, &c. to regulate their motions. The philoſophers, many of them, allow of two, and others of three, kinds of ſouls; *viz.* a

SOUL, *Rational,* which they hold to be divine, and infuſed by the breath of God. This they call the ſpirit, and in this they ſuppoſe the intellect and will to be ſeated.

SOUL, *Senſitive,* or *Irrational,* which man has in common with brutes; which is formed out of the elements, and in which they apprehend the paſſions and appetites are ſeated.

SOUL, *Vegetative,* which we have in common with plants; and, as the firſt is the principle of reaſon and underſtanding, or that in us which thinks and underſtands; and the ſecond, the principle of life; this is the principle of growth, nutrition, and vegetation.

The firſt ancient philoſopher who taught the immortality of the ſoul, is ſaid to have been Pherecydes. (See his article.) The human mind, according to the doctrine of the ancient Indians (ſee BRACHMANS), is of celeſtial origin, and has a near relation to God. When it departs from the body, it returns to its parent, who expects to receive back the ſouls which he has ſent forth. The human ſoul they repreſented as of divine original, becauſe, with all the other eaſtern nations, they conceived it to be a particle, or an emanation, of that intellectual fire, by which they believed the univerſe to be animated. Their doctrine of the return of the ſoul to God, which ſome have confounded with the Chriſtian doctrine of the reſurrection, ſeems to have meant nothing more than that the ſoul, after being diſengaged from the groſſer material body, would be reunited to the fountain of all being, the ſoul of the world. For the opinion of the Egyptians concerning the human ſoul, we refer to the article EGYPT.

Among the northern nations it was a generally received opinion, that the human ſoul was of divine original, rational and immortal. That this was the univerſal doctrine of the Celts, whether Gauls, Britons, Germans, or other nations, is unanimouſly atteſted by the Greek and Roman writers, and by the remains of northern antiquities. Cæſar informs us (Bell. Gall. lib. vi. c. 14.), that the firſt doctrine of the Gallic Druids was, that the ſoul of man is immortal; and Pomponius Mela (lib. iii. c. 2.) ſays, that one of their doctrines, which was divulged among the people in order to inſpire them with martial courage, was, that the ſoul is immortal. This account is confirmed by Valerius Maximus (l. ii. c. 6.), Strabo (l. iv.), and other hiſtorians. And the fables every where received among the Celts concerning a future ſtate, leave no room to doubt, that the doctrine of the immortality of the ſoul was generally received among them.

> "Without or breath, or reaſoning pow'rs, or ſpeech,
> Or vital blood, or the fair human face,
> Aſkus and Emla lay: till Odin bade
> Them live, Hænerus kindled in their breaſt
> The lamp of mind, and Lædur through their veins
> Pour'd forth the purple ſtream; thus man aroſe,
> Graceful in youth, an animated form."

The hiſtory of all the northern nations abounds with facts, which prove that their contempt of death originated from an expectation of immortality. It does not, however, certainly appear, what kind of immortality theſe nations expected. According to Cæſar (l. ii. c. 6.) and Diodorus Siculus (l. i.), they thought, that the ſoul at death paſſes from one body to another. This doctrine of tranſmigration is alſo aſcribed to them by Lucan (Pharſ. l. i. v. 454.)

> "If dying mortals doom they ſing aright,
> No ghoſts deſcend to dwell in dreadful night;
> No parting ſouls to griſly Pluto go,
> Nor ſeek the dreary ſilent ſhades below:
> But forth they fly, immortal in their kind,
> And other bodies in new worlds they find:
> Thus life for ever runs its endleſs race,
> And, like a line, death but divides the ſpace." Rowe.

On the contrary, Pomponius Mela repreſents the Celts as expecting to paſs, after death, into the inviſible world. And this notion beſt agrees with the accounts, which are given by various writers, of the funeral ceremonies practiſed in the northern nations, particularly that of committing to the funeral pile, or to the ſepulchre, whatever had been dear to the deceaſed. It is alſo moſt conſonant to the language of the ancient Edda, which every where repreſents the future life, as an aſſembly of good or bad men, in a ſtate of reward or puniſhment, and only ſpeaks of a return to life for the purpoſe of reuniting the ſoul and body, after the ſoul has paſſed through a neceſſary courſe of purification, previouſly to its admiſſion into the regions of the happy. From this ſtate of purgation none were to be excuſed, except thoſe who had voluntarily expoſed themſelves to death in battle: and hence it was, that they who fell in war were deemed to have made a glorious and happy exit from life, whilſt they who died by ſickneſs were thought to have periſhed ſhamefully and wretchedly. See CELTS and DRUIDS.

Of the opinion of Socrates concerning the human ſoul, we have already given an account under the article SOCRATES. For Plato's opinion, ſee PLATONISM. For an account of the Ariſtotelian doctrine on this ſubject, ſee ARISTOTLE. Strabo taught that the ſeat of the ſoul is in the middle of the brain; and that it only acts by means of the ſenſes. (See STRABO.) Dicearchus, of whom Cicero ſpeaks as a learned and eloquent writer, maintained, that there is no ſuch thing as mind, or ſoul, either in man or beaſt; that the principle, by which animals perceive and act, is equally diffuſed through the body, is inſeparable from it, and expires with it. For the opinion of the Stoics, ſee STOICS. For the opinion of Pythagoras and his followers, ſee PYTHAGOREANS. See alſo EMPEDOCLES, DEMOCRITUS, and HERACLITISM.

The Epicureans took the ſubſtance of the ſoul, we mean of the rational ſoul, to be a ſubtile air, compoſed of their atoms, or primitive corpuſcles. See EPICUREANS.

The tenets of the modern Platoniſts with regard to the ſoul of man, may be found in the writings of Plotinus, Jamblichus, and Porphyry, who may be reckoned among the principal perſons that belonged to the Eclectic ſect. Plotinus taught, that the firſt principle of the univerſe, which is diſtinct from the univerſe, is the cauſe of intellectual life and the ſource of eſſence and being, ſimple in its own nature, and having no place, and deſtitute both of motion and reſt; infinite and unlimited, eſſentially good, and fair and beautiful, the author of all that is lovely, the beginning and end of beauty. From this firſt principle proceeds mind, or intellect, and ſoul, or the active principle. The primary eſſential good is the centre; mind, the light emerging from it, and remaining fixed; ſoul, the motion of the emerging light; and body, the opaque ſubſtance, which is illumined by the ſoul. From the emanative energy of mind is produced ſoul, or the active principle of life. This divine principle is the fountain, whence all life is derived. It ſubſiſts, as well as intellect, within the divine eſſence, and is therefore ὑπερκόσμιον, ſupramundane. This is the immediate ſource of the principle which animates the world, ἐγκόσμιον, and which is diffuſed, in various portions, through animated nature. The ſouls of men and inferior animals conſtitute the common limit between the intellectual and ſenſible world. The human ſoul is derived from the ſupramundane ſoul, or firſt principle of life, and is in this reſpect ſiſter to the ſoul of the world. Souls are not in the body as their place, nor as their receptacle, nor as their ſubject, nor as a part of a whole, nor as form united to matter, but ſimply as the animating principle; and it is in this reſpect only, that we know the ſoul to be preſent with the body. The power of the ſoul is diffuſed through every part of the body; and though it be ſaid to reſide in its chief inſtrument the brain, it is incorporeal, and exiſts entirely every where within the ſphere of its energy. Partaking of the nature of real being, it is immutable. It is the principle of motion, moving itſelf, and communicating motion to bodies. The vices and infelicities of the ſoul, are wholly derived from its union with the body.

Souls, in the periodical revolutions of nature, ſeparate themſelves from their fountain, and deſcend into the lower regions of the world. In their paſſage, they attract to themſelves an ethereal vehicle, and at laſt ſink into animal bodies, as into a cavern or ſepulchre. But when, by the power of reminiſcence, they again turn themſelves to the contemplation of intelligible and divine natures, they regain their freedom. God, on account of his greatneſs, is not known by intelligence or ſenſe, but by a kind of intuition ſuperior to ſcience, by means of which the ſoul can ſee him in his real nature, as the fountain of life, mind, and being, and the cauſe of good. A ſoul which has attained to this viſion of God will lament its union with the body, and will rejoice to leave its priſon, and return to the divine nature from which it proceeded. After death, the ſouls of men paſs into other animals, or aſcend into ſuperior regions, and are converted into beings of an higher order, according to their preſent degree of defilement or of purification.

The human ſoul, according to Jamblichus, has an innate knowledge of God, prior to all reaſoning, having originally derived its eſſence from, and ſubſiſted in, the divine nature. By the intervention of dæmons, it enjoys communications with the ſuperior divinities, and with God himſelf. Prayers, hymns, luſtrations, and ſacrifices are the means by which this intercourſe is maintained. The mind of man, as we learn from the writings of Porphyry and others, originally a portion of the divine nature, having fallen into a ſtate of darkneſs and defilement by its union with the body, is to be gradually emancipated from the chain of matter, and by contemplating real entities, to riſe to the knowledge and viſion of God. The end of philoſophy is, therefore, the liberation of the ſoul from its corporeal impriſonment. For this purpoſe it muſt paſs through the ſeveral ſtages of the human and divine virtues. The human virtues are phyſical, economical, and political; or thoſe which reſpect the care of the body, and the offices of domeſtic and civil life. The divine virtues are purgative, theoretic, and theurgic: the firſt claſs conſiſts in bodily abſtinence, and other voluntary mortifications; the ſecond comprehends all thoſe exerciſes of the intellect and imagination, by which the mind contemplates abſtract truth, and intelligible natures; the third includes thoſe religious exerciſes, by which the philoſopher is qualified for, and admitted to, an immediate intercourſe with ſuperior beings, attains a power over dæmons, and aſcends ſo far above the ordinary condition of humanity, as to enjoy the viſion of God in this life, and to return, at death, to the divine mind, whence it firſt proceeded. Thus, we have given a ſpecimen of the viſionary ſubtleties of the Alexandrian philoſophy, or that of the Eclectic ſect.

According to the popular doctrine of the Jews, in and after the tenth century, the ſoul of man is a thinking ſubſtance, having three faculties, the vegetative, the ſenſitive, and the rational: it is poſſeſſed of liberty, and is immortal. After death it is not immediately admitted to celeſtial joys, but wanders in this world, chiefly about its body, during which time it is tormented by evil dæmons; in this purgatory it is cleanſed from its ſtains; after which it paſſes into either bodies of men, or inferior animals. There will be a reſurrection of the bodies of dead men, and an univerſal judgment, which will be ſucceeded by a ſtate of retribution. The ſoul will enjoy eternal life in paradiſe, and the wicked will be conſigned to the infernal regions; the Jew for a time, but the infidel for ever. The world will be deſtroyed; but the materials of which it is compoſed will remain. Thus the modern Jews blended tenets, which they derived from their ſacred ſcriptures, with opinions which they borrowed from their Gentile neighbours. They firſt ſuffered their doctrines to be corrupted by the Egyptian philoſophy, and afterwards learned from the Saracens to reaſon, after the Peripatetic manner, upon metaphyſical ſubjects; of which examples may be ſeen in the writings of Maimonides, and in the book Coſri. The human ſoul, according to the Cabbaliſtic doctrine, proceeding by emanation from the Deity, is an incorporeal ſubſtance, of the ſame nature with the divine intellect. Being united to the body, one complex nature is produced, endued with reaſon, and capable of action. The human ſoul conſiſts of four parts, "nepheſh," or the principle of vitality; "ruach," or the principle of motion; "neſchamah," or the power of intelligence; and "jechidah," a divine principle, by means of which it contemplates ſuperior natures, and even aſcends to the Enſophic world. All ſouls were produced at once, and pre-exiſted in Adam. Every human ſoul has two guardian angels, produced by emanation, at the time of the production of ſouls. The mind of man is united to the divine mind, as the radius of a circle to its centre. The ſouls of good men aſcend above the manſion of angels, and are delighted with the viſion of the firſt light, which illuminates all the world.

The doctrine of the Arabians, ſtated by Al-Gazel, is, that the ſouls of men are immortal, and that their bodies will be raiſed from the dead. In the interval between death and the reſurrection, ſouls remain in an intermediate ſtate; and after the reſurrection the good and faithful ſhall be rewarded, and the wicked and unbelieving ſhall be puniſhed; but they who, after having ſuffered puniſhment, ſhall confeſs one God, will, through his favour, be releaſed from their confinement, and placed among the bleſſed.

The Carteſians make thinking the eſſence of the ſoul; and, from this principle, deduce its immateriality and immortality. But, according to Mr. Locke, &c. the principle is falſe; nor is there any need to define the ſoul a ſubſtance that thinks, to prove it immortal. It is enough that the ſoul be capable of thinking, and that it produce its own thoughts, without making thinking its eſſence. It is no more eſſential to the ſoul to think than to will; for a thing I can conceive the ſoul without, cannot be its eſſence.

Again, if thought be the eſſence of the ſoul, as a thing cannot produce itſelf, its own being, or eſſence; the ſoul does not produce its own thoughts, nor its own will: and thus it is brought to the condition of brutes, or even of inanimate bodies, without any action, any liberty, &c.

If the Carteſians only mean this of the faculty of thinking, they do wrong even to call this the eſſence of the ſoul. It is no more its eſſence than the faculty of willing is. And we conceive ſomething in the ſoul prior to both thoſe faculties.

The ſoul is a ſpiritual ſubſtance, proper to inform or animate a human body: and, by its union with this body, to conſtitute a reaſonable animal or man. This is its eſſence, and this its definition.

It muſt be owned, the Carteſians prove the ſpirituality and immortality of the ſoul, from its thinking, exceedingly well; but they are not to have the honour of this proof as their own invention. All the great philoſophers uſed it before them, and uſe it ſtill.

For an account of Leibnitz's doctrine concerning the ſoul, ſee LEIBNITZ, LEIBNITZIAN *Philoſophy*, MONAD, and *Pre-eſtabliſhed* HARMONY.

Spinoza, and his followers, allowing only of one kind of ſubſtance, *viz.* matter; maintain the ſoul to be of the ſame ſubſtance with the body, *viz.* material. See SPINOZISM.

The doctrine of the materiality of the human ſoul has been adopted and maintained by ſeveral modern writers; and even by thoſe who have diſtinguiſhed themſelves as able and zealous advocates in the cauſe of religion, both natural and revealed. In this number we may reckon Dr. Prieſtley, who, rejecting the commonly received notion of matter, (ſee MATTER,) as an abſolutely impenetrable, inert ſubſtance, and premiſing, that the powers of ſenſation or perception, and thought, as belonging to man, have never been found but in conjunction with a certain organized ſyſtem of matter, maintains, that thoſe powers neceſſarily exiſt in, and depend upon, ſuch a ſyſtem. In proof of this doctrine, it is alleged, that perception and thought are not incompatible with the properties of matter, conſidered as a ſubſtance extended and endued with the powers of attraction and repulſion; and, therefore, if one kind of ſubſtance be capable of ſupporting all the known properties of man, true philoſophy, which will not authorize us to multiply cauſes or kinds of ſubſtance, without neceſſity, will forbid us to admit of any ſubſtance in the conſtitution of human nature, eſſentially different from matter. The proper ſeat of the powers of perception and thought, according to this writer, is the brain; becauſe, as far as we can judge, the faculty of thinking, and a certain ſtate of the brain, always accompany and correſpond to one another; and there is no inſtance of any man retaining this faculty, when his brain was deſtroyed; and whenever that faculty is impeded or injured, there is ſufficient reaſon to believe that the brain is diſordered in proportion. Dr. Prieſtley apprehends, that ſenſation and thought neceſſarily reſult from the organization of the brain, when the powers of mere life are given to the ſyſtem, and that they follow of courſe, as much as the circulation of the blood follows reſpiration; but he profeſſes to have no idea at all of the manner in which the power of perception reſults from organization and life.

To this reaſoning it has been replied, in general, that Dr. Prieſtley's account of matter does not anſwer to the common ideas of matter, or that it is not ſolid extenſion, or an impenetrable and inert ſubſtance, which is the only matter that is the object of natural philoſophy; but ſomething not ſolid, that exiſts in ſpace, and ſo far agreeing with ſpirit; and conſequently, if ſuch matter is, as he aſſerts, the only matter poſſible, it will follow, not that we have no ſouls diſtinct from our bodies, but that we have no bodies diſtinct from our ſouls, and that all in nature is ſpirit. Beſides, it has been farther urged, that a connection and dependence by no means prove ſameneſs.

From the dependence of actual ſenſations and thought on the brain, we have no more reaſon to conclude that the brain is the mind, than a ſavage who had never heard the muſic of a harpſichord, and did not ſee the hand that played upon it, would have to conclude, that it played upon itſelf, and was the muſician; becauſe he could trace all the ſounds to the inſtrument, and found that when the ſtrings were out of order, the muſic was diſturbed or deſtroyed. What experience teaches us is, that the exerciſe of the mental powers *depends* on the brain and the nerves; not that the mind *is* the brain and the nerves. We are ſure the mind cannot be the brain, becauſe the brain is an aſſemblage of beings; whereas the mind is one being.

It has been further objected by an anonymous writer (Edinb. Rev. N° XVII.), that it is unphiloſophical to claſs perception among the qualities of matter, when it is obvious, that it is by means of perception alone that we get any notion of matter or its qualities; and that it is poſſible, with perfect conſiſtency, to maintain the exiſtence of our perceptions, and to deny that of matter altogether. The other qualities of matter are perceived by us; but perception cannot be perceived; all we know about it is, that it is that by which we perceive every thing elſe. It ſounds ſomewhat abſurd and unintelligible, to ſay that perception is that quality of matter by which it becomes conſcious of its own exiſtence, and acquainted with its other qualities. It is plain that this is not a quality, but a knowledge of qualities: and that the percipient muſt neceſſarily be diſtinct from that which is perceived by it. We muſt always begin with perception; and the followers of Berkeley will tell us, that we muſt end there alſo. At all events, it certainly never entered into the head of any plain man to conceive, that the faculty of perception itſelf was one of the qualities with which that faculty made him acquainted; or that it could poſſibly belong to a ſubſtance, which his earlieſt intimations and moſt indeſtructible impreſſions taught him to regard as ſomething external and ſeparate.

The following lines, if we may be allowed to avail ourſelves of poetry in the illuſtration of a metaphyſical queſtion, forcibly expreſs the univerſal and natural impreſſion of mankind on this ſubject.

"Am I but what I ſeem, mere fleſh and blood?
A branching channel, and a mazy flood?
The purple ſtream, that through my veſſels glides,
Dull and unconſcious flows like common tides.
The pipes, through which the circling juices ſtray,
Are not that thinking I, no more than they.
This frame, compacted with tranſcendent ſkill,
Of moving joints, obedient to my will,
Nurſed from the fruitful glebe like yonder tree,
Waxes and waſtes: I call it *mine*, not *me*.
New matter ſtill the mouldering maſs ſuſtains;
The manſion changed, the tenant ſtill remains,
And, from the fleeting ſtream repair'd by food,
Diſtinct, as is the ſwimmer from the flood."

But, beſides the impropriety of making the faculty of perception a quality of the thing perceived, and of abſurdly converting our knowledge of the qualities of matter into another quality of the ſame ſubſtance, chargeable upon the doctrine of materialiſm, it is alleged that to call perception a *quality* at all, is a groſs and unwarrantable abuſe of language. Perception is an act or an event, a fact or a phenomenon, of which the percipient is conſcious; but it cannot be intelligibly conceived as a quality; and, leaſt of all, as a quality of that ſubſtance which is known to us as ſolid and extended. 1ſt. All the qualities of matter, it has been already ſtated, are perceived by the ſenſes; but the ſenſation itſelf cannot be ſo perceived: nor is it poſſible to call it an object of ſenſe, without the groſſeſt perverſion of expreſſion. 2dly. All the qualities of matter have a direct reference to ſpace or extenſion, and are conceived, in ſome meaſure, as attributes or qualities of the ſpace within which they exiſt. When we ſay that a particular body is ſolid, we mean merely that a certain portion of ſpace is impenetrable; when we ſay that it is coloured, we mean that the ſame portion of ſpace appears of one hue,—and ſo of the other qualities: but ſenſation or thought is never conceived to occupy ſpace, or to characterize it; nor can theſe faculties be at all conceived as definite portions of ſpace, endued with perceptible properties. In the third place, all the primary qualities of matter are inſeparable from it, and enter neceſſarily into its conception and definition. All matter muſt neceſſarily be conceived ſo extended, ſolid, and figured. It is obvious, however, that thought or ſenſation is not an inſeparable attribute of matter, as by far the greater part of matter is entirely deſtitute of it; and it is found in connection with thoſe parts which we term organized, only while they are in a certain ſtate, which we call alive. If it be ſaid, however, that thought may reſemble thoſe accidental qualities of matter, ſuch as heat or colour, which are not inſeparable or permanent; then we reply, that none of theſe things can properly be termed matter, more than thought or ſenſation; they are themſelves ſubſtances, or matter poſſeſſed of inſeparable and peculiar qualities, as well as thoſe which addreſs themſelves to the other ſenſes. Light is a material ſubſtance, from which the quality of colour is inſeparable; and heat is a material ſubſtance, which has univerſally the quality of exciting the ſenſation of warmth. If thought be allowed to be a ſubſtance in this ſenſe, it will remain to ſhew that it is material, by being referrible to ſpace, and liable to attraction, repulſion, condenſation or reflection, like heat or light.

Thought, as the advocates of materialiſm allege, is nothing elſe than motion; but, without attempting to define motion, it is ſufficient to obſerve, that it is not a quality of matter; it is an act, a phenomenon, or a fact; but it makes no part of the deſcription or conception of matter, though it only exiſts with reference to that ſubſtance. Let any man aſk himſelf, however, whether the motion of matter bears any ſort of reſemblance to thought or ſenſation; or whether it be even conceivable that theſe ſhould be one and the ſame thing? But, it is ſaid, we find ſenſation always produced by motion; and as we can diſcover nothing elſe in conjunction with it, we are juſtified in aſcribing it to motion. This is not the queſtion. It is not neceſſary to inquire, whether motion may *produce* ſenſation or not, but whether ſenſation *be* motion, and nothing elſe. It ſeems pretty evident that motion can produce nothing but motion or impulſe, and that it is at leaſt as inconceivable that it ſhould ever produce ſenſation in matter, as that it ſhould produce a ſeparate ſubſtance, called mind. But this is not the queſtion with the materialiſts. Their propoſition is, not that motion produces ſenſation, which might be as well in the mind as in the body; but that ſenſation is motion; and that all the phenomena of thought and perception are intelligibly accounted for by ſaying, that they are certain little ſhakings in the pulpy part of the brain.

That ſenſation may follow motion in the brain, or may even be produced by it, is conceivable at leaſt, and may be affirmed with perfect preciſion and conſiſtency; but that the motion is itſelf ſenſation, and that the proper and complete definition of thought and feeling is, that they are certain vibrations in the brain, is a doctrine that can only be wondered at, and that muſt be comprehended before it be anſwered.

No advocate for the exiſtence of mind, ever thought it neceſſary to deny that there was a certain bodily apparatus neceſſary to thought and ſenſation in man, and that on many occaſions the ſenſation was preceded or introduced by certain impulſes and correſponding movements of this material machinery; we cannot ſee without eyes and light, nor think without living bodies. All that they maintain is, that theſe impulſes and movements are not feelings or thought, but merely the occaſions of feeling and thought, and that it is impoſſible for them to confound the material motions which precede their ſenſations, with the ſenſations themſelves, which have no conceivable affinity with matter.

Dr. Prieſtley farther argues, that all our ideas either proceed from the bodily ſenſes, or are conſequent upon the perceptions of ſenſe; and hence infers, that the notion of the poſſibility of thinking in man, without an organized body, is not only deſtitute of all evidence from actual appearances, but is directly contrary to them. Moreover, if the mind was naturally ſo independent of the body, as to be capable of ſubſiſting by itſelf, and even of appearing to more advantage after the death of the body, as ſome of the advocates for an intermediate ſtate have maintained, it might, he ſays, diſcover ſome ſigns of its independence before its death, and eſpecially when the organs of the body were obſtructed, ſo as to leave the ſoul more at liberty to exert itſelf, as in a ſtate of ſleep or ſwooning, which moſt reſemble the ſtate of death, in which it is pretended that the ſoul is moſt of all alive, moſt active, and vigorous; but, judging by appearances, the reverſe of all this is the caſe. Beſides, if the mental principle was, in its own nature, immaterial and immortal, all its particular faculties would be ſo too; whereas we ſee that every faculty of the mind, without exception, is liable to be impaired, and even to become wholly extinct before death. Whence he infers, that the ſubſtance, or principle, in which theſe faculties exiſt, muſt be pronounced to be mortal too. He adds, if the ſentient principle in man be immaterial, it can have no extenſion, but every thing within it, or properly belonging to it, muſt be ſimple and indiviſible; and if this were not the caſe, the ſoul would be liable to corruption and death. But Dr. Prieſtley obſerves, that, whatever ideas are in themſelves, they are evidently produced by external objects, and muſt therefore correſpond to them; and ſince many of the objects or archetypes of ideas are diviſible, it neceſſarily follows, that the ideas themſelves are diviſible alſo; and hence he infers, that the ſentient principle in man, containing ideas which certainly have parts, and are diviſible, and conſequently having extenſion, cannot be that ſimple, indiviſible, and immaterial ſubſtance, that ſome have imagined it to be; but ſomething that has real extenſion, and therefore may have the other properties of matter. To this reaſoning an excellent writer replies, that it would be as proper to aſſert that ideas are hard or round, as to aſſert that they are diviſible. Perception is a ſingle and indiviſible act; and though the object perceived may be diviſible, the perception of it by the mind cannot be ſo. Dr. Prieſtley farther adds, that the ſoul poſſeſſes a great variety of mental affections, which neceſſarily imply alteration, eſpecially melioration and depravation, which is ſomething ſo ſimilar to corruption, that it has univerſally obtained the ſame name, and which is certainly incompatible with natural and perfect ſimplicity. This writer alleges alſo, in favour of the ſyſtem of materialiſm, that we hereby get rid of many difficulties, which muſt embarraſs the oppoſite ſyſtem; ſuch, *e. gr.* as theſe—what becomes of the ſoul during ſleep, in a ſwoon, when the body is ſeemingly dead (as by drowning, or other accidents), and eſpecially after death? alſo what was the condition of it before it became united to the body, and at what time did that union take place? what are the nature and ſtate of the ſouls of brutes? what is the uſe of the human body? &c. The ſyſtem of materialiſm, he ſays, which revelation uniformly ſuppoſes, is clogged with no difficulties of this kind. Man, according to this ſyſtem, is no more than what we now ſee of him. His being commences at the time of his conception, or perhaps at an earlier period. The corporeal and mental faculties, inhering in the ſame ſubſtance, grow, ripen, and decay together; and, whenever the ſyſtem is diſſolved, it continues in a ſtate of diſſolution, till it ſhall pleaſe that Almighty Being, who called it into exiſtence, to reſtore it to life again. Accordingly the Chriſtian ſyſtem provides no reward for the righteous till the general reſurrection of the juſt, nor any puniſhment for the wicked till the end of the world. Hence alſo the doctrine of the pre-exiſtence of human ſouls, and that of the pre-exiſtence of Chriſt, is rejected, as having no other foundation than the notion of there being ſomething in man quite different from his corporeal organized ſyſtem.

Dr. Prieſtley argues in many parts of his work on the ſuppoſition, that, according to the ideas of modern immaterialiſts, ſpirit can have no relation to place, and is incapable of being preſent any where. But Dr. Clarke, and ſome others of the beſt modern writers, did not entertain theſe ideas of ſpirit. Time and place are neceſſary to the exiſtence of all things; and hence Dr. Clarke infers, that infinite ſpace and duration are the eſſential properties of the Deity. Sir Iſaac Newton was alſo of the ſame opinion; and Dr. Price obſerves, that if ſpirit exiſts at all, it muſt exiſt ſomewhere, as well as in ſome time.

Dr. Prieſtley deduces another argument in favour of the material ſyſtem, from the conſideration, that ſpirit and body have no common property, and that it muſt, therefore, be impoſſible for them to act upon one another: againſt which it has been objected, that his principles tend to prove, that the Deity is material, as well as all inferior beings: and if matter be a power of attraction and repulſion united to extenſion, the Deity muſt be the ſame. But if this maxim be not univerſally true, and the Deity be immaterial, as Dr. Prieſtley himſelf aſſerts, it will follow, that ſpirit may act upon matter, without having any other common property with it than being locally preſent to it; and one of his chief arguments for the materiality of the ſoul will be given up. Beſides, allowing this maxim, how is it poſſible to avoid aſſerting the impoſſibility of the creation of the world out of nothing? For what common property can the Creator have with *nothing?* Dr. Prieſtley has laboured to prove, that the ſcriptures, both of the Old and New Teſtament, ſuppoſe and inculcate the doctrine of the uniform compoſition of man, or of the materiality of the human ſoul; and that, in conformity to this doctrine, the ſtate of retribution does not take place till after the general reſurrection. Accordingly, his ſyſtem leads him to deny the natural immortality of the ſoul, and its conſcious exiſtence in the intermediate ſtate. To thoſe who object, that if the ſoul be not naturally capable of ſurviving the body, or if death is unavoidably its deſtruction, then the reſurrection muſt be the reſurrection of a non-entity; he replies, that though the power of thinking cannot exiſt without its ſubſtance, which is an organized ſyſtem, yet if this property of thinking neceſſarily attends the property of life, nothing can be requiſite to the reſtoration of all the powers of the man, but the reſtoration of the body to a ſtate of life. And he apprehends that a reſurrection properly ſo called (becauſe this can be only a reſurrection of ſomething that had been dead, *viz.* the body), is manifeſtly uſeleſs, upon the ſuppoſition of there being a ſoul diſtinct from the body; it being, upon this hypotheſis, the ſoul, and not the body, that is the ſeat of all perception, and the ſource of all action. See SLEEP *of the Soul.*

Dr. Prieſtley conceives, that the three doctrines of materialiſm, of that which is commonly called Socinianiſm, and of philoſophical neceſſity, are equal parts of one ſyſtem, being equally founded on juſt obſervations of nature, and fair deductions from the ſcriptures; and that whoſoever ſhall duly conſider their connection and dependence on one another, will find no ſufficient conſiſtency in any general ſcheme of principles that does not comprehend them all. But it has been urged by another able writer, that if man be the matter itſelf which conſtitutes the man, and not its form or arrangement, as Dr. Prieſtley allows, the man will always remain while the matter which conſtitutes him remains, however different its organization or arrangement may be: that ſince death does not deſtroy the matter which conſtitutes man, it does not deſtroy the man; and that, conſequently, he goes on to exiſt after death, or is naturally immortal: that, in order to the reſurrection of the ſame man, the ſame matter muſt ariſe; and that it is no leſs poſſible for man to have exiſted *before* his birth, than it is, that he ſhould exiſt *after* his death; and that, conſequently, all the ſupport to the Socinian ſcheme, which Dr. Prieſtley derives from his ſentiments of materialiſm, falls to the ground. To this reaſoning, however, he replies, that the pre-exiſtence of the materials of the man Jeſus is a very different kind of pre-exiſtence from that of thoſe who make Chriſt, or rather the principal part of him, to have pre-exiſted in an active ſtate. We ſhall here ſubjoin the following argument, urged by the learned Dr. Clarke againſt Mr. Dodwell, in proof of the immateriality and natural immortality of the ſoul. That the ſoul cannot be material, he ſays, is demonſtrable from the ſingle conſideration even of bare ſenſe and conſciouſneſs itſelf. For matter being a diviſible ſubſtance, conſiſting always of ſeparable, nay, of actual ſeparate and diſtinct parts; it is plain, unleſs it were eſſentially conſcious, in which caſe every particle of matter muſt conſiſt of innumerable ſeparate and diſtinct conſciouſneſſes, no ſyſtem of it in any poſſible compoſition or diviſion, can be an individual conſcious being: for ſuppoſe three, or three hundred particles of matter, at a mile, or any given diſtance, one from another, is it poſſible that all thoſe ſeparate parts ſhould, in that ſtate, be one individual conſcious being? Suppoſe, then, all theſe particles brought together, into one ſyſtem, ſo as to touch one another, will they, thereby, or by any motion or compoſition whatſoever, become any whit leſs truly diſtinct beings than they were at the greateſt diſtance? How then can their being diſpoſed in any poſſible ſyſtem, make them one individual conſcious being? If you ſuppoſe God by his infinite power ſuperadding conſciouſneſs to the united particles, yet ſtill thoſe particles, being really and neceſſarily as diſtinct beings as ever, cannot be themſelves the ſubject in which that individual conſciouſneſs inheres; but the conſciouſneſs can only be ſuperadded by the addition of ſomething, which, in all the particles, muſt ſtill itſelf be but one individual being. The ſoul, therefore, whoſe power of thinking is undeniably one individual conſciouſneſs, cannot poſſibly be a material ſubſtance. See on the ſubject of this article, Brucker's Hiſtory of Philoſophy, by Enfield. Prieſtley's Diſquiſitions relating to Matter and Spirit, 8vo. 1777. Correſpondence between Dr. Price and Dr. Prieſtley, 8vo. 1778. Clarke's Demonſtration of the Being and Attributes of God. Anſwer to Dodwell. Controverſies with Collins; and Letters between him and Leibnitz. Butler's Analogy, chap. i. Baxter's Matho, vol. i. Enquiry into the Nature of the human Soul, &c. vol. i.

The notions of the ancients were very various with regard to the ſeat of the ſoul, and the mode of its action on the body. Some have maintained, that it is equally diffuſed through every part of it; and others ſay, that whilſt it influences and acts upon every part of the body, it has its principal reſidence in ſome particular part. Since it has been diſcovered, by the improvements in anatomy, that the nerves are the inſtruments of perception, and of the ſenſations accompanying it, and that the nerves ultimately terminate in the brain, it has been the general opinion of philoſophers that the brain is the ſeat of the ſoul; and that it perceives the images that are brought there, and external things, only by means of them. Des Cartes, obſerving that the PINEAL *Gland* (which ſee) is the only part of the brain that is ſingle, all the other parts being double, and thinking that the ſoul muſt have one ſeat, was thus determined to make that gland the ſoul's habitation; to which, by means of the animal ſpirits, intelligence is brought of all objects that affect the ſenſes. See CARTES and CARTESIANISM.

Others have not thought proper to confine the habitation of the ſoul to the pineal gland, but to the brain in general, or to ſome part of it, which they call the "ſenſorium." Even the great Newton favoured this opinion, though he propoſes it only as a query, with that modeſty which diſtinguiſhed him no leſs than his great genius.

"Is not," ſays he, "the ſenſorium of animals the place where the ſentient ſubſtance is preſent, and to which the ſenſible ſpecies of things are brought through the nerves and brain, that there they may be perceived by the mind preſent in that place? And is there not an incorporeal, living, intelligent, and omnipreſent Being, who, in infinite ſpace, as if it were in his ſenſorium, intimately perceives things themſelves, and comprehends them perfectly, as being preſent to them; of which things, that principle in us which perceives and thinks, diſcerns only in its little ſenſorium, the images brought to it through the organs of the ſenſes?" His great friend Dr. Clarke adopted the ſame ſentiments with more confidence. In his papers to Leibnitz, we find the following paſſages. "Without being preſent to the images of the things perceived, the ſoul could not poſſibly perceive them. A living ſubſtance can only there perceive when it is preſent, either to the things themſelves, (as the omnipreſent God is to the whole univerſe,) or to the images of things, (as the ſoul of man is in its proper ſenſory). Nothing can any more act, or be acted upon, where it is not preſent, than it can be where it is not. We are ſure the ſoul cannot perceive what it is not preſent to, becauſe nothing can act, or be acted upon, where it is not." See SENSORIUM.

Mr. Locke expreſſes himſelf in ſuch a manner, that, for the moſt part, one would imagine, that he thought the ideas, or images, of things, which he believed to be the immediate objects of perception, are impreſſions upon the mind itſelf; yet in ſome paſſages he rather places them in the brain, and makes them to be perceived by the mind there preſent. From ſuch paſſages, cited by Dr. Reid (ubi infra), it may be inferred, that he thought there are images of external objects conveyed to the brain. But whether he thought, with Des Cartes and Newton, that the images in the brain are perceived by the mind there preſent, or that they are imprinted on the mind itſelf, is not obvious. This hypotheſis is founded on three aſſumptions; and if any one of them fail, it muſt fall to the ground. 1. That the ſoul has its ſeat, or, as Mr. Locke calls it, its preſence-room, in the brain: 2. That images are formed in the brain of all the objects of ſenſe: 3. That the mind or ſoul perceives thoſe images in the brain; and that it perceives not external objects immediately, but only perceives them by means of thoſe images. The firſt aſſumption is not ſufficiently eſtabliſhed to warrant our founding other principles upon it. Of the ſecond there is no proof or probability, with regard to any of the objects of ſenſe. The brain has been diſſected times innumerable, by the niceſt anatomiſts; every part of it has been examined by the naked eye, and with the help of microſcopes; but no veſtige of any external object was ever found. The brain ſeems to be the moſt improper ſubſtance that can be imagined for receiving or retaining images, being a ſoft, moiſt, medullary ſubſtance. The third aſſumption is as improbable, as that there are images of external objects in the brain to be perceived. If our powers of perception, ſays Dr. Reid, be not altogether fallacious, the objects we perceive are not in our brain, but without us. Reid's Eſſay on the Intellectual Powers of Man, Eſſ. ii. ch. 4. See PERCEPTION.

Borri, a Milaneſe phyſician, in a letter to Bartholine, "De Ortu Cerebri, et Uſu Medico," aſſerts, that in the brain is found a very ſubtle fragrant juice, which is the principal ſeat or reſidence of the reaſonable ſoul; and adds, that the ſubtlety and fineneſs of the ſoul depends on the temperature of this liquor rather than on the ſtructure of the brain, to which it is uſually aſcribed. This liquor, we conceive, muſt be the ſame with what is uſually called the *nervous juice*, or *animal ſpirits:* the conſtitution of which is, doubtleſs, of great importance, with regard to the faculties of the ſoul.

Mr. Locke diſtinguiſhes two principal faculties or powers of the rational or human ſoul, *viz. perception* and *willing.* See POWER.

To theſe, other philoſophers add others; as *ſenſation, liberty, memory, imagination,* and *habit.*

The myſtic divines diſtinguiſh two principal parts of the ſoul: the *ſuperior part,* which comprehends the underſtanding and the will, and the *inferior part,* which comprehends imagination and ſenſation.

As to the ſoul of brutes, the Carteſians, and ſome others, deny its exiſtence in the common ſenſe of the word ſoul; that is, they ſtrip it of all the properties or faculties of the human ſoul: and the Peripatetics, on the contrary, inveſt it with the greateſt part, if not all of them.

In man, a particular agitation of the fibres of the brain is accompanied with a ſenſation of heat; and a certain flux of animal ſpirits towards the heart and viſcera is followed by love or hatred.

Now the Peripatetics maintain, that brutes feel the ſame heat, and the ſame paſſions, on the ſame occaſions; that they have the ſame averſion for what incommodes them; and, in the general, are capable of all the paſſions, and all the ſenſations we feel.

The Carteſians deny they have any perceptions or notices at all, that they feel any pain or pleaſure, or love or hate any thing. The ground of their opinion is, that they allow of nothing in brutes but what is material: and that they deny ſenſations and paſſions to be any properties of matter.

Some of the Peripatetics, on the other hand, maintain matter, when ſubtilized, framed, ranged, and moved, in a certain manner, to be capable of ſenſation and paſſion; that beaſts may feel and perceive, by means of the animal ſpirits, which are a matter thus modified; and that even the human ſoul itſelf only becomes capable of ſenſation and paſſion by means of it.

The maintainers of the contrary opinion urge that appearance of ſenſe, of fear, caution, love for their young, admirable ſagacity, both for their own preſervation and that of their ſpecies, viſible through the whole brute creation. And it is true, that all the actions of beaſts plainly expreſs an underſtanding, for every thing that is regular expreſſes it, even a machine or watch expreſſes it, and a plant much more; the radicle of the ſeed turning downwards, and the ſtem upwards, whatever ſituation the ſeed is ſown in; the young plant knitting from ſpace to ſpace to ſtrengthen it, its putting forth prickles, &c. to defend it, &c. mark a great underſtanding. All the motions of plants and brutes plainly diſcover an intelligence; but the intelligence does not reſide in the matter thereof; it is as diſtinct from the beaſt or plant, as that which ranged the wheels of the watch is diſtinct from the watch itſelf.

For, in effect, this intelligence appears infinitely great, infinitely wiſe, infinitely powerful; and the ſame which formed us in our mother's womb, which gave us our growth, &c. Thus, in brutes there is not either underſtanding or ſoul, in the ſenſe we generally uſe the word; they eat without pleaſure, cry without pain, grow without knowing it. They fear nothing, know nothing; and if they act in ſuch manner as ſhews underſtanding, it is becauſe God, having made them, to preſerve them, has formed their bodies ſo as to avoid whatever might hurt them mechanically.

Otherwiſe it might be ſaid, that there is more underſtanding in the vileſt inſect, nay, in the ſmalleſt grain, than in the moſt knowing men; for it is evident, either of them contains more parts, and produces more regular motions and actions, than we are capable of underſtanding. Thus does the great F. Malebranche argue againſt the ſouls of brutes. (Recherche de la Verité, liv. vi.) On this ſubject, ſee Brutes and Instinct.

In connection with the intereſting ſubject of this article, we ſhall here introduce ſome appropriate obſervations of an acute and elegant writer. (See Stewart's Elements of the Philoſophy of the Human Mind.) This writer agrees with Dr. Reid in ſuppoſing, that the notions we annex to the words matter and mind, are merely relative. If I am aſked, ſays he, what I mean by matter? I can only explain myſelf by ſaying, it is that which is extended, figured, coloured, moveable, hard or ſoft, rough or ſmooth, hot or cold; that is, I can define it in no other way, than by enumerating its ſenſible qualities. It is not matter or body which I perceive by my ſenſes; but only extenſion, figure, colour, and certain other qualities, which the conſtitution of my nature leads me to refer to ſomething which is extended, figured, and coloured. The caſe is preciſely ſimilar with reſpect to mind. We are not immediately conſcious of its exiſtence, but we are conſcious of ſenſation, thought, and volition; operations, which imply the exiſtence of ſomething which feels, thinks, and wills. Every man too is impreſſed with an irreſiſtible conviction, that all theſe ſenſations, thoughts, and volitions, belong to one and the ſame being; to that being which he calls *himſelf*; a being which he is led, by the conſtitution of his nature, to conſider as ſomething diſtinct from his body, and as not liable to be impaired by the loſs or mutilation of any of his organs. From theſe conſiderations it appears, that we have the ſame evidences for the exiſtence of mind, that we have for the exiſtence of body; nay, if there be any difference between the two caſes, that we have ſtronger evidence for it; inaſmuch as the one is ſuggeſted to us by the ſubjects of our conſciouſneſs, and the other merely by the objects of our perception. But as from our earlieſt years the attention is engroſſed with the qualities and love of matter, theſe phenomena occupy our thoughts more than thoſe of the mind, and we are perpetually tempted to explain the latter by the analogy of the former, and even to endeavour to refer them to the ſame general laws; and we acquire habits of inattention to the ſubjects of our conſciouſneſs, not eaſily ſurmounted. If, therefore, our notions of mind and matter are merely relative; if we know the one, only by ſuch ſenſible qualities as extenſion, figure, and ſolidity, and the other, by ſuch operations as ſenſation, thought, and volition, we are warranted in ſaying, that matter and mind, conſidered as objects of human ſtudy, are eſſentially different; the ſcience of the former reſting ultimately on the phenomena exhibited to our ſenſes, and that of the latter, on the phenomena of which we are conſcious. Inſtead, therefore, of objecting to the ſcheme of materialiſm, that its concluſions are falſe, it would be more accurate to ſay, that its aim is unphiloſophical. It proceeds on a miſapprehenſion of the proper object of ſcience; the difficulty which it profeſſes to remove being manifeſtly placed beyond the reach of our faculties. Surely, when we attempt to explain the nature of that principle which feels, and thinks, and wills, by ſaying, that it is a material ſubſtance, or that it is the reſult of material organization, we impoſe on ourſelves by words, forgetting that matter as well as mind is known to us by its qualities and attributes alone, and that we are totally ignorant of the eſſence of either. Should it be ſaid that the unknown ſubſtance which has the qualities of extenſion, figure, and colour, may be the ſame with the unknown ſubſtance which has the attributes of feeling, thinking, and willing; this is only an hypotheſis, which amounts to nothing more than a mere poſſibility; and even if it were true, it would no more be proper to ſay of mind that it is material, than to ſay of body that it is ſpiritual.

Souls, *Cure of*. See Cure.

Souls, *Migration of*. See Migration and Metempsychosis.

Soul, *Sleep of the*. See Sleep *of the Soul*.

Soul-*Scot*, a certain fee paid by our Saxon anceſtors to the prieſt on opening a grave.

Soul's *Cheat*, a legacy anciently bequeathed at their deaths by our ſcrupulouſly pious anceſtors, to the pariſh-prieſt, to compenſate for any tithes that might have been forgot in their lives.

SOULAINES, in *Geography*, a town of France, in the department of the Aube, and chief place of a canton, in the diſtrict of Bar-ſur-Aube; 12 miles N. of Bar-ſur-Aube. The place contains 763, and the canton 7723 inhabitants, on a territory of 265 kiliometres, in 21 communes.

SOULAMEA, in *Botany*, ſlightly altered from *Soulamoe*, the name given to the plant in the iſland of Ternate. Lamarck Dict. v. 1. 449. Juſſ. 429. This is no other than what we have deſcribed under the article Rex Amaroris, to which we refer the reader. Commerſon, it ſeems, gathered this curious plant at Port Praſlin, in the Arſacides. Lamarck deſcribes the flowers with a three-cleft *calyx*, three *petals*, ſix *ſtamens*, and two *ſtigmas*. The *germen* is ſuperior.

Fruit an inverſely heart-ſhaped *capſule*, compreſſed, dilated at the margin, of two cells, each containing an oval *ſeed;* but it often happens that one of theſe ſeeds is abortive.

SOULANCOURT, in *Geography*, a town of France, in the department of the Upper Marne; 4 miles E. of Bourmont.

SOULE, a ſmall country of France, ſo called before the revolution, ſituated between Bearn and Navarre, of which Mauleon was the capital, now in the department of the Lower Pyrenées.

SOULLIERES, a town of France, in the department of Mont Blanc; 20 miles E. of St. Jean de Maurienne.

SOULONA, a town of Thibet; 20 miles E.S.E. of Coucour-Hotun.

SOULTZ, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Colmar. The place contains 4298, and the canton 9317 inhabitants, on a territory of 87½ kiliometres, in 9 communes.

SOULZ-SOUS-FORETS, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the diſtrict of Wiſſembourg; 2 miles S. of Wiſſembourg. The place contains 1269, and the canton 13,768 inhabitants, on a territory of 145 kiliometres, in 26 communes.

SOUM, in *Agriculture*, a term denoting the paſturage of a full-grown cow. It is moſtly applied to lands in the moory ſtate, and ſuch as are under the ſheep-walk ſyſtem. It nearly anſwers, in ſome reſpects, to gaite. It is much uſed in the northern parts of Scotland. In the county of Perth, a horſe is accounted two ſoums; in ſome places four ſheep, but in other places five, are eſtimated at one ſoum; and of young cattle according to their age. The graſs of a ſoum, in hilly ground, is valued, on an average, from five to ſeven ſhillings, according to its quality. By ſome, much cenſure has been beſtowed on this mode of aſcertaining the value of paſture or graſs-land in the Highlands: but in mountainous diſtricts, where the ground has never been meaſured, and probably never will, where one mountain is exactly different from another in the quality and quantity of its produce as a paſture, and where there is even a great diverſity in different regions of the ſame mountain, it is perhaps not eaſy to conceive a better method of aſcertaining the value of paſture than by the number of cattle it can maintain. Whoever propoſes to explode any old cuſtom, ought, it is ſuppoſed, to ſubſtitute a better in its place.

Such old cuſtoms are now, however, a great deal more neglected and diſregarded, even in theſe Highland ſituations, than was formerly the caſe; juſt in the ſame manner as the term *gaite* has partially grown into diſuſe in different diſtricts in the ſouthern parts of the kingdom.

SOUMENZAC, in *Geography*, a town of France, in the department of the Lot and Garonne; 7 miles N.W. of Lauſun. N. lat. 44° 41′. E. long. 0° 27′.

SOUND, Sonus, a perception of the ſoul, communicated by means of the ear; or the effect of a colliſion of bodies, and a tremulous motion conſequent upon it, communicated thence to the circumambient fluid, and propagated through it to the organs of hearing.

Sound is not ſimply a vibration or undulation of the air, as ſome have called it, for there are many ſounds in which the air is not concerned, as when a tuning-fork or any other ſounding body is held by the teeth: nor is ſound always a vibration or alternation of any kind, for every noiſe is a ſound, and a noiſe, as diſtinguiſhed from a continued ſound, conſiſts of a ſingle impulſe in one direction only, ſometimes without any alternation; while a continued ſound is a ſucceſſion of ſuch impulſes, which, in the organ of hearing at leaſt, cannot but be alternate. If theſe ſucceſſive impulſes form a connected ſeries, following each other too rapidly to be ſeparately diſtinguiſhed, they conſtitute a continued ſound, like that of the voice in ſpeaking; and if they are equal among themſelves in duration, they produce a muſical or equable ſound, as that of a vibrating chord or ſtring, or of the voice in ſinging. Thus, a quill ſtriking againſt a piece of wood cauſes a noiſe, but ſtriking againſt the teeth of a wheel or comb, a continued ſound; and if the teeth of the wheel are at equal diſtances, and the velocity of the motion is conſtant, a muſical note.

To illuſtrate the cauſe of ſound, we obſerve, firſt, that a motion is neceſſary in the ſonorous body for the production of ſound. Secondly, that this motion exiſts, firſt, in the ſmall and inſenſible parts of the ſonorous bodies; and is excited in them by their mutual colliſion and percuſſion againſt each other, which produces that tremulous motion ſo obſervable in bodies that have a clear ſound, as bells, muſical chords or ſtrings, &c. Thirdly, that this motion is communicated to, or produces a like motion, uſually in the air, or ſuch parts of any material ſubſtance as are fit to receive and propagate it, inaſmuch as no motion of bodies, at a diſtance, can affect our ſenſes, without the mediation of other bodies, which receive thoſe motions from the ſonorous body, and communicate them immediately to the organ. Laſtly, that this motion muſt be communicated to thoſe parts that are the proper and immediate inſtruments of hearing. See Ear.

Further, that motion of a ſonorous body which is the immediate cauſe of ſound, may be owing to two different cauſes: either the percuſſion between it and other hard bodies, as in drums, bells, ſtrings, &c. or the beating and daſhing of the ſonorous body and the air immediately againſt each other, as in wind-inſtruments, flutes, trumpets, &c.

But, in both caſes, the motion, which is the conſequence of the mutual action, and the immediate cauſe of the ſonorous motion which the air conveys to the ear, is an inviſible, tremulous, or undulating motion, in the ſmall and inſenſible parts of the body.

To explain this, all ſenſible bodies are ſuppoſed to conſiſt of a number of ſmall and inſenſible parts or corpuſcles, which are of the ſame nature in all bodies, and are perfectly hard and incompreſſible.

Of theſe are compoſed others, ſomewhat greater, but ſtill inſenſible; and theſe different, according to the different figures and union of their component parts. Theſe, again, conſtitute other maſſes, bigger and more different than the former; and of the various combinations of theſe laſt, are thoſe groſs bodies compoſed that are viſible, tangible, &c. The firſt and ſmalleſt parts, we have obſerved, are abſolutely hard; the others are compreſſible, and are united in ſuch manner, that, being compreſſed by an external impulſe, they have an elaſtic or reſtitutive power, by which they reſtore themſelves to their natural ſtate.

A ſhock, then, being made by one body upon another, the ſmall particles, by their elaſtic principle, move to and again with a very great velocity, in a tremulous, undulating manner, ſomewhat like the viſible motions of groſſer ſprings; as we eaſily obſerve in the ſtrings of muſical inſtruments. And this is what we may call the *ſonorous motion*, which is propagated to the ear; but obſerve, that it is the inſenſible motion of thoſe particles next the ſmalleſt, which is ſuppoſed to be the immediate cauſe of ſound; and, of theſe, only thoſe next the ſurface communicate with the air, the motion of the whole, or of the greater parts, being no farther concerned, than as they contribute to the other.

To apply this theory, ſtrike a bell with any hard body, and you eaſily perceive a ſenſible tremor on the ſurface, ſpreading itſelf over the whole, and that more ſenſibly as the ſhock is greater. Upon touching it in any other part, the motion and the ſound too are ſtopped. Now this is apparently a motion of the ſmall and inſenſible parts, changing their ſituation, with reſpect to one another; which being ſo many, and ſo cloſely united, we cannot perceive their motions ſeparately and diſtinctly; but only a trembling, which we reckon to be the effect of the confuſion of an infinite number of little particles, cloſely joined, and only moving in infinitely little lines.

M. Perrault adds, that the viſible motion of the parts contributes no otherwiſe to ſound, than as it cauſes the inviſible motion of the ſmaller parts, which he calls *particles*, to diſtinguiſh them from the ſenſible ones, which he calls *parts*, and from the ſmalleſt of all, which we call *corpuſcles*.

This he ſupports from the inſtance of a chord or ſtring, which being ſtruck, and the ſound, and ſenſible undulations, at reſt again, if you approach the chord ſoftly with the finger, you will find a ſmall tremulous motion, which is the remains of the vibrations of the whole ſtring and the parts. Now the parts vibrate without any ſound; but no ſooner is the vibration felt by the finger, than the ſound is heard again; which he aſcribes to this, that the motion of the parts being inſufficient to move the particles, whoſe motion is the firſt that ceaſes, requires ſome aſſiſtance from daſhing againſt the finger, whereby to become enabled to give the particle the motion neceſſary for the producing of ſound. He finiſhes his proof by the inſtance of flutes, which, when made of different matters, as wood, metal, &c. whoſe parts are very different, but their particles nearly the ſame, if their lengths and bore be the ſame, there is very little ſenſible difference in their ſounds.

The ſonorous body having made its impreſſion on the contiguous air, that impreſſion is propagated from one particle to another, according to the laws of pneumatics.

A few particles, for inſtance, driven from the ſurface of the body, drive their neighbouring particles into a leſs ſpace; and the medium, as it is thus rarefied in one place, becomes condenſed in the other; but the air, thus compreſſed in the ſecond place, is, by its elaſticity, returned back again, both to its former place and its former ſtate; and the air contiguous to that is compreſſed; and the like obtains, when the air leſs compreſſed expanding itſelf, a new compreſſion is generated. From each agitation of the air, therefore, there ariſes a motion of the air, analogous to the motion of a wave on the ſurface of the water; which we call a *wave*, or *undulation* of air.

In each wave the particles go and return back again, through very ſhort, but equal ſpaces; the motion of each particle is analogous to the motion of a vibrating pendulum, while it performs two oſcillations; and moſt of the laws of the pendulum, with very little alteration, are applicable thereto.

The only condition neceſſary for the production of a ſimple ſound, is a ſufficient degree of velocity in the motion or impulſe which occaſions it. A very moderate velocity muſt be ſufficient for producing an impreſſion on the ear: and when the ſound is continued, it may remain audible with a velocity of no more than one hundredth part of an inch in a ſecond, or perhaps with a velocity much leſs than this; but at its origin, it is probable that the velocity of the motion conſtituting a ſound muſt always be conſiderably greater. A continued ſound may be produced by a repetition of ſeparate impulſes, independent of each other, as when a wheel ſtrikes in rapid ſucceſſion the teeth of a pinion, ſo as to force out a portion of air from between them; when a pipe, through which air is paſſing, is alternately opened and ſhut, either wholly or partially, by the revolution of a ſtop-cock or valve; or when a number of parallel ſurfaces is placed at equal diſtances, in a line nearly perpendicular to them, and a noiſe of any kind is reflected from each of them in ſucceſſion:—a circumſtance which may often be obſerved, when we are walking near an iron railing, an acute ſound being heard, which is compoſed of ſuch reflections from the ſurfaces of the paliſades. See Sound, in *Muſic*, *infra*.

Sounds are as various as are the means that concur to their production. The principal varieties reſult from the figure, conſtitution, quantity, &c. of the ſonorous body; the manner of percuſſion, with the velocity, &c. of the vibrations conſequent thereon; the ſtate and conſtitution of the medium; the diſpoſition, diſtance, &c. of the organ; the obſtacles between the organ and the ſonorous object, and the adjacent bodies. The moſt notable diſtinction of ſounds, ariſing from the various degrees and combinations of the conditions mentioned, are into *loud* and *low* (or ſtrong and weak); into *grave* and *acute* (or ſharp and flat, or high and low); and into *long* and *ſhort*: the management of which makes the office of muſic. See the next article.

M. Euler is of opinion, that no ſound, making fewer vibrations than 30, or more than 7520 in a ſecond, is diſtinguiſhable by the human ear. According to this doctrine, the limit of our hearing, as to acute and grave, is an interval of eight octaves. Tentam. Nov. Theor. Muſ. cap. i. ſect. 13.

The velocity of ſound is the ſame with that of the aerial waves, and does not differ much, whether it go with the wind or againſt it. By the wind, indeed, a certain quantity of air is carried from one place to another; and the ſound is accelerated, while its waves move through that part of the air, if their direction be the ſame as that of the wind. But as ſound moves much more ſwiftly than wind, the acceleration it will hereby receive is inconſiderable; and the chief effect we can perceive from the wind is, that it increaſes and diminiſhes the ſpace of the waves, ſo that by help of it the ſound may be heard to a greater diſtance than otherwiſe it would. See Wind, & *infra*.

That the air is the ordinary medium of ſound, and that the preſence of this, or of ſome other material ſubſtance for its tranſmiſſion is neceſſary, appears from various experiments in rarefied and condenſed air. In an unexhauſted receiver, a ſmall bell may be heard at ſome diſtance; but when exhauſted, it can ſcarcely be heard at the ſmalleſt diſtance. If the air be condenſed, the ſound will be louder proportionably to the condenſation, or quantity of air crowded in, of which we have many inſtances in Mr. Haukſbee's experiments. From theſe experiments (Phil. Tranſ. 1709, xxiv. 1902, 1709, xxvi. 367. 371.) it appears, that a bell was heard at the diſtance of 30 yards, when the air was in its common ſtate, at 60 with the force of two atmoſpheres, at 90 with the force of three: beyond this the intenſity did not much increaſe.

Beſides, ſounding bodies communicate tremors to diſtant bodies; *e. g.* the vibrating motion of a muſical ſtring puts others in motion, whoſe tenſion and quantity of matter diſpoſe their vibrations to keep time with the pulſes of air, propagated from the ſtring that was ſtruck. Galileo explains this phenomenon by obſerving, that a heavy pendulum may be put in motion by the leaſt breath of the mouth, provided the blaſts be often repeated, and keep time exactly with the vibrations of the pendulum, and alſo by the like art in raiſing a large bell.

Dr. Prieſtley conſtructed an apparatus in order to aſcertain whether the intenſity of ſound is affected by any other property of the air in which it is made beſides its mere denſity. The reſult of his experiments with different kinds of air was, that the intenſity of ſound depends ſolely upon the denſity of the air in which it is made, and not at all upon any chemical principle in its conſtitution. In inflammable air the ſound of the bell he uſed was hardly to be diſtinguiſhed from the ſame in a pretty good vacuum ; and this air is ten times rarer than common air. In fixed air the ſound was much louder than in common air, ſo as to be heard about half as far again ; and this air is in about the ſame proportion, denſer than common air. In dephlogiſticated air the ſound was alſo ſenſibly louder than in common air. Experiments and Obſervations, &c. vol. v. p. 296, &c.

But it is not the air alone that is capable of the impreſſions of ſound, but water alſo, as is manifeſt by ſtriking a bell under water, the ſound of which may plainly enough be heard, only not ſo loud, and alſo a fourth deeper, according to good judges in muſical notes. And Merſenne ſays, a ſound made under water is of the ſame tone or note as if made in air, and heard under water.

It does not appear that any direct experiments have been made on the velocity with which an impulſe is tranſmitted through a liquid, although it is well known that liquids are capable of conveying ſound without difficulty. Profeſſor Robiſon informs us, that he heard the ſound of a bell tranſmitted by water, at the diſtance of 1200 feet. It is eaſy to calculate the velocity with which ſound muſt be propagated in any liquid, of which the compreſſibility has been meaſured. Mr. Canton has aſcertained, that the elaſticity of water is about 22,000 times as great as that of air : it is, therefore, meaſured by the height of a column, which is in the ſame proportion to 34 feet, that is 750,000 feet ; and the velocity correſponding to half this height is 4900 feet in a ſecond. In mercury alſo, it appears from Mr. Canton's experiments, that the velocity muſt be nearly the ſame as in water ; in ſpirit of wine a little ſmaller. The experiments were made by filling the bulb of a thermometer with water, and obſerving the effects of placing it in an exhauſted receiver, and in condenſed air ; taking care to avoid changes of temperature, and other ſources of error. The fluid roſe in the tube when the preſſure was removed, and ſubſided when it was increaſed. A ſlight correction, however, is neceſſary, on account of the expanſion and contraction of the glaſs, which muſt have tended to make the elaſticity of the fluids appear ſomewhat greater than it really was. See COMPRESSION.

The leaſt elaſtic ſubſtance that has been examined is perhaps carbonic acid gas, or fixed air, which is conſiderably denſer than atmoſpherical air, expoſed to an equal degree of preſſure. The height of the atmoſphere, ſuppoſed to be homogeneous, is, in ordinary circumſtances, and at the ſea-ſide, about 28,000 feet ; and in falling through half this height, a heavy body would acquire a velocity of 946 feet in a ſecond. But from a compariſon of the accurate experiments of Derham, made in the day-time, with thoſe of the French academicians, made chiefly at night, the true velocity of ſound is about 1130 feet in a ſecond ; which agrees very nearly with ſome obſervations made with great care by profeſſor Pictet. This difference between calculation and experiment, which has long occupied the attention of natural philoſophers, has been in a great meaſure removed by the ſuggeſtion of La Place, who has attributed the effect to the elevation of temperature, which is always found to accompany the action of condenſation, and to the depreſſion produced by rarefaction. When the denſity of the air is changed, while its elaſticity remains unaltered, which happens when it is expanded by heat, or condenſed by cold, the height of the column, and conſequently the velocity, will alſo be altered ; ſo that for each degree of Fahrenheit's thermometer, the velocity will vary about one part in a thouſand. Bianconi has actually obſerved this difference of velocity according to the different heights of the thermometer, and it may be ſhewn leſs directly by means of the ſounds of pipes ; but it has not been accurately determined whether or not the correction, on account of the effect of compreſſion in cauſing heat, remains unaltered, although Bianconi's experiments agree very well with the ſuppoſition that no material change takes place in this reſpect. The velocity of ſound muſt alſo be, in ſome meaſure, influenced by the quantity of moiſture contained in the atmoſphere : it muſt be a little diminiſhed by cold fogs, which add to the denſity, without augmenting the elaſticity ; and increaſed by warm vapours, which tend to make the air lighter : and theſe two oppoſite ſtates are probably often produced in ſucceſſion, in wind inſtruments blown by the mouth ; the air within them being at firſt cold and damp, and afterwards warm and moiſt.

In pure hydrogen gas, the velocity of ſound ought, from calculation, to be more than three times as great as in common air ; but the difference does not appear to have been ſo great in any experiment hitherto made on the ſounds of pipes, in gaſes of different kinds. For ſuch experiments, the comparative ſpecific gravity of the gas may be moſt conveniently aſcertained by Mr. Leſlie's method of obſerving the time employed in emptying a veſſel through a ſmall orifice, by means of the preſſure of an equal column of water ; according to the ſimple theory, the velocities of the gas thus diſcharged ought to be in the ſame proportion as the reſpective velocities with which ſounds would be tranſmitted by them : and if any variation from this proportion were diſcovered, it muſt be attributed to the different degrees of heat produced by condenſation in the different fluids. Steam, at the temperature of boiling water, is only one-third as heavy as common air ; conſequently the velocity of ſound in ſteam muſt be nearly three-fourths greater than in air.

A certain time is always required for the tranſmiſſion of an impulſe through a material ſubſtance, even through ſuch ſubſtances as appear to be the hardeſt, and the leaſt compreſſible. It is demonſtrable that all minute impulſes are conveyed through any homogeneous elaſtic medium, whether ſolid or fluid, with an uniform velocity, which is always equal to that which a heavy body would acquire by falling through half the height of the modulus of elaſticity, that is, in the caſe of the air, half the height of the atmoſphere, ſuppoſed to be of equal denſity ; ſo that the velocity of ſound, paſſing through an atmoſphere of an uniform elaſtic fluid, muſt be the ſame with that of a wave moving on its ſurface. In order to form a diſtinct idea of the manner in which ſound is propagated through an elaſtic ſubſtance, we muſt firſt conſider the motion of a ſingle particle, which, in the caſe of a noiſe, is puſhed forwards, and then either remains ſtationary, or returns back to its original ſituation ; but, in the caſe of a muſical ſound, is continually moved backwards and forwards, with a velocity always varying, and varying by different degrees, according to the nature or quality of the tone : for inſtance, differently in the notes of a bell and of a trumpet. We may firſt ſuppoſe, for the ſake of ſimplicity, a ſingle ſeries of particles to be placed only in the ſame line with the direction of the motion. It is obvious, that if theſe particles were abſolutely incompreſſible, or infinitely elaſtic, and were alſo retained in contact with each other by an infinite force of coheſion or of compreſſion, the whole ſeries muſt move preciſely at the ſame time, as well as in the ſame manner. But in a ſubſtance which is both compreſſible and extenſible or expanſible, the motion muſt occupy a certain time in being propagated to the ſucceſſive particles on either ſide, by means of the impulſe of the firſt particle on thoſe which are before it, and by means of the diminution of its preſſure on thoſe which are behind; ſo that when the ſound conſiſts of a ſeries of alternations, the motion of ſome of the particles will be always in a leſs advanced ſtate than that of others nearer to its ſource; while at a greater diſtance forwards, the particles will be in the oppoſite ſtage of the undulation; and ſtill further on, they will again be moving in the ſame manner with the firſt particle, in conſequence of the effect of a former vibration.

It is well known, that ſolid bodies in general are good conductors of ſound: thus, any agitation communicated to one end of a beam is readily conveyed to the ear, applied to the other end of it. The motion of a troop of cavalry is ſaid to be perceived at a greater diſtance, by liſtening with the head in contact with the ground, than by attending to the ſound conveyed through the air; and we may frequently obſerve, that ſome parts of the furniture of a houſe are a little agitated by the approach of a waggon, before we hear the noiſe which it immediately occaſions. The velocity, with which impulſes are tranſmitted by ſolids, is in general conſiderably greater than that with which they are conveyed by the air. Mr. Wunſch has aſcertained this by direct obſervations on a ſeries of deal rods cloſely united together, which appeared to tranſmit a ſound inſtantaneouſly, while a ſenſible interval was required for its paſſing through the air. He alſo found that the blow of a hammer on a wall, at the upper part of a high houſe, is heard as if double by a perſon ſtanding near it on the ground; the firſt ſound deſcending through the wall, the ſecond through the air. It appears from experiments on the flexure of ſolid bodies of all kinds, that their elaſticity, compared with their denſity, is much greater than that of the air: thus, the height of the modulus of elaſticity of fir wood is found, by means of ſuch experiments, to be about 9,500,000 feet; whence the velocity of an impulſe conveyed through it muſt be 17,400 feet, or more than three miles, in a ſecond. It is obvious, therefore, that in all common experiments, ſuch a tranſmiſſion muſt appear perfectly inſtantaneous. There are various methods of aſcertaining this velocity from the ſounds produced under different circumſtances, by the ſubſtances to be examined; and profeſſor Chladni has, in this manner, compared the properties of a variety of natural and artificial productions.

Sound may be propagated not only in ſingle right lines, or in parallel lines, but uſually the impulſe that occaſions it, more eſpecially when ſound is tranſmitted through a fluid, ſpreads in every direction, ſo as to occupy at any one time nearly the whole of a ſpherical ſurface. It is impoſſible, however, that the whole of this ſurface ſhould be affected in a ſimilar manner by any ſound, originating from a vibration confined to a certain direction, ſince the particles behind the ſounding body muſt be moving towards the centre, whenever the particles before it are retreating from the centre; ſo that in one half of the ſurface, the motions may be called retrograde or negative, while in the other they are direct or poſitive: conſequently at the ſides, where theſe portions join, the motions can neither be poſitive nor negative, and the particles muſt remain at reſt: the motions muſt alſo become gradually leſs and leſs ſenſible, as they approach to the limit between the two hemiſpheres. This ſtatement may be confirmed by an experiment on the vibration of a body, of which the motion is limited to a certain direction; the ſound being ſcarcely audible, when the ear is in a direction preciſely perpendicular to that of the vibration. The ſound, thus diverging, muſt always be ſpread through a part of a ſpherical ſurface, becauſe its velocity muſt be equal in every direction; ſo that the impulſe will always move forwards in a ſtraight line paſſing through the centre of the ſphere, or the vibrating body. But when a hemiſpherical pulſe arrives at the ſurface of a plane ſolid obſtacle, it is reflected, preciſely in the ſame manner that a wave of water is reflected, and aſſumes the form of a pulſe proceeding from a centre at an equal diſtance on the oppoſite ſide of the ſurface. This reflection, when it returns back perpendicularly, conſtitutes what is commonly called an *echo* (which ſee): but in order that the echo may be heard diſtinctly, it is neceſſary that the reflecting object be at a diſtance moderately great, otherwiſe the returning ſound will be confuſed with the original one; and it muſt either have a ſmooth ſurface, or conſiſt of a number of ſurfaces arranged in a ſuitable form: thus there is an echo not only from a diſtant wall or rock, but frequently from the trees in a wood, and ſometimes, as it is ſaid, even from a cloud.

If a ſound or a wave be reflected from a curved ſurface, the new direction which it will aſſume may be determined, either from the condition that the velocity with which the impulſe is tranſmitted muſt remain unaltered, or from the law of reflection, which requires that the direction of the reflected pulſe or wave be ſuch as to form an angle with the ſurface, equal to that which the incident pulſe before formed with it. Thus, if a ſound or wave proceed from one focus of an ellipſe, and be reflected at its circumference, it will be directed from every part of the circumference towards the other focus; ſince the diſtance which every portion of the pulſe has to paſs over in the ſame time, in following this path, is the ſame, the ſum of the lines drawn from the foci to any part of the curve being the ſame; and it may alſo be demonſtrated that theſe lines form always equal angles with the curve on each ſide. (See ELLIPSE.) If an ellipſe be prolonged without limit, it will become a *parabola* (which ſee); hence a parabola is the proper form of the ſection of a tube, calculated for collecting a ſound which proceeds from a great diſtance into a ſingle point, or for conveying a ſound nearly in parallel directions to a very diſtant place. It appears, therefore, that a parabolic conoid is the beſt form for a hearing trumpet, and for a ſpeaking trumpet. See TRUMPET.

The decay of ſound is the natural conſequence of its diſtribution throughout a larger and larger quantity of matter, as it proceeds to diverge every way from its centre. The actual velocity of the particles of the medium tranſmitting it appears to diminiſh ſimply in the ſame proportion as the diſtance from the centre increaſes; conſequently their energy, which is to be conſidered as the meaſure of the ſtrength of ſound, muſt vary as the ſquare of the diſtance; ſo that, at the diſtance of ten feet from the ſounding body, the velocity of the particles of the medium becomes one-tenth as great as at the diſtance of one foot; and their energy, or the ſtrength of the ſound, only one-hundredth as great. Young's Lect. on Nat. Phil. vol. i. lect. 31.

The ſpace through which ſound is propagated, in a given time, has been very differently eſtimated by authors who have written concerning this ſubject. Roberval gives it at the rate of 560 feet in a ſecond; Gaſſendus, at 1473; Merſenne, at 1474; Du Hamel, in the Hiſtory of the Academy of Sciences at Paris, at 1172; the Academy del Cimento, at 1148; Boyle, at 1200; Roberts, at 1300; Walker, at 1338; ſir Iſaac Newton, at 968; Dr. Derham, in whoſe meaſure Mr. Flamſteed and Dr. Halley acquieſced, at 1142.

The reaſon of which variety Dr. Derham aſcribes partly to ſome of thoſe gentlemen uſing ſtrings and plummets, inſtead of regular pendulums; and partly to there not being diſtance enough between the ſonorous body and the place of obſervation; and partly to there being no regard had to the winds: Derham having found the effects of the wind, though not of any changes of weather.

But by the accounts ſince publiſhed by M. Caſſini de Thury, in the Memoirs of the Royal Academy of Sciences at Paris for the year 1738, where cannon were fired at various as well as great diſtances, under great variety of weather, wind, and other circumſtances, and where the meaſures of the different places had been ſettled with the utmoſt exactneſs, ſound was propagated at a medium at the rate only of 1038 French feet in a ſecond. The French foot exceeds the Engliſh by nearly ſeven lines and a half, or is as 107 to 114; and conſequently 1038 French feet are equal to 1106 or 1107 Engliſh feet. The difference, therefore, of the meaſures of Dr. Derham and M. Caſſini is 34 French, or 36 Engliſh feet, in a ſecond. According to this laſt meaſure, the velocity of ſound, when the wind is ſtill, is ſettled at the rate of a mile, or 5280 Engliſh feet in $4\frac{77}{100}''$.

According to Mayer, the velocity of ſound in a ſecond is 1105 feet; according to Müller, 1109; and according to Pictet, about 1180. According to Bianconi (C. Bon. ii. i. 365.), in ſummer, the thermometer being at 20°, 70 vibrations of the pendulum elapſed while a ſound paſſed over 13 miles; in winter, 79 ſeconds, the thermometer being at 1.2°. In a cloud or miſt, $155''$ elapſed while the ſound paſſed and repaſſed. Hence the air ſhould expand $\frac{6}{76}$ for 21.2°, or $\frac{1}{270}$ for 1° of the thermometer employed, probably Reaumur's, which is $\frac{1}{608}$ for 1° of Fahrenheit. The mean difference of the temperature of the air was probably ſomewhat leſs than is ſuppoſed, perhaps 17° or 18°.

Chladni infers, from the longitudinal vibrations of different ſubſtances, a velocity of 7800 feet in a ſecond in tin, 9300 in ſilver, 12,500 in copper, 17,500 in glaſs and iron, 11,000 to 18,000 in wood, and 10,000 to 12,000 in tobacco-pipes. Theſe obſervations are fully confirmed from different grounds. According to the elaſticity of fir, as inferred from an experiment of Mr. Leſlie, the velocity of an impulſe ſhould be 17,300. The velocity may be eaſily calculated from the ſound of a braſs-rod: if the number of vibrations of the graveſt ſound in a ſecond be n, the velocity will be $978\,\frac{n\,l^2}{d}$, l being the length, and d the depth in feet. From an experiment of this kind, Dr. Young ſays (Lect. on Phil. vol. ii. p. 266.) that he found the velocity 17,700 in crown glaſs, and 11,800 in braſs.

Some of the moſt conſiderable queries, relating to the laws of ſounds, have been propoſed by Dr. Derham; and he anſwered ſeveral of them accurately, from experiments made for that purpoſe by himſelf, as follows:

How far does a ſound move in a ſecond of time? Sound moves 1142 feet, or 380 yards in a ſecond, which is juſt an Engliſh mile in $9\frac{1}{4}$ or 9.25 half ſeconds; two miles in $18\frac{1}{2}$; three miles, or a league, in $27\frac{3}{4}$, &c.; and about 13 miles in one minute.

But ſea-miles are to land-miles nearly as 7 to 6; and, therefore, ſound runs a ſea-league in about 12 ſeconds of time. It is a common obſervation, that perſons in good health have about 75 pulſations, or beats, of the artery at the wriſt, in a minute; conſequently, in 75 pulſations, ſound flies about 13 land-miles, and about $11\frac{1}{7}$ ſea-miles, which is about one land-mile in ſix pulſes, and about one ſea-mile in near ſeven pulſes, or a league in 20 pulſes. And hence the diſtance of objects may be found, by knowing the time which ſound takes to move from thoſe objects to an obſerver. *E. g.* upon ſeeing the flaſh of a gun at ſea, if 56 beats of the pulſe at the wriſt were counted before the report was heard, the diſtance of that gun may be eaſily found by dividing 56 by 20, which gives 2.8 leagues, or about eight miles.

Does the report of a gun, diſcharged with its mouth towards us, come ſooner than when the muzzle is from the obſerver? By repeated experiments it appears, there is no difference in the ſound from this different direction.

Do ſounds move in the ſame time, through the ſame ſpaces, in all ſtates of the atmoſphere, and heights of the barometer, by day and by night, in ſummer and in winter, in ſnowy and in clear weather, in this or that climate? By repeated experiments, it does not appear there ariſes any difference from any of theſe different circumſtances.

Do the winds affect the motion of ſounds? By repeated experiments, it appears, there is ſome, though a very ſmall difference, in the velocity of ſounds, with or againſt the wind; which is alſo augmented or diminiſhed by the ſtrength or weakneſs of the wind.

Do a great and intenſe ſound, and a ſmall or languid one, move with the ſame velocity? It appears that they do.

For by experiments, a cannon fired with a half-pound charge of powder, was heard at about the diſtance of $17\frac{1}{2}$ miles, in the ſame time after the flaſh was ſeen, as when fired with a charge of ſix pounds.

Does the ſound of a gun move equally ſwift at all elevations of the gun? It does.

Do different quantities or ſtrengths of gunpowder occaſion any difference as to the velocity of the ſound? None.

Does ſound move in a right line the neareſt way, or does it ſweep along the earth's ſurface? And is there any difference in the time, if the piece be diſcharged in an acclive and a declive poſition? Sound moves the neareſt way; and the velocity appears to be the ſame in acclivities as in declivities.

Have all kinds of ſounds, as thoſe of guns, bells, &c. the ſame velocity? And are ſounds equally ſwift in the beginning of their motion and in the end? There appears no inequality in either of theſe reſpects; and, therefore, the times in which ſound is heard are proportional to the diſtance; that is, at a double diſtance it is heard in twice the time, &c.

Sound, *for the Reflection, Refraction, &c. of.* See Echo and Phonics.

Sounds, *Articulate.* See Articulate.

Sound, in *Muſic*, denotes a quality in the ſeveral agitations of the air, conſidered as their diſpoſition, meaſure, &c. may make muſic or harmony.

Muſical ſounds are moſt frequently produced by the alternate motions of ſubſtances naturally capable of iſochronous vibrations; which ſubſtances may be either ſolids or fluids, or inſtruments compoſed of a combination of fluids with ſolids. The reſonance of a room or paſſage is one of the

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the ſimpleſt ſources of a muſical ſound; the walls being parallel, the impulſe is reflected backwards and forwards continually, at equal intervals of time, ſo as to produce the effect of a muſical ſound. When we blow obliquely and uniformly into a cylindrical pipe cloſed at one end, the impulſe or condenſation muſt probably travel to the bottom and back, before the reſiſtance is increaſed; the current of our breath will then be diverted from the mouth of the pipe, for an equal time, which will be required for the diminution of the reſiſtance by the diſcharge of the condenſed air, ſo that the whole time of a vibration will be equal to the time occupied by an impulſe of any kind in paſſing through four times the length of the pipe. An open pipe may be conſidered nearly as if it conſiſted of two ſuch pipes, united at their cloſed ends; the portions of air contained by them being agitated by contrary motions, ſo as always to afford each other a reſiſtance ſimilar to that which the bottom of the ſtopped pipe would have furniſhed. It is probable, ſays Dr. Young, that when an open pipe is once filled with air a little condenſed, the oblique current is diverted, until the effect of the diſcharge, beginning at the remoter end, has returned to the inflated orifice, and allowed the current to re-enter the pipe. Where the diameter of the pipe is different at different parts of its length, the inveſtigation of the ſound becomes much more intricate; but it has been purſued by M. Daniel Bernouilli with conſiderable ſucceſs, although upon ſuppoſitions, ſays Young, not ſtrictly conſiſtent with the actual ſtate of the motions concerned.

In the ſame manner as an open pipe is divided by an imaginary baſis, ſo as to produce the ſame ſound with a ſtopped pipe of half the length, a pipe of any kind is capable of being ſubdivided into any number of ſuch pipes, ſuppoſed to meet each other's correſponding ends only; and in general the more violently the pipe is inflated, the greater is the number of parts into which it ſubdivides itſelf, the frequency of the vibrations being always proportional to that number. Thus, an open pipe may be divided not only into two, but alſo into four, ſix, eight, or more portions, producing the ſame ſounds as a pipe of one-half, one-third, one-fourth, or any other aliquot part of the length; but a ſtopped pipe cannot be divided into any even number of ſimilar parts; its ſecondary ſounds being only thoſe of a pipe of which the proportion is determined by the odd numbers, its length being, for example, one-third, one-fifth, or one-ſeventh of the original length. Theſe ſecondary notes are ſometimes called harmonics; they are not only produced in ſucceſſion from the ſame pipe, but they are alſo often faintly heard together, while the fundamental note of the pipe continues to ſound. When the pipe has a large cavity connected with it, or conſiſts principally of ſuch a cavity, with a ſmall opening, its vibrations are uſually much leſs frequent, and it is generally incapable of producing a regular ſeries of harmonics.

It is obvious, from this ſtatement of the analogy between the velocity of ſound and the vibrations of the air in pipes, that they muſt be affected in a ſimilar manner by all alterations of temperature. Thus, the frequency of the vibrations of a pipe muſt be increaſed nearly in the ratio of 33 to 34 by an elevation of 30 degrees of Fahrenheit's thermometer; and if this change be accompanied by a tranſition from dampneſs to ſimple moiſture, the ſound will be ſtill more altered.

Dr. Chladni has diſcovered that ſolids of all kinds, when of a proper form, are capable of longitudinal vibrations, exactly reſembling in their nature thoſe of the air in an organ-pipe, having alſo their ſecondary or harmonic notes related to them in a ſimilar manner. Theſe vibrations are always far more frequent than thoſe of a column of air of equal length, the velocity with which an impulſe is tranſmitted by a ſolid of any kind, being uſually from 5 to 16 times as great as the velocity of ſound in air; ſo that the longitudinal ſounds are always extremely acute, when they are produced by ſubſtances of moderate length. Theſe ſounds afford perhaps the moſt accurate mode of determining the velocity of the tranſmiſſion of an impulſe through any elaſtic ſubſtance, and of obtaining from that velocity the exact meaſure of its elaſticity: they may be eaſily exhibited by holding a long bar or wire of iron or braſs in the middle, and ſtriking it at one end with a ſmall hammer in the direction of its length.

The vibrations by which ſolid bodies moſt uſually produce ſound, are, however, not longitudinal, but lateral, and they are governed either by a tenſion, derived from the operation of a weight, or of ſome other external force, or by the natural elaſticity of the ſubſtance. The vibrations of extended ſubſtances reſemble moſt in their properties thoſe of elaſtic fluids, and they occur the moſt frequently in practice, although the vibrations produced by the elaſticity of the ſubſtance may be conſidered as the moſt natural. See String and Vibration.

Sound is the object of muſic; which is nothing but the art of applying ſounds, under ſuch circumſtances of tone and time, as to raiſe agreeable ſenſations.

The principal affection of ſound, by which it becomes fitted to have this end, is that by which it is diſtinguiſhed into *acute* and *grave*.

This difference depends on the nature of the ſonorous body; the particular figure and quantity of it; and even, in ſome caſes, on the part of the body where it is ſtruck; and this is that which conſtitutes what we call *different tones*.

The cauſe of this difference appears to be no other than the different velocities of the vibrations of the ſounding body. In effect, the tone of a ſound is found, by abundance of experiments, to depend on the nature of thoſe vibrations, whoſe difference we can conceive no otherwiſe than as having different velocities: and ſince it is proved, that the ſmall vibrations of the ſame chord or ſtring are all performed in equal time, and that the tone of a ſound, which continues for ſome time after the ſtroke, is the ſame from firſt to laſt, it follows, that the tone is neceſſarily connected with a certain quantity of time in making each vibration or each wave; or that a certain number of vibrations or waves, accompliſhed in a given time, conſtitute a certain and determinate tone. From this principle are all the phenomena of tune deduced.

If the vibrations be iſochronous, the ſound is called muſical, and is ſaid to continue at the ſame pitch; and is ſaid to be acuter, ſharper, or higher, than any other ſound, whoſe vibrations are ſlower and graver, and flatter or lower, than any other whoſe vibrations are quicker. See Unison.

From the ſame principle ariſe what we call *concords*, &c. which are nothing but the reſults of frequent unions and coincidences of the vibrations of two ſonorous bodies, and conſequently of the waves and undulating motions of the air occaſioned by them.

On the contrary, the reſult of leſs frequent coincidences of thoſe vibrations is what we call a *diſcord*.

Another conſiderable diſtinction of ſound, with regard to muſic, is that by which they are denominated *long* and *ſhort*; not with regard to the ſonorous body's retaining a motion, once received, a longer or a leſs time, though gradually growing weaker, but to the continuation of the impulſe of the efficient cauſe on the ſonorous body, for a longer or ſhorter time, as in the notes of a violin, &c. which are made longer or ſhorter by ſtrokes of different length or quickneſs.

This continuity is properly a ſucceſſion of ſeveral ſounds, or the effect of ſeveral diſtinct ſtrokes, or repeated impulſes, on the ſonorous body, ſo quick that we judge it one continued ſound, eſpecially if it be continued in the ſame degree of ſtrength; and hence ariſes the doctrine of *meaſure* and *time*.

Sounds, again, are diſtinguiſhed, with regard to muſic, into *ſimple* and *compound*, and that two ways. In the firſt, a ſound is ſaid to be compound, when a number of ſucceſſive vibrations of the ſonorous body, and the air, come ſo faſt upon the ear, that we judge them the ſame continued ſound; as in the phenomenon of the circle of fire, cauſed by putting the fire-end of a ſtick in a quick circular motion; where, ſuppoſing the end of the ſtick in any point of the circle, the idea we receive of it there continues till the impreſſion is renewed by a ſudden return.

A ſimple ſound then, with regard to this compoſition, ſhould be the effect of a ſingle vibration, or of ſo many vibrations as are neceſſary to raiſe in us the idea of ſound. In the ſecond ſenſe of compoſition, a ſimple ſound is the product of one voice, or one inſtrument, &c.

A compound ſound conſiſts of the ſounds of ſeveral diſtinct voices or inſtruments, all united in the ſame individual time and meaſure of duration, that is, all ſtriking the ear together, whatever their other differences may be. But in this ſenſe, again, there is a two-fold compoſition; a natural and an artificial one.

The natural compoſition is that proceeding from the manifold reflections of the firſt ſound from adjacent bodies, where the reflections are not ſo ſudden as to occaſion echoes, but are all in the ſame tune with the firſt note.

The artificial compoſition, which alone comes under the muſician's province, is that mixture of ſeveral ſounds, which being made by art, the ingredient ſounds are ſeparable and diſtinguiſhable from one another. In this ſenſe the diſtinct ſounds of ſeveral voices or inſtruments, or ſeveral notes of the ſame inſtrument, are called ſimple ſounds, in contradiſtinction to the compound ones, in which, to anſwer the end of muſic, the ſimples muſt have ſuch an agreement in all relations, chiefly as to acuteneſs and gravity, as that the ear may receive the mixture with pleaſure.

Another diſtinction of ſounds with regard to muſic is that, by which they are ſaid to be *ſmooth* and *even*, or *rough* and *harſh*, alſo *clear* and *hoarſe*: the cauſe of which differences depends on the diſpoſition and ſtate of the ſonorous body, or the circumſtances of the place; but the ideas of the differences muſt be ſought from obſervation.

Smooth and rough ſounds depend principally on the ſounding body; of theſe we have a notable inſtance in ſtrings that are uneven, and not of the ſame dimenſion or conſtitution throughout.

M. Perrault, to account for roughneſs and ſmoothneſs, maintains, there is no ſuch thing as a ſimple ſound; but that the ſound of the ſame chord or bell is a compound of the ſounds of the ſeveral parts of it; ſo that where the parts are homogeneous, and the dimenſions or figure uniform, there is always ſuch a perfect mixture and union of all the ſounds, as makes one uniform and ſmooth ſound: contrary conditions produce harſhneſs. In effect, a likeneſs of parts and figure make an uniformity of vibrations, by which a great number of ſimilar and coincident motions conſpire to fortify and improve each other, and unite, for the more effectual producing of the ſame effect.

This account he confirms from the phenomenon of a bell, which differs in tone according to the part it is ſtruck in; and yet ſtrike it any where, there is a motion over all the parts. Hence he conſiders the bells as compoſed of an infinite number of rings, which, according to their different dimenſions, have different tones, as chords or ſtrings of different lengths have; and when ſtruck, the vibrations of the parts immediately ſtruck ſpecify the tone, being ſupported by a ſufficient number of conſonant tones in other parts. This muſt be allowed, that every note of a ſtringed inſtrument is the effect of ſeveral ſimple ſounds; for there is not only the ſound reſulting from the motion of the ſtring, but that from the motion of the parts of the inſtrument, which has a conſiderable effect in the total ſound, as is evident from hence, that the ſame ſtring on different violins ſounds very differently.

But Perrault affirms the ſame of every ſtring itſelf, and without conſidering the inſtrument. Every part of the ſtring, he ſays, has its particular vibrations, different from the groſs and ſenſible vibrations of the whole; and theſe are the cauſes of different motions and ſounds in the particles, which uniting compoſe the whole ſound of the ſtring, and make an uniform compoſition, in which the tone of the particular part ſtruck prevails, and all the others mix under a due ſubordination with it, ſo as to make the compoſition ſmooth and agreeable. If the parts be unevenly or irregularly conſtituted, the ſound is harſh; which is the caſe in what we call *falſe* ſtrings, and various other bodies, which, for this reaſon, have no certain and diſtinct tone, but a compoſition of ſeveral tones, which do not unite and mix, ſo as to have one predominant to ſpecify the total tone.

As to clear and hoarſe ſounds, they depend on circumſtances that are accidental to the ſonorous body; thus, a voice and inſtrument will be hollow and hoarſe, if raiſed within an empty hogſhead, that yet is clear and bright out of it: the effect is owing to the mixture of other and different ſounds, raiſed by reflections, which corrupt and change the ſpecies of the primitive ſounds.

For ſounds to be fit to obtain the end of muſic, they ought to be ſmooth and clear, poſſeſſing eſpecially the firſt quality: ſince, without this, they cannot have one certain and diſcernible tone, capable of being compared to others, in a certain relation of acuteneſs, of which the ear may judge, and of conſequence they can be no part of the object of muſic.

Upon the whole then, with Mr. Malcolm, we call that an *harmonic* or *muſical* ſound, which, being clear and even, is agreeable to the ear, and gives a certain and diſcernible tune (hence called *tunable* ſound), which is the ſubject of the whole theory of harmony.

Dr. Burney, in the diſcuſſion of the ſubject of this article, obſerves, that enquiries concerning the abſolute production and modification of ſound belong to phyſics; whereas a muſician only examines ſounds comparatively one with the other, and conſiders their proportions and relation as divided into concords and diſcords. (See CONCORD, DISCORD, and RELATION.) And it is only in this light, he ſays, that we ſhall conſider ſound in the reſidue of this article. We ſhall examine ſound under three different heads; the tone, the force, and the quality of tone. Under theſe heads, ſound admits of modification: firſt, from grave to acute; ſecondly, loud and ſoft; thirdly, harſh and ſweet, or dull and brilliant.

We ſhall firſt eſtabliſh it as a principle, that whatever is the cauſe of ſound, its vehicle is the circumambient air;

becauſe the air is the only medium of which we are certain, between the ſounding body and the organ of hearing: that we muſt not multiply bodies unneceſſarily, as the air is ſufficient to explain the formation of ſound; and it is found by an exhauſted receiver, that ſound cannot be produced without air.

The continuance or permanence of ſound can only be occaſioned by the agitation of the air. As long as this agitation continues, the tremulous motion of the air is communicated to the ear, and likewiſe prolongs the ſenſation of ſound. And there is no way more ſimple of accounting for the duration of ſound, than in ſuppoſing that the ſucceſſion of vibrations continues to renew the impreſſion. Further, this agitation of the air, of whatever kind it may be, can only be produced by a ſimilar agitation in the ſeveral parts of the ſounding body; and it is a certain fact, that theſe ſeveral parts of a ſounding body are in conſtant vibration as long as it continues to ſound. If we touch the body of a violoncello, or any inſtrument, while it is ſounding, we feel it tremble under the hand, and we may even *ſee* the ſtring tremble as long as it ſounds. It is the ſame with a bell cauſed to ſound by a blow of the clapper, we may feel and ſee it tremble; and grains of ſand, if ſprinkled on its ſurface, will be ſeen to jump and ſkip. If a ſtring is relaxed, or a bell cracked, there is no longer either ſound or vibration. If, therefore, neither the bell nor the ſtring can communicate to the air no motion but ſuch as they have themſelves, there can be no doubt but that ſound is produced by the vibrations of the ſounding body, and is propagated by ſimilar vibrations, which this tremulous body communicates to the air.

This being ſuppoſed, let us firſt examine what conſtitutes the ratio of ſound, with reſpect to grave and acute.

Rouſſeau, in his article *Son*, ſound, repeats all the experiments for meaſuring and comparing ſound with ſound, which we have given, and ſhall give, under the different heads of tuning glaſſes by water, ſee ARMONICA; ſtrings by weight; by moveable bridges, ſee MONOCHORD; by the number of vibrations, ſee RATIO; by the relative length, thickneſs, and tenſion of a *ſtring*, which ſee; by the beats of organ-pipes, ſee BEAT; by the holes in flutes and hautbois, which ſerve to ſhorten the tube; by the different columns of air, which form the different tones of horns and trumpets: theſe are all upon the ſame principle as the ſons harmoniques of the violin and violoncello. See HARMONICS.

The ſecond point to be conſidered in analyſing ſound, is its *force*, which depends on the vibrations of the ſounding body: the more powerful and ſtrong theſe vibrations are made, the more vigorous and audible is the ſound. A certain limited degree of force can only be given to a pipe or ſtring, beyond which all its proportions are broken, and its tone rendered falſe and diſagreeable to the ear. The velocity of ſound has been conſidered by the moſt eminent philoſophers and mathematicians; but the reſult of their enquiries and experiments have materially varied. Halley and Flamſteed make ſound move, in England, 1070 Fr. feet in a ſecond; and La Condamine 174 toiſes in Peru; while Merſennus and Gaſſendi aſſure us that the wind being favourable or contrary, neither accelerates nor retards the motion of ſound. But ſince the experiments of Derham (Phil. Tranſ.), and the Academy of Sciences at Paris, former calculations are regarded as erroneous.

Without ſlackening its pace, ſound becomes weaker by extent from the place of its production; but if not checked by any obſtacle, nor repreſſed by the wind, it generally moves in the ratio of the ſquares of the diſtance.

Thirdly, as to the difference of ſound in the *quality* of tone, it certainly does not ariſe from its elevation in the ſcale, nor from its force. The tone of a flute and a hautbois, though perfectly in tune together, can never reſemble each other. There will always be a ſoftneſs and ſmoothneſs in the flute, and a ſpirit and agreeable vibration of the reed in the hautbois, which muſt ever prevent ſimilarity; without mentioning the different tones of voices, by which individuals are as well recognized as by their features. See VOICE.

Rouſſeau ſays, a compoſer does not conſider merely whether the ſounds he uſes are high or low, but whether they ſhould be loud or ſoft, rough or ſmooth, dull or brilliant; and he diſtributes them to different inſtruments and voices accordingly; ſometimes in ſolo parts, and ſometimes in *tutti*, or full chorus; at the extremities or medium of inſtruments or voices in piano or forte, as the compoſition ſhall require.

For the appreciable extent of the muſical ſcale or compaſs, it depends on our power of perception, though in nature it is infinite. Lengthen or ſhorten a muſical ſtring to a certain degree, and it produces no ſound. We can neither augment nor diminiſh the compaſs of the flute at our pleaſure, or the length or ſhortneſs of an organ-pipe; both have their limits. All appreciable ſounds are compriſed, according to Euler, within the numbers 30 and 7552. So that by the experiments of this great geometrician, the loweſt ſound of which we can aſcertain the tone, makes 30 vibrations in a ſecond, and the higheſt 7552 vibrations in the ſame time; an interval of nearly eight octaves. See EULER, and COMPASS.

In our preſent ſyſtem of muſic, we have but one octave of twelve ſounds, the reſt are all replicates, recurrencies, or repetitions of theſe twelve ſemitones in the octaves above and below; and if we could uſe all theſe octaves or recurrencies of ſound in the firſt octave, they amount in all to 96, which is the greateſt number of practicable ſounds in muſic, generated by one fundamental.

It is impoſſible to calculate, with ſimilar preciſion, the number of practicable ſounds in the muſic of the ancients. For the Greeks may be ſaid to have formed as many ſyſtems of muſic, as they had different ways of tuning their tetrachords. It appears, in reading their treatiſes of muſic, that theſe different tunings amounted to an indefinite number, including all the changes of genus and mode which a new ſound or key would introduce. See TETRACHORD, and SYSTEM *of the ancient Greeks*.

With regard to the twelve ſounds of the modern ſyſtem, the tuning never changes, and they are always immoveable. Broſſard pretends that they are moveable, founding his opinion of their being often altered by flats and ſharps; but the changing the chord or ſtring, or its ſound, are different things.

SOUNDS, *Harmonical.* See HARMONICS.

The harmonical ſounds, *viz.* the twelfth and ſeventeenth above the principal (as well as ſome others), have been long known to accompany every fundamental ſound; and may naturally, and in general, be ſuppoſed to be produced by the partial or ſeparate vibrations of the ſtring or ſonorous body, ſpontaneouſly dividing itſelf, according to a determinate law, into three, five, or other aliquot parts of the whole, conſidered as unity. The theory of M. Rameau, which has been ſo excellently illuſtrated by M. d'Alembert, in his Elémens de Muſique, is founded on theſe harmonical ſounds. See FUNDAMENTAL *Baſe*, HARMONY, and SYSTEM.

SOUNDS, *Harmonic*, denote alſo a ſingular kind of ſounds, which are produced in certain inſtruments, ſuch as the violin and violoncello, by a particular motion of the bow, and by placing

placing the finger lightly in certain diviſions of the chord or ſtring. On account of their ſweetneſs, they are called *fluted* ſounds. By ſliding the finger lightly from ſharp to flat, from the middle of a chord which is touched at the ſame time with the bow, we hear diſtinctly a ſucceſſion of harmonic ſounds from flat to ſharp, which are very aſtoniſhing to thoſe who are not acquainted with the theory. See Sons *Harmoniques*.

The principle on which this theory is founded is, that if a chord be divided into two parts which are commenſurable with each other, and conſequently with the whole chord, and the obſtacle placed at the point of diviſion obſtructs, in an imperfect manner, the communication of the vibrations from one part to another; when it is ſounded, it will not yield the ſound of the entire chord, nor that of its greater part, but that of the ſmaller part, if it exactly meaſures the other; or if it does not meaſure it, the ſound of the greateſt aliquot common to theſe two parts. Let a chord, as 6, be divided into two parts, as 4 and 2, the harmonic ſound will be produced by the ſmall part, 2, which is the aliquot of the other, 4; but if a chord, as 5, be divided into two parts, as 2 and 3, then, as the ſmall part does not meaſure the greater, the harmonic ſound will proceed from the half, 1, of the ſmall part; unit being the greateſt common meaſure of the two parts 3 and 2, and of the whole chord 5. By means of this law, which is conformable to the experiments of M. Sauveur and of Dr. Wallis, it is eaſy, by a very ſimple calculation, to aſſign to each tone the harmonic ſound which anſwers to it. Whilſt the finger ſlides the length of the chord, we obtain a ſeries of harmonic ſounds, which ſucceed each other rapidly according to the order of the diviſions of the chord, to which the finger is ſucceſſively applied.

The firſt column of the following table exhibits the ſounds which the diviſions of the inſtrument would yield when touched full, and the ſecond column ſhews the *fluted* ſounds correſponding to them when the chord is touched harmonically.

Table of Harmonic Sounds.

The whole chord	gives	the uniſon.
The minor third		the 19th, or double octave of the 5th.
The major third		the 17th, or double octave of the major third.
The fourth		the double octave.
The fifth		the 12th, or octave of the ſame 5th.
The minor ſixth		the triple octave.
The major ſixth		the 17th major, or double octave of the 3d.
The octave		the octave.

After the firſt octave, *i. e.* advancing from the middle of the chord towards the bridge, we ſhall have again the ſame harmonic ſounds in the ſame order on the ſame diviſions, *i. e.* the 19th on the minor 10th, the 17th on the major 10th, &c. Encyclopédie, art. *Harmoniques* Sons. See Harmonics, and Harmony.

Sounds, *Third*, denote thoſe which are produced by ſounding two notes at the ſame time, either on the ſame or on two different inſtruments; and which are almoſt always graver than the loweſt of the two tones that generated them, and are their proper fundamental baſe.

The diſcovery of theſe ſounds has been generally aſcribed to Tartini, who publiſhed an account of them in his "Tratto di Muſica, ſecundo la vera Scienza dell'Armonia," printed at Padua, 1754; but the Encyclopédie, art. *Harmonie*, attributes the firſt diſcovery, though probably unknown to Tartini, to M. Romieu, of the Royal Society of Sciences of Montpellier, who publiſhed an account of it in a memoir in 1752.

The experiment may be made by ſounding the perfect interval of a 3d, 4th, or 5th, &c. either on two ſtrings of the ſame violin, or on two violins played upon at the diſtance of about thirty feet, with a ſtrong bow, and holding out the notes; or with two trumpets, hautbois, or German flutes; the hearer, in the laſt mentioned caſes, playing himſelf in the middle of the interval between the two inſtruments. Thus, *e. gr.* the interval C *e*, or a major 3d, produces C, the octave below the lower note; C ſharp *e*, a minor 3d, produces A, a tenth below the graver tone; B *e*, a 4th, gives E, the octave of the upper note; B *f* ſharp, a 5th, produces an uniſon to B; B *g*, a 6th, generates the double octave below the upper note; and B flat *g*, or the major 6th, produces E flat, the 5th of the lower note, &c.

M. Tartini obſerves, that the third ſound reſulting from the 4th, from two 3ds, from two 6ths, whether major or minor, is the moſt eaſily diſtinguiſhed, becauſe this ſound is always more grave than either of the two which produce it; that the third ſound produced by the 5th is diſtinguiſhed with greater difficulty, becauſe it is an uniſon of a graver ſound; and that it is more difficult to diſtinguiſh it in the tones major and minor, becauſe theſe tones, differing little from one another, are eaſily confounded in the intonation; and for the ſame reaſon, with greater difficulty, in the ſemitones major and minor.

The author, in a ſong compoſed of two parts, diſcovers, by means of two correſponding ſounds, the third ſound reſulting from them; and this, he ſays, is the true baſe of the ſong; and every other baſe will be a paralogyſm. From his experiments and reaſoning he concludes, that if any adjoining two ſimple intervals in the harmonic ſeries 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. be ſounded, the third ſound will always be that of half the ſtring; that the ſmaller the interval is, the farther diſtant is the third ſound: ſo that, *e.g.* the third ſound to the interval of the ſemitone minor G G ſharp, is the 26th below G natural.

M. Serre, of Geneva, in his "Eſſai ſur les Principes de l'Harmonie," printed at Paris in 1753, mentions this diſcovery of Tartini as a fact ſufficiently aſcertained; and adds, that he has produced the ſame effect by means of two fine female voices, as Tartini had done by inſtruments; but he mentions only the third ſound produced by the third major, and that produced by the third minor: and there is this difference between the reſults of theſe two gentlemen. According to M. Tartini, the two ſounds of a third major, as *ut mi*, produced the octave *ut* below *ut*; and according to M. Serre, a double octave: according to the former, the two ſounds of a third minor, *la ut*, produced the tenth major, *fa* below *la*; but according to the latter, the ſeventeenth major below *la*, or the octave under the tenth *fa*. M. Serre takes no notice of a third ſound produced by any other two ſounds, and it does not appear that he made any trials of this kind.

As to the phyſical cauſe of theſe third ſounds, it is much more difficult to offer any plauſible conjectures concerning it, than concerning the harmonical notes mentioned in the preceding article; becauſe all thoſe of the latter kind being more acute than the principal, or generating tone, are, for that reaſon, capable of being actually and immediately produced by the vibrations of certain portions of the ſtring or other ſounding body; whereas, in the third ſounds, a tone is heard always (except in the caſe of the fifth), and often conſiderably below the pitch of either of the bodies whoſe vibrations it accompanies, and which conſequently cannot immediately proceed from either of theſe bodies. To take the firſt of the above-mentioned intervals, that of the greater third, for an example: a third ſound is here heard, ſuch as would be produced by the actual vibration of a ſtring of the ſame diameter and tenſion with, but of double the length of, that which produced the loweſt note of the interval. As no ſuch ſtring, however, is employed in the experiment, we are obliged to ſeek for the cauſe of this new ſound in the air, or other medium of ſound, or in the organ of hearing, or in ſome internal modification of the ſenſitive faculty.

As the immenſe variety of our ſenſations of colour is juſtly ſuppoſed to be produced by an equal diverſity of coloured particles of light, each highly qualified to excite one particular ſenſation and no other, ſo ſome, with M. Mairan, have ſuppoſed, that our numerous and diverſified ſenſations of muſical tones are not produced by the undulations of the air, conſidered in its whole maſs, but by aerial particles, ſpecifically different in elaſticity, magnitude, figure, &c. each capable of exciting, by its motions or other modifications, the idea of only one determinate tone. Therefore we might ſay, that the two orders of particles which give the tones C and *e*, either by an harmonical congruity in their ſpring with that ſet of particles which give the third ſound C below, or by ſome other peculiar affinity to them, are qualified, by their joint action on theſe laſt-mentioned particles, to give them that particular modification, by which they excite in us the ſenſation of that ſpecific tone to which they are adapted. Or, may we not conceive in general, that a mixture of two given tones may excite the idea of a third and different ſound, in ſome ſuch manner as two given colours, *e. g.* blue and yellow; nay, the paſt impreſſions of theſe colours excite the idea of green, different from both of them.

But if the effect is produced merely by the organ of hearing, we may obſerve, that, from a conſideration of the ſpiral and conical ſtructure of the cochlea, ſome phyſiologiſts have been tempted to imagine, that the branches or filaments of the auditory nerve, after paſſing out from the nucleus or axis of the cochlea, are ſtrained upon the ſpiral plates, like the radii of a circle, and become gradually ſhorter and ſhorter toward its apex. It may be ſuppoſed likewiſe, that of theſe nervous ſtrings, the longeſt, which are in the baſis of the cochlea, are adapted to receive the tremors or other impreſſions, and convey to the mind the ideas, of grave tones; and the ſhorter nervous chords, fixed more towards the apex of the cone, thoſe of acute ſounds. This being allowed, and taking the former interval C *e* for an example, it may be ſaid that the tone C, beſides acting on the nervous chord appropriated to excite the idea of that tone, muſt act likewiſe on another nervous chord of double its length, ſituated towards the baſis of the cochlea, &c. and which is naturally adapted to receive and tranſmit to the mind C, the octave below; but which the upper tone C now divides into two equal parts, each giving tones uniſon to the ſaid note C. The tone *e*, in like manner, will excite five equal vibrations in each of the halves of this nervous chord; all which, likewiſe, produce ſenſations uniſon with itſelf. Theſe phenomena at leaſt are invariably obſerved to be produced in muſical ſtrings. Thus we obtain the uniſons to C and *e*: and farther, the laſt-mentioned chord thus vibrating in two and in ten parts, and from one extremity of it to the other, may fairly be ſuppoſed to vibrate in its whole length; in which caſe it muſt excite in the mind the idea of its own fundamental tone, the third ſound C, an octave below the firſt of theſe notes, and a tenth below the latter. See, on the ſubject of this article, Encyclopédie, art. *Baſſe* FONDAMENTALE. Principles and Power of Harmony, 4to. 1771, and Monthly Rev. vol. xlv. p. 371, &c.

SOUND, in *Geography*, denotes a ſtrait or inlet of the ſea, between two capes or head-lands.

The Sound is uſed, by way of eminence, for that famous ſtrait which joins the German ſea to the Baltic.

It is ſituate between the iſland of Zealand and the coaſt of Schonen. It is about ſixteen leagues long, and in general five broad, excepting againſt the caſtle of *Cronenburg*, (which ſee,) where it is but one; ſo that there is there no paſſage for veſſels but under the cannon of the fortreſs.

This was firſt erected for the better commanding of the Sound, as was alſo Helſinburgh, on the oppoſite ſhore in Schonen, for the protection of ſhips from pirates, then numerous in that ſea.

This has given occaſion to the Danes to ſettle a toll on all veſſels, which is ſaid to be one of the beſt revenues of the crown of Denmark; and to forbid all pilots from paſſing through the Great and Little Belt, which are two other inlets into the Baltic, though ſomewhat leſs commodious than the former.

All nations who traffic into this part of the North are ſubject to this toll: the Swedes, indeed, were exempted from it by the treaty of 1644, but by the treaty of 1720, they are excluded the privilege, and put on the ſame footing with their neighbours.

By the treaty of Spire, made between the Danes and Charles V. in behalf of his Netherland ſubjects, the toll for this paſſage was fixed at two roſe nobles for a ſhip of two hundred tons; yet, in the year 1640, the ſame was raiſed to upwards of five hundred rix-dollars.

The connivance of our king James I. who had married a daughter of Denmark, and the wars which the Hollanders had been long engaged in for their liberty, furniſhed the occaſion for ſo grievous an exaction. Of late years, the toll has been again reduced to an eaſier footing.

Cromwell was bent on extorting this paſſage from the Danes, and had probably effected it, but that, before the fleet for that purpoſe arrived there, he died.

However, in 1659, England, Holland, and France, by treaty, obliged Denmark to ſtipulate, that it ſhall never be increaſed upon the ſaid three nations, who are mutual guarantees to this treaty.

The origin and progreſs of this impoſition (which, from an eaſy contribution, of which we have an account ſo early as 1348, voluntarily paid by merchants for maintaining lights on certain places of the coaſt, and for protection of ſhips from pirates, and of which the king of Denmark was only treaſurer or truſtee, grew at length to be a heavy burden on trade, as well as a kind of ſervile acknowledgment of his ſovereignty of theſe ſeas) is given in lord Moleſworth's Account of Denmark, chap. iii. p. 11. ſeq.

As to the preſent ſtate of this toll, Dr. Buſching, in his New Geography, obſerves, that it is on an equal footing with all nations, excepting the Hamburghers, who pay more than others: the Engliſh, Dutch, Swediſh, and French ſhips, are not ſearched when provided with proper paſſes, according to treaties; and pay down only 1 *per cent.* for ſuch goods as are not ſpecified in the tarif. But all other nations pay 1½ *per cent.* and muſt ſubmit to be ſearched. With regard to the Hanſe Towns, on the Baltic, there is a great variety in the toll they pay, for almoſt every one of thoſe towns is treated with in particular. See DENMARK and ELSINEUR.

On the Sound, accounts are kept in rix-dollars, of 4 orts, which contain 96 ſkillings Daniſh, or 48 ſhillings Hamburgh

burgh money. The tolls paid at the paſſage of the Sound are reckoned in rix-dollars, Swediſh ſpecie, which are $12\frac{1}{2}$ *per cent.* better than crown money, and therefore $19\frac{17}{37}$ *per cent.* better than Daniſh currency; but this rix-dollar is $2\frac{5}{8}$ *per cent.* worſe than the effective rix-dollar ſpecie of 7 marks 6 ſkillings Daniſh currency. The tolls are alſo ſometimes ſettled in crown money. In paying duties at the Sound, the ſhippond is reckoned for 300 lbs.; the ſtein or ſtone for 30 lbs.; the Ruſſian berkovitz for 300 lbs.; and the pood for 30 lbs. Here are alſo certain regulations for foreign meaſures, an abſtract of which is given in Kelly's Cambiſt.

Sound, in the *Manege.* A horſe is ſaid to be ſound that does not halt. When a jockey ſells a horſe he warrants him ſound hot and cold; that is, that he does not halt either when you mount him or when he is heated, nor yet after alighting, when he ſtands and cools.

Sound, an inſtrument which ſurgeons introduce through the urethra into the bladder, in order to diſcover whether there is a ſtone in this viſcus or not. The ſound is uſually made of very highly poliſhed ſteel, that it may be well calculated for conveying to the ſurgeon's fingers, a ſenſation of any thing againſt which its end may ſtrike. It is alſo generally leſs curved than a catheter, ſo that its end may be more eaſily inclined to the lower part of the bladder, where the ſtone is moſt frequently ſituated.

SOUND-BOARD, or *Wind-cheſt*, of an organ, is the principal part of that moſt noble and comprehenſive inſtrument, and that which feeds all the pipes with wind. See Organ.

The ſound-board, or ſommier, as it is called in France, is a reſervoir, into which the wind drawn in by the bellows is conducted by a port-vent, and thence diſtributed into pipes placed over the holes of its upper part. The wind enters the pipes by valves, which are opened by preſſing the keys, after drawing the regiſters by the ſtops, which prevent the air from going into any of the pipes, except thoſe required. Organs, whoſe longeſt pipe in the diapaſon is four feet, have their ſound-board from five to ſix feet. Organs of ſixteen feet have two ſound-boards, which communicate the wind from one to the other, by means of a pewter port-vent.

SOUND-HOLM, in *Geography*, one of the ſmaller Shetland iſlands, near the S.W. coaſt of Yell.

SOUNDING, in *Navigation*, the act of trying the depth of the water, and the quality of the bottom, by a line and plummet, or other artifice.

There are two plummets uſed for this purpoſe; one of which is called the hand-lead, weighing about 8 or 9 lbs. and the other the deep-ſea lead, which weighs from 25 to 30 lbs. and both are ſhaped like the fruſtum of a cone or pyramid. The former is uſed in ſhallow waters, and the latter at a great diſtance from the ſhore, particularly on approaching the land after a ſea voyage. Accordingly, the lines employed for this purpoſe are called the deep-ſea lead-line and the hand-lead line. The hand-lead line, which is uſually 20 fathoms in length, is marked at every 2 or 3 fathoms; ſo that the depth of the water may be aſcertained either in the day or night: at the depth of 2 and 3 fathoms, there are marks of black leather; at 5 fathoms, there is a white rag; at 7, a red rag; at 10, and at 13, black leather; at 15, a white rag; and at 17, a red one.

Sounding with the hand-lead, which the ſeamen call heaving the lead, is generally performed by a man who ſtands in the main-chains to windward. Having the line all ready to run out, without interruption, he holds it nearly at the diſtance of a fathom from the plummet, and having ſwung the latter backwards and forwards three or four times, in order to acquire the greater velocity, he ſwings it round his head, and thence as far forwards as is neceſſary; ſo that, by the lead's ſinking whilſt the ſhip advances, the line may be almoſt perpendicular when it reaches the bottom. The perſon ſounding then proclaims the depth of the water in a kind of ſong, reſembling the cries of hawkers in a city; thus, if the mark of 5 is cloſe to the ſurface of the water, he calls, 'by the mark 5,' and as there is no mark at 4, 6, 8, &c. he eſtimates thoſe numbers, and calls, 'by the dip 4, &c.' If he judges it to be a quarter or a half more than any particular number, he calls, 'and a quarter 5,' and 'a half 4,' &c. If he conceives the depth to be three-quarters more than a particular number, he calls it a quarter leſs than the next: thus, at 4 fathoms $\frac{3}{4}$, he calls, 'a quarter leſs 5,' and ſo on.

The deep-ſea lead-line is marked with two knots at 20 fathoms, 3 at 30, 4 at 40, &c. to the end. It is alſo marked with a ſingle knot at the middle of each interval, as at 25, 35, 45 fathoms, &c. To uſe this lead more effectually at ſea, or in deep water on the ſea-coaſt, it is uſual previouſly to bring-to the ſhip, in order to retard her courſe: the lead is then thrown as far as poſſible from the ſhip on the line of her drift, ſo that as it ſinks, the ſhip drives more perpendicularly over it. The pilot feeling the lead ſtrike the bottom, readily diſcovers the depth of the water by the mark on the line neareſt its ſurface. The bottom of the lead being alſo well rubbed over with tallow, retains the diſtinguiſhing marks of the bottom, as ſhells, ooze, gravel, &c. which naturally adhere to it.

The depth of the water, and the nature of the ground, which are called the ſoundings, are carefully marked in the log-book, as well to determine the diſtance of the place from the ſhore, as to correct the obſervations of former pilots. Falconer.

For a machine to meaſure unfathomable depths of the ſea, ſee Altitude.

Sounding *the Pump*, at *Sea*, is done by letting fall a ſmall line, with ſome weight at the end, down into the pump, to know what depth of water there is in it.

Sounding, in *Surgery*, the operation of introducing the ſound. See Searching *for the Stone.*

SOUNDIPOUR, in *Geography*, a town of Hindooſtan, in Bahar, 8 miles S. of Rotaſgur.

SOUNE, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 10° 57′.

SOUNISA, a town of Aſiatic Turkey, in the government of Sivas; 27 miles N. of Tocat.

SOUNMEN Harho Hotun, or Soumen *Char*, a town of Chineſe Tartary, in the province of Hami; 15 miles N.W. of Hami-Hotun.

SOUP, or Soop, a kind of pottage made of bread, and broth, or of the juice of fleſh, or other matters, uſually ſerved at the beginning of a meal.

The word is French, formed from the Italian, *zuppa*, or *ſuppa*, of the Latin, *ſapa*, wine boiled away to a third part. Others derive it from the Celtic, *ſouben*, which ſignifies the ſame.

Soup is eſteemed eſſential to a French dinner. Sometimes they heighten the reliſh by the addition of onions, or leeks, or cabbage, or turnips, &c.

Soup, *Portable*, is a kind of cake, formed of concentrated broth, which, being freed from all fat, and having by long boiling evaporated the moſt putreſcent parts of the meat, is reduced to the conſiſtence of a glue, as in reality it is, and will, like other glues, in a dry place, keep ſound for years together. Sir John Pringle inclines to believe, that the gelatinous parts of animal ſubſtances, ſuch as compoſe theſe cakes, are not of a nature much diſpoſed to putrefy. But, however that be, captain Cook obſerves, that, in his voyage (ſee Scurvy), this ſoup was the means of making his people eat a greater quantity of greens than they would have done otherwiſe, and ſo far we muſt allow it to have been virtually antiſeptic. For the method of preparing cakes for portable ſoup, by Chaptal, &c. ſee Jelly.

Soup, in *Agriculture*, a term applied to ſuch liquid animal food or proviſions, as are formed by cutting various dry materials, ſuch as hay, ſtraw, &c. and blending them with liquid matters; and alſo to ſuch as are prepared with meals of different ſorts, ſuch as that of oats, peas, beans, and others of a ſimilar kind. By this practice, the ſubſtances are not only found to go much farther, but to have a much greater effect in promoting the growth or fattening of the animals.

The advantages of preparing the food, and feeding ſome ſorts of animals in this way, are now well known, as ſuch food not only goes much farther, but affords a much greater improvement in the animals. The advantage of feeding young hogs with ſoups of theſe kinds are faſt becoming well underſtood; and the animals are found to go on far better with them than in the old methods of proceeding, but there is ſtill much to be done in regard to the modes of preparing of them, and the conditions in which they ſhould be at the time they are given. See Swine.

SOUPROSSE, in *Geography*, a town of France, in the department of the Landes; 6 miles S.E. of Tartas.

SOUR. See Sur.

Sour, a river of France, which riſes near Baſtogne, in the department of the Foreſts, and runs into the Moſelle, 3 miles above Treves.

Sour *Guſlan*, a town of Algiers, near mount Jurjura.

Sour-*Dock*, in *Botany*. See Sorrel.

Sour-*Food*, in *Agriculture*, ſuch food as has been rendered ſour by the acetous fermentation, and which has lately been ſaid to be of ſuperior utility in the fattening of animals. Oxen as well as ſwine have lately been ſuppoſed by ſome to feed faſter, where their food has been brought into this condition before uſing it, than when uſed in the natural ſtate. See Stall-*feeding*.

Sour-*Gourd*, in *Botany*. See Adansonia.

Sour-*Graſs*, in *Agriculture*, the coarſe tufty herbage uſually met with about the dung-heaps in fields, and where there is much ſtagnant moiſture. It is obſerved by Dr. Darwin, that where a piece of graſs is over-run with tuſſocks of ſour-graſs, which often happens near towns, he has been informed, that lime or coal-aſhes ſpread on them, would render the graſs ſweeter, ſo that horſes or cattle would eat it. But he ſuppoſes the more certain and advantageous management would conſiſt in mowing it frequently, and giving it to horſes or cattle in the ſtable or ſtall; as he believes they will eat it greedily after it has been a few hours withered, and thus the land will not only yield more provender at preſent, but after a few mowings a ſweeter graſs will riſe in the place of that which was of a bad kind, or of too luxuriant growth, for which purpoſe it ſhould be mowed as near the ground as may be; or if it be frequently mowed during the ſummer, and left on the ground, ſome cattle will eat it, when it is withered to a certain degree; by which the diſagreeable flavour of it is probably leſſened or deſtroyed. Proper drainage and cloſe feeding ſuch lands, are likewiſe uſeful methods of bringing them into a ſtate of better and ſweeter graſs.

Sour-*Kroute*. See Croute.

Sour-*Land*, in *Agriculture*, a term applied to cold clayey ſoils, and ſuch as have ſome ſort of impervious ſtrata at no great diſtance from the ſurface, by which they are kept in a wet and ſour ſtate. See Clay, and *Clayey* Soil.

Sour-*Sop*, in *Botany*. See Annona.

SOURA, in *Geography*, a town of the Arabian Irak, on the Euphrates; 153 miles N.W. of Baſſora.

Soura, a town of Portugal, in Eſtremadura, ſituated on the river Soure; 7 miles S.S.E. of Montemor o Velho.

SOURABAYA, a pleaſant town on the N.E. coaſt of the iſland of Java, ſituated on the banks of a river, a mile and a half diſtant from the ſea-ſhore, ſo that only the flag-ſtaff can be ſeen from the road. The river is navigable up to the town for veſſels of 100 tons burthen, and the bank on one ſide is made convenient for tacking. The Chineſe carry on a conſiderable trade here, and have a town on the ſide of the river oppoſite to Sourabaya. The country near the town is flat, and the ſoil light, ſo that they plough with a ſingle bullock, or buffalo. The latitude in Sourabaya road is 7° 11′ S. The Dutch had a reſident in this place, with the rank of ſenior merchant, and the title of the commander of the eaſtern diſtrict. The chief commodity of this government is rice. The interior parts of the country, near the mountains, are infeſted with a breed of fierce tigers, which render travelling dangerous. Here is alſo a breed of horſes, ſmall, but handſome and ſtrong. The Javaneſe in the vicinity are numerous. Stavorinus's Voyage, vol. ii.

SOURAH, a town of Hindooſtan, in the circar of Aurungabad; 20 miles S.S.E. of Jaffierabad.

SOURAN, a town of Perſia, in Khoraſſan; 255 miles N. of Herat.

SOURAPATA, a kingdom on the S. coaſt of the iſland of Java.

SOURATAU HOUTCHIN, a town of Chineſe Tartary, in the country of the Monguls. N. lat. 53° 54′. E. long. 114° 34′.

SOURDEVAL, a town of France, in the department of the Channel, and chief place of a canton, in the diſtrict of Mortain; 4 miles N. of Mortain. The place contains 3896, and the canton 9580 inhabitants, on a territory of 115 kiliometres, in 9 communes.

SOURDON, in *Natural Hiſtory*, the name of a bivalve ſhell-fiſh found on the coaſt of Poitou, and other places. It is a ſmall fiſh, its length being little more than an inch, and its breadth about three quarters of an inch; its ſhells are both conſiderably convex; the outer ſurface is deeply furrowed, but the inſide is perfectly ſmooth: the fiſh buries itſelf lightly in the ſand, and has a pipe of communication, which it raiſes to the ſurface; but as this creature never buries itſelf deep, the pipe is neceſſarily very ſhort; but they are cut into ſeveral ſegments at the extremity, and appear as it were fringed, and have ſeveral hairs growing from theſe ſegments. The ſourdon is capable of a progreſſive motion by means of a limb, ſomewhat reſembling that of the other chamæ, but more than any approaching the nature of a leg, as it in ſome meaſure repreſents, in miniature, a human leg with a clumſy boot upon it: by means of this limb the creature can eaſily bury itſelf in the ſand, or riſe up out of it, or move horizontally on the ſurface, and that as well backwards as forwards, and with more ſwiftneſs than could well be ſuppoſed. Mem. Acad. Par. 1710.

SOURE, in *Geography*, a river of Portugal, which runs into the Mondego; 4 miles S. of Montemor o Velho.

SOURERAH, a town of Hindooſtan, in the circar of Cicacole; 40 miles W.N.W. of Ganjam.

SOURI, a town of Perſia, in the province of Lariſtan, on the Perſian gulf; 38 miles S.W. of Ormus.

SOURING *Lime for Mortar and Plaſter*, in *Rural Economy*, the practice of macerating and rendering it proper

per for theſe uſes. It has been ſtated by the writer of an "Eſſay on Quicklime as a Cement," that when lime is to be employed for making plaſter, it is of great importance that every particle of the limeſtone be ſlaked before it is worked up; for, as the ſmoothneſs of the ſurface is the circumſtance moſt wiſhed for in plaſter, if any particles of lime ſhould be beaten up in it, and employed in work before they have had ſufficient time to fall, the water ſtill continuing to act upon them after the materials have been worked up, will infallibly ſlake ſuch particles, which will then expand themſelves in a forcible manner, and be productive of thoſe excreſcences upon the ſurface of the plaſter, which are commonly known by the name of bliſters. Conſequently, if it be intended to have a perfect kind of plaſter, which is capable of remaining ſmooth on the ſurface and free from bliſters, there is an abſolute neceſſity for allowing the lime of which it is compoſed, to lie for a conſiderable length of time in maceration with water, before it is wrought up into plaſter, which is a proceſs or operation that is here termed ſouring. Where the limeſtone is of a pure quality, and has been very perfectly calcined or burnt, there will ſeldom be any danger of the whole of the lime falling at firſt; but where it has been leſs perfectly burnt, there will be many particles, which will require to lie a long time before they will be completely reduced into powder. This macerating proceſs or operation is conſequently more neceſſary with impure than pure lime; but ſtill it ought on no occaſion to be omitted or neglected, as there is not the ſmalleſt probability, but that ſome bliſters would appear on the ſurface of plaſters made with even the pureſt lime, when worked up and applied immediately after being ſlaked, without undergoing this ſouring proceſs in ſome degree.

The practice is alſo common of ſouring the lime when it is intended for being uſed in mortar; but although it is not ſo indiſpenſably neceſſary in this caſe, as in that where it is deſigned for plaſter, yet, when properly performed, it is evident, it is ſaid, that it muſt even in this inſtance too be of utility; as any dry knots of lime that may fall after the mortar is uſed, muſt have a tendency to diſunite the parts of it, which have already been united, and to render the mortar or cement much leſs perfect than if the whole had been properly mixed up with the materials and allowed to ſour before uſing. More circumſpection is, however, requiſite, it is ſaid, in ſouring lime for mortar than for plaſter; for, as it is not neceſſary that plaſter ſhould be endowed with a ſtony degree of hardneſs, there is no loſs ſuſtained by allowing a great proportion of the lime which is deſigned for that purpoſe to abſorb its air before it be uſed; for a very ſmall quantity of cauſtic or quicklime will be ſufficient to unite the whole into one ſlightly coherent maſs. Conſequently, the only circumſtance which is neceſſary to be attended to in ſouring lime for plaſter is, that it be allowed to macerate long enough, as there is no danger of ever erring on the oppoſite extreme. It is indeed neceſſary, it is ſaid, on ſome occaſions, it ſhould lie a very long time, before any certainty can be had, that all the particles are thoroughly ſlaked, as pieces of lime-ſhells have been known to lie upwards of ſix months expoſed to all the changes of the winter weather, and fall after that period. Such ſlightly burnt ſtones are indeed, it is ſaid, uſually ſeparated in ſifting the lime for plaſter; but as ſome ſmall chips may eſcape, it is always the ſafeſt way to allow lime to lie in the ſour a very conſiderable length of time. Another advantage of ſome conſequence likewiſe, it is ſaid, attends this practice; as, if by ſuch means a large proportion of the lime be allowed to abſorb its air, and become in the mild or effete ſtate, when it is wrought or beaten up for uſe, the water can have no ſenſible effect upon this mild lime; it will only ſeparate the particles of the cauſtic lime more perfectly from each other, ſo as to permit it to dry without cracks of any kind, and render the ſurface of the plaſter a great deal more ſmooth and entire, than could have been the caſe, if the whole had been made uſe of while in the perfectly cauſtic ſtate. By this means too, thoſe cryſtalline exudations, which are ſo common on walls newly plaſtered, will be the beſt and moſt effectually prevented. On all which accounts, the practice of ſuffering lime, which is deſigned for plaſter, to macerate or ſour a long time with water, ſhould never, it is ſaid, except in caſes of neceſſity, be neglected or overlooked.

However, as lime, from the moment of its being fully ſlaked, begins to abſorb air, and continues to take up more and more every minute from that time until it becomes perfectly mild or effete, ſo as to be rendered gradually leſs and leſs proper for forming mortar of any kind, it neceſſarily follows, that where lime deſigned for this purpoſe is permitted to lie long in the ſour, a great part of it will be converted into chalky matter, or uncryſtallized mild or effete lime, in which ſtate it will be capable of having ſo much ſand added to it, or of forming ſo good a mortar as would have been the caſe, if a larger proportion of the ſandy material had been made uſe of in the firſt place, and been wrought up as ſpeedily as poſſible, without ſo much ſouring, into mortar, and immediately made uſe of. The evil will alſo be increaſed where the lime has been but ſlightly burnt, conſequently the beſt burned lime ſhould always be preferred for this uſe, which, when carefully ſifted after ſlaking, will ſoon fall ſufficiently for this purpoſe; as the main point here is to have the mortar firm and binding; and the falling or burſting of very ſmall unſlaked particles of lime in the mortar afterwards, will not be productive of ſuch evident inconvenience as is the caſe in the making and uſing of plaſter. In the making of good mortar, it will conſequently be neceſſary to get the beſt burnt lime, and to only ſuffer it to macerate or ſour with water a very ſhort time before it is wrought and applied. The beſt burnt lime, however, moſtly requires ſome days to macerate and ſour with water, before the whole becomes fully ſlaked and fallen for this uſe.

This doctrine of the nature and utility of the ſouring proceſs in the making of theſe ſubſtances is ſuppoſed to receive additional proof and ſupport from the practice which was followed by the ancients, which is very ſimilar to this, if the accounts given of it by Vitruvius and Pliny can be depended on. The former, it is ſaid, expreſsly recommends that the lime ſhould be macerated or ſoured in water, for exactly the ſame reaſons that have been already ſeen, as it is only by that means, he aſſerts, that the plaſter can be prevented from bliſtering. His words are theſe: "tuuc de albariis operibus eſt explicandum. Id autem erit recte, ſi glebæ calcis optime, ante multo tempore quam opus fuerit, macerabuntur. *Numque cum non penitus macerata, ſed recens ſumitur——habens latentes crudos cuculos, puſtulas omittit.——Qui calculi diſſolvunt et diſſipant tectorii politiones.*" Vit. lib. vii. c. 2.

The latter points out, it is ſaid, in a ſtill more clear manner, the difference between the quality of the lime, which is neceſſary for making mortar and plaſter:—a certain proof, it is conceived, that the ancients had been very accurate in the obſerving of facts, as they could have no idea of the reaſoning by which thoſe facts might have been corroborated or explained.

"Ruinarum urbis," ſays he, "ea maxime cauſa, quod ſurto, calcis *ſine ferrumine ſuo cæmenta* componuntur. *Intrita* quoque *quo vetuſitor, eo melior.* In antiquarum (antiquis) ædumligibus invenitur, ne recentiore trima uteretur redemptor; idio nulla (nullæ) tectoria eorum rimæ fædavere." Plin. Hiſt. lib. xxxvi. c. 23.

In this paſſage, the writer ſtrongly contraſts, it is ſaid, mortar (*cæmenta*) with plaſter (*intrita*). The firſt, he contends, by implication, ought always to be compoſed of lime *cum ferrumine ſuo;* that is, lime which ſtill retains its *gluten*, cementing or adhering principle; lime that ſtill keeps or poſſeſſes that quality, by which it is enabled to unite detached matters into a ſolid body, and *glue* them, as it were, together. In other places of the ſame work, the author, it is ſaid, deſcribes it as *calcis quam vehementiſſimæ;* lime in its moſt acrid ſtate; that is, perfectly *cauſtic* lime. And this quality he plainly hints, it gradually loſes by time, ſo as to come at length to be *ſine ferrumine ſuo:* in which ſtate, as it is impoſſible to become a good firm mortar or cement for building with, thoſe who make uſe of it as ſuch are ſeverely reprehended. But although the practice of uſing old and inert lime for mortar is condemned, it is immediately added, as has been ſeen above, that for plaſter it is better than new, becauſe it is not ſo ſubject to crack in the work.

Thus it would ſeem, that the importance of the ſouring operation or proceſs, for theſe different purpoſes, was well known at an early period, though the principles on which its utility depended, were probably far from being underſtood.

SOURIS, Lake *des*, in *Geography*, a lake of Canada, the direction acroſs which is amongſt iſlands, N.W. by W. ſix miles. In this traverſe is an iſland remarkable for a very large ſtone in the form of a bear, on which the natives have painted the head and ſnout of that animal; and here they were alſo formerly accuſtomed to offer ſacrifices. This lake is ſeparated only by a narrow ſtrait from the lake du Serpent, which runs N.N.W. ſeven miles, to a narrow channel, that connects it with another lake, bearing the ſame name, and running the ſame courſe for 11 miles, when the rapid of the ſame denomination is entered on the W. ſide of the lake. A ſingular circumſtance is obſervable here, that for three or four miles on the N.W. ſide of this lake, there is an high bank of clay and ſand, clothed with cypreſs trees, no ſuch caſe occurring on any other lake deſcribed by Mackenzie; as they are bounded, particularly on the N., by black and grey rocks. Mackenzie's Travels, Introd.

Souris, in the *Manege*, is a cartilage in the noſtrils of a horſe, by means of which he ſnorts. See Snort.

The cutting of this cartilage is called in French *eſſouriſſer*.

SOURMAN, in *Geography*, a town of Thibet; 250 miles N.E. of Laſſa.

SOURNAT, a town of France, in the department of the Correze; 9 miles N.N.W. of Uſſel.

SOURNIA, a town of France, in the department of the Eaſt Pyrenées, and chief place of a canton, in the diſtrict of Prades; 7 miles N. of Prades. The town contains 842, and the canton 3718 inhabitants, on a territory of 160 kiliometres, in 12 communes.

SOUROUBEA, in *Botany*. See Ruyschia.

SOURTOU, in *Geography*, a town of Chineſe Tartary. N. lat. 44° 51′. E. long. 94° 24′.

SOURUNGE, a town of Hindooſtan, in the circar of Cicacole; 35 miles S.W. of Ganjam.

SOUSEL, a town of Portugal, in Alentejo, containing about 1300 inhabitants; 6 miles N.N.W. of Eſtremoz.

SOUSOU, a town of Aſiatic Turkey, in Natolia; 24 miles N. of Satalia.

SOUSOUGHERLIK, a town of Aſiatic Turkey, in Natolia; 20 miles S.E. of Balikeſri.

SOUSSERAC, a town of France, in the department of the Lot; 6 miles E. of St. Ceré.

SOUSTONS, a town of France, in the department of the Landes, and chief place of a canton, in the diſtrict of Dax. The place contains 2578, and the canton 6604 inhabitants, on a territory of 417½ kiliometres, in 11 communes.

SOU-TÇHEOU, Soo-choo, or Soo-choo-foo, a city of China, of the firſt rank, in the province of Kiang-nan, ſituated in the vicinity of Nan-lum, on a river which communicates with the lake Tain-hoo. This is reckoned one of the moſt agreeable cities in China, and compared by Europeans, who have ſeen it, with Venice, with this difference, that the latter is built in the ſea, and Sou-tcheou is interſected by canals of freſh water, branching from the principal canal, over each of which branches is erected an elegant ſtone-bridge. In the walls of the city are turned ſeveral arches, through which the canal paſſes. Under theſe walls are drawn up an immenſe number of veſſels; and one ſhip-building yard contained, when this city was viſited by the embaſſy, ſixteen upon the ſtocks, cloſe to each other, each of the burden of about two hundred tons. The ſuburbs are very extenſive. Sou-tcheou is large and very populous; the houſes are neat and well built, and the inhabitants reſpectably dreſſed, moſtly in ſilk. The women, ſays ſir John Staunton, were fairer than thoſe in the north; many of whom wore a ſmall cap of black ſatin, adorned with ſpangles upon the forehead, brought down to a peak above the eye-brows; and they had ear-pendents of gold or cryſtal.

There is not perhaps in the univerſe, according to Groſier's account, a country more delightful, either for pleaſantneſs of ſituation, or mildneſs of climate. The air is ſo temperate, proviſions ſo plentiful and cheap, the ſoil ſo fruitful, and the manners of the people ſo gentle, that this city is conſidered as the paradiſe of China. "Above (ſay the Chineſe authors) is the celeſtial paradiſe; but the paradiſe of this world is Sou-tcheou." Upon obſerving the continual motion of its immenſe number of inhabitants, and the confuſion occaſioned every where by their commercial intercourſe with ſtrangers, one would be induced to believe that the trade of all the provinces centered in it. The brocades and embroideries manufactured here are in great requeſt through the whole empire. The juriſdiction extends over only eight cities, one of which is of the ſecond claſs, and the reſt of the third; but all theſe cities are beautiful, and about two or three leagues each in circumference. In the vicinity of this city is found that remarkable tree which furniſhes tallow, the "croton ſebiferum" of Linnæus. See Croton. N. lat. 31° 22′. E. long. 120°.

SOUTELLO, a town of Portugal, in the province of Beira; 17 miles W. of St. Joao do Peſqueira.

SOUT-EL-TELL, a mountain of Algiers; 30 miles N.E. of Tremecen.

SOUTERRAINE, La, a town of France, in the department of the Creuſe, and chief place of a canton, in the diſtrict of Gueret; 17 miles W. of Gueret. The place contains 2665, and the canton 10,237 inhabitants, on a territory of 275 kiliometres, in 11 communes. N. lat. 46° 15′. E. long. 1° 34′.

SOUTH, one of the four cardinal points of the compaſs. See Cardinal *Points*.

South, Robert, in *Biography*, a divine of the church of England, eminent for learning, talents, and wit, was the ſon of a London merchant, and was born at Hackney in 1633.

1633. He was educated at Weſtminſter ſchool by the celebrated Buſby, from whence he was elected to Chriſtchurch, Oxford. Here he was ſoon diſtinguiſhed for his claſſical attainments, of which one of his products was an elegant Latin poem addreſſed to Oliver Cromwell, on the concluſion of the Dutch war. Another poem of his, which was much read and applauded, was entitled "Muſica Incantans," which was afterwards printed ſeparately, at Dr. Fell's requeſt. In 1657 he commenced M.A., and in the following year he received holy orders from one of the deprived biſhops, and being ſoon after choſen to preach the aſſize ſermon before the judges, he made a violent attack upon the Independents, which ingratiated him with the Preſbyterians. Soon after the Reſtoration, he was choſen public orator of the univerſity. In this office he acquitted himſelf ſo much to the ſatisfaction of lord Clarendon, when complimenting him at his inveſtiture as chancellor of the univerſity, that he was taken under the protection of that eminent man, and appointed his domeſtic chaplain. He was promoted to a prebend of Weſtminſter in 1663, and was in the ſame year admitted to the degree of D.D. He ſoon ſucceeded to a canonry of Chriſtchurch, and in 1673 he attended as chaplain to the younger ſon of the earl of Clarendon, in an embaſſy to Poland. On his return he was preſented to the rectory of Iſlip, in Oxfordſhire, and became greatly diſtinguiſhed by his turn for humorous ſarcaſm, in which he indulged even in the pulpit. During the reign of Charles II. Dr. South was, from principle, a ſtrenuous aſſertor of the royal prerogative, as he was alſo during the following reign, though he was fully ſenſible of the dangers to which the eſtabliſhed religion was expoſed under the bigotted and gloomy James II. He nevertheleſs refuſed to join in an invitation to the prince of Orange to come to its reſcue; and after the arrival of that prince, he declined ſubſcription to the aſſociation for his ſupport, which was ſigned by the vice-chancellor, and ſeveral heads of colleges in Oxford. When William was ſeated on the throne, he did not ſcruple taking the oath of allegiance to the new government, but he is ſaid to have rejected the offer of ſome perſons in power to place him in one of the ſees vacated by the nonjuring biſhops. His political conduct continued the ſame: he was a violent enemy to toleration, and to any conceſſions for conciliating the ſeparatiſts. In 1693 he engaged in the controverſy reſpecting the doctrine of the Trinity with Dr. Sherlock, and is ſaid to have diſplayed as great a want of Chriſtian charity, as abundance of learning and orthodox zeal. He now began to decline in health; and though his mind was active, yet his bodily powers failed him, and he paſſed the greater part of queen Anne's reign in a ſtate of inaction; but on Sacheverel's trial, he exerted himſelf vigorouſly to procure a lenient ſentence from the judges. When his friends came into power, towards the cloſe of that reign, he was ſolicited to accept the biſhopric of Rocheſter and deanery of Weſtminſter, but he replied, ſuch a chair would be too uneaſy for an old infirm man to ſit in. The queen's deceaſe was conſidered by him as a ſignal of his own approaching diſſolution, "ſince," he ſaid, "that all that was good and gracious, and the very breath of his noſtrils, had made its departure to the regions of bliſs and eternal happineſs." He died in July 1716, at the age of 83, and was interred with much ſolemnity in Weſtminſter Abbey.

Dr. South cannot be regarded as a proper pattern of a Chriſtian miniſter, the follower of the meek and holy Jeſus; though his ſincerity as a true believer of the doctrines of revealed religion has never been doubted. His temper was harſh and unamiable, iraſcible and unforgiving, and his talents for wit and humour led him too frequently to indulge in ill-natured ſarcaſm. His talents were conſiderable, and he is uſually reckoned among the good writers of the time, though he frequently manifeſted a want of taſte in not adapting his wit to ſubjects ſuited to it. He is author of Sermons, in ſix volumes, which have paſſed through many editions. After his deceaſe there appeared his "Opera Poſthuma Latina," and his Engliſh poſthumous works, which conſiſted of three additional ſermons; Travels into Poland, and Memoirs of his Life, in 2 vols. 8vo. Biog. Brit.

South, in *Geography*, a ſhort river of Anne Arundel county, in Maryland, which runs eaſterly into Cheſapeak bay; its mouth is about ſix miles S. of Annapolis city, and is navigable for veſſels of burden ten or twelve miles.

South *Anna*, a branch of North Anna river, in Virginia, which together form Pamunky river.

South *Bay*, a bay in Hudſon's Straits, on the N. coaſt of Labrador, W. of Cape Chidley.—Alſo, an arm of lake Champlain, extending weſterly from its ſouth extremity. Where it unites with the lake, it receives Wood creek from the ſouth.

South *Cape*, a cape at the ſouthern extremity of New Holland. S. lat. 43° 42′. E. long. 146° 56′.

South *Creek*, a river of North Carolina, which runs into Pamlico Sound, N. lat. 34° 54′. W. long. 76° 48′.

South *Downs*, downs of England, in the county of Suſſex, between Brighthelmſtone and Lewes.

South *Downs Sheep*. See Sheep.

South-*Eaſt Bay*, in *Geography*, a bay of the S.E. extremity of Tavia-Poenammoo. S. lat. 46° 45′. W. long. 191° 21′.

South *Eſk*. See Esk.

South *Friar's Bay*, a bay on the S. coaſt of the iſland of St. Chriſtopher; 3 miles E.S.E. of Baſſeterre.

South *Hams*, a tract of land in the county of Devon, England, in the vicinity of Torbay, celebrated for cyder.

South *Haven Point*, a long crooked projection of land on the coaſt of Dorſetſhire, in the Engliſh Channel, which forms one of the points of entrance into Pool harbour.

South *Head*, a cape on the N.E. coaſt of New Holland. S. lat. 24° 2′. W. long. 108° 17′.

South *Hero*. See Hero. North Hero, in 1810, contained 552, and South Hero 826 inhabitants.

South *Iſland*, a ſmall iſland in the Indian ſea, near the E. coaſt of Madagaſcar. S. lat. 17°. E. long. 50° 20′.—Alſo, a ſmall iſland in the ſtrait of Saleyer, near the S. coaſt of the iſland of Celebes. S. lat. 5° 45′. E. long. 120° 51′.—Alſo, a ſmall iſland in the Eaſt Indian ſea, near the S.W. coaſt of the iſland of Bouton. S. lat. 5° 42′. E. long. 122° 50′.—Alſo, a ſmall iſland in the North Pacific ocean. N. lat. 24° 22′. E. long. 141° 20′.

South *Key*, a ſmall iſland in the Spaniſh Main. N. lat. 15° 40′. W. long. 82° 35′.—Alſo, one of the Bahamas, in the Weſt Indies. N. lat. 22° 21′. W. long. 74° 6′.

South *Mountain*. See Blue *Ridge*.

South *Point*, a cape on the S. coaſt of the iſland of Anticoſti. N. lat. 49° 5′. W. long. 62° 35′.—Alſo, a cape at the ſouthern extremity of the iſland of Barbadoes. N. lat. 13°. W. long. 58° 23′.—Alſo, a cape on the S.W. coaſt of Sir Henry Martin's iſland. S. lat. 8° 58′. E. long. 220° 15′.—Alſo, a cape on the S.W. coaſt of the iſland of Fortaventura. N. lat. 28° 1′. W. long. 14° 1′.

South *River*, a river of Antigua, which runs into the ſea, a little to the north of Young Point.—Alſo, a river of Canada, which runs into the St. Lawrence, N. lat. 46° 56′. W. long. 70° 26′.

South *Salem*, a poſt-townſhip of America, in the ſtate of New York, and county of Weſt Cheſter; 50 miles from New York; bounded north by North Salem, eaſt by the ſtate of Connecticut, ſouth by Connecticut and the towns of Pounbridge and Bedford, and weſt by Somers. The whole of this townſhip may be called a good farming country. In 1810, the number of its inhabitants was 1566. This town was formerly called Salem, but its name was altered in 1808. The inhabitants manufacture moſt of their clothing in their own houſes.

SOUTH *Sea*. See PACIFIC *Ocean*.

SOUTH-*Sea Caſtle*, a fortreſs of England, in the vicinity of *Portſmouth*; which ſee.

SOUTH-*Sea Company*. See COMPANY and FUND.

SOUTH-*Sea Tea*, in *Botany*, &c. See ILEX.

SOUTH *Thule*, in *Geography*, a point of land in the South Atlantic ocean, being the moſt ſouthern land diſcovered by navigators. S. lat. 59° 54′. W. long. 27° 45′.

SOUTH-*Weſt Bay*, a bay on the ſouth-weſt coaſt of Tavai-Poenammoo, between Cape South and Cape Weſt.

SOUTH-*Weſt Cape*, a cape on the ſouth coaſt of New Holland, north-weſt of South Cape. S. lat. 43° 37′. E. long. 146° 7′.

SOUTH-*Weſt Point*, a cape on the ſouth-weſt coaſt of the iſland of Anticoſti. N. lat. 49° 25′. W. long. 63° 4′.

SOUTHADLEY, or SOUTH HADLEY, a poſt-town of America, in the ſtate of Maſſachuſetts, and county of Hampſhire, on the eaſt bank of Connecticut river; 12 miles N. of Springfield; incorporated in 1753, and containing 902 inhabitants.

SOUTHAKER LEDGE, a reef of rocks, near the ſouth coaſt of Labrador. N. lat. 50° 5′. W. long. 60°.

SOUTHAM, a ſmall market-town in Southam diviſion of Knighlow hundred, Warwickſhire, England, is ſituated 10 miles from Warwick, 12 from Coventry, and 82 N.W. from London. In Domeſday book the name is written *Sucham*, and the town is there ſaid to contain four hides, with two mills, and woods of one mile in length and half a mile in breadth; all which belonged to the king. Henry III. granted it a weekly market, and an annual fair. The market is held on Mondays, but little buſineſs is tranſacted. The chief ſources of emolument are the two roads which paſs through it: that from Coventry to Banbury, and that from Warwick to London. The pariſh church is a handſome edifice, with a ſpire riſing from a ſquare tower at the weſt end. The population of the pariſh, in the year 1811, was returned as 1007; the number of houſes 165.

Two miles from Southam is the village of Long Itchington, where the earl of Leiceſter magnificently entertained queen Elizabeth, July 9, 1575, in her progreſs to Kenilworth. The village is now ſmall, but appears to have been of conſiderable conſequence at the time of the Conqueſt, and for ſome ſucceeding ages. It was the birth-place of St. Wolſtan, biſhop of Worceſter, in the eleventh century, a man of ſome eminence in the pious chronicles of that period. Beauties of England and Wales, vol. xv. part 2. Warwickſhire, by J. N. Brewer.

SOUTH AMBOY, a town of America, in Middleſex county, New Jerſey, containing, by the cenſus of 1810, 3071 inhabitants. See PERTH-*Amboy*, which contained 815 inhabitants.

SOUTH AMERICA. See AMERICA.

SOUTHAMPTON, or SOUTHTON, an ancient borough, port, and corporate town of Hampſhire, England, is ſeated on a neck of land, which is bounded on the weſt and ſouth by a broad lake-like expanſe, called the Southampton Water, and by the river Itchin on the eaſt. From this peculiarity of ſituation, it has only one approach by land, from the north; and from the ſame cauſe, the firſt buildings of the town appear to have been raiſed at the extreme point of land, and to have progreſſively continued in a line northward, on a ridge of ground between the two waters. Hence the town was ſoon formed by one long ſtreet, flanked and guarded by embattled walls, and ſtrongly fortified gates towards the water on the ſouth, and to the inland country on the north. The preſent Southampton is comparatively a modern town, and originated in the ſuperior eligibility of its ſcite, for commerce, to the ſtation at Bittern, the Clauſentum of the Romans, and the Hamton of the Saxons, &c. The ancient hiſtory, before the Norman conqueſt, applies chiefly to Old-Hampton; but it is almoſt impoſſible to aſcertain when the old town was deſerted, and the new one formed and governed by its own laws. It is evident that Hampton muſt have been a town of conſequence under the Anglo-Saxon dynaſty, as it imparted its name to the whole county, and is ſtill the county town.

Hiſtorical Events.—The origin and name of this town have occaſioned much conjecture and diſſertation. The moſt natural ſuppoſition is, that it was derived from the river *Ant*, or *Anton*, near the ſouthern extremity of which it ſtands. This river, after flowing from the upper parts of the county, and giving appellations to ſeveral places in its courſe, here widens into a conſiderable eſtuary; and, in conjunction with the Itchin, forms the head of the Southampton Water, the ſuppoſed *Antona* of Tacitus. There are indeed thoſe who prefer deducing it from *Ham*, a home or reſidence, with the adjunct *Ton*. Domeſday book and other ancient records, however, clearly favour the former opinion; for in theſe writings it is ſpelt *Hantun*, and *Hantune*. The prefix of *South* evidently aroſe from its relative ſituation to *Northam*. The county itſelf was alſo called *Hantunſcyre*, though its name has been long altered into *Hampſhire*.

It appears from the Saxon Chronicle, that in 873 Hanton was attacked by the Danes, who landed from 33 ſhips; but, after committing many atrocities, they were repulſed and driven to their ſhips. About the year 980 another body of Danes landed here, and ravaged the town and its neighbourhood; and it was ſcarcely 12 years afterwards, that they are recorded to have a third time plundered Southampton, under the command of Sueno of Denmark, and Olaus of Norway.

It does not appear with any certainty, whether the town had been fortified previous to theſe devaſtations; though an eminent antiquary, ſir Henry Englefield, ſuggeſts the opinion, that a *caſtle* was built here by the Saxons, very ſoon after they had achieved a permanent eſtabliſhment in this country. "The peculiar advantages of the narrow and rather high point of land on which Southampton now ſtands," ſays the worthy baronet, "commanding at once the Itchin and Teſt rivers, and very eaſily fortified on the land ſide, could not eſcape their notice; and from the high circular hill, on which the keep of the caſtle formerly ſtood, and the curved line of its yet remaining wall, we have probable grounds for ſuppoſing it to be among the moſt ancient of the Saxon caſtles."

The different aſſaults made on Hanton by the Danes, render it probable that it had very early riſen to ſome importance; and moſt likely from its commerce, to which its ſituation was very favourable. The acceſſion of Canute to the Britiſh ſceptre, however, put a period to the Daniſh ravages in this iſland; and Southampton appears to have become an occaſional reſidence of that ſovereign: for it is here that he is recorded, by Henry of Huntingdon, to have repreſſed the impious flattery of his courtiers by a moſt impreſſive leſſon. They had hailed him as one whoſe royal mandate all nature muſt obey. To put this ſuppoſed omnipotence to the teſt, and to reprove the flattery, he, deſcending the beach, commanded, ſays the hiſtorian, a chair to be ſet for him; in which having ſeated himſelf, he ſaid to the flowing tide, "Thou art under my dominion, and the ground on which I ſit is mine; nor did ever any diſobey my commands with impunity: therefore, I command thee not to wet the clothes or feet of me, thy lord and maſter." But the rude waves, continues the hiſtorian, preſently came up to his royal feet, and daſhed over him; when, ſpringing back, he exclaimed, "Let all the inhabitants of the world know, that the power of monarchs is a vain and empty thing; and that no one deſerves the name of king, but He, whoſe will, by an eternal decree, the heavens, the earth, and the ſea, do obey." Nor would he ever after ſuffer the crown to be put on his head, but cauſed it to be placed on the great crucifix at Wincheſter. And it is worthy of remark, that all the coins of Canute ſeem to give ſanction to this ſtory; as they either repreſent him as wearing a mitre, or a cap, or a triangular covering, ſimilar to that on the coins of St. Edward. See Canute.

Several circumſtances prove, that this town had attained conſiderable importance before the Norman invaſion; though it appears to have ſuffered greatly from the ravages of earl Toſtan. Henry I. is ſuppoſed to have made it a borough by charter; as the "burgeſſes of Southampton" are mentioned in his grants to the canons of the priory of St. Dionyſius, which he had founded. Many privileges were granted to the burgeſſes by king John, who exempted them from toll, paſſage, and pontage, by ſea and land, in fairs and in markets, throughout all his dominions; as well on this ſide the ſea as beyond. By the ſame charter he granted them the port of Portſmouth, in *ferm;* for which, together with the *ferm* of Southampton, they were to pay 200*l.* yearly. The agreement to pay this ſum ſufficiently indicates the opulence and flouriſhing ſtate of the town at that period; which appears to have ariſen principally from the wine trade: and, ſo early as 1215, the merchants of Southampton are recorded to have imported more wine than any others in England, thoſe of London excepted. White or ſweet wines were then moſtly in uſe, and theſe were chiefly imported from Genoa and Venice, by aliens; who were reſtricted to this port by a duty payable to Southampton, even if the wine was landed elſewhere.

In the reign of Henry III. the barons of the Cinque Ports became very troubleſome to the merchants of Southampton, by frequently attaching their perſons, and ſeizing their goods, under pretended reference to ancient grants. The king, being appealed to on this ſubject, iſſued a writ, dated May 14, 1252, commanding the barons to deſiſt from their outrages; and four years afterwards he inveſted the burgeſſes with new privileges, by a very ample charter, dated at Briſtol, July 14, 1256. It appears that Southampton firſt ſent members to parliament in the 23d of Edward I. Conſiderable trade was now carried on between this port and France; and the detention, at St. Valery and Barfleur, of ſome ſhips belonging to Southampton, was in great meaſure the cauſe of the war between this country and France, toward the concluſion of the 13th century.

The trade of this town continued very flouriſhing till the rupture with France in 1338, on account of the refuſal of the ſtates of that kingdom to acknowledge the claims of Edward III. to its throne. The ſame year the mayor and bailiff were commanded, by writ, to cauſe all their ſhips, of 40 tons burthen and upwards, to be victualled, and furniſhed with men at arms, ready to defend the land, in caſe of invaſion. Theſe preparations, however, were made too late. The French, with their allies, the Spaniards and Genoeſe, landed in October, from a fleet of 50 gallies; and, having ſlain all who oppoſed them, entered and plundered the town, and afterwards deſtroyed the greater part of it by fire. Many of the principal inhabitants were, at the ſame time, inhumanly put to death. The invaders did not, however, effect this devaſtation with impunity: ſeveral diſtinguiſhed perſonages of their own party were ſlain, and, among them, the ſon of the king of Sicily. This fatal event interrupted the growing proſperity of Southampton; as many of the merchants were totally ruined, and others afterwards removed to places leſs expoſed to invaſion. In the following year an act was paſſed for rebuilding and ſtrongly fortifying the town; and the king, in a new charter, confirmed all the grants made by his predeceſſors, and inveſted the inhabitants with additional immunities.

In the reign of Richard II. a plan was propoſed, by a rich Genoeſe merchant, for rendering Southampton one of the principal ports of Europe; but the jealouſy of ſome London merchants is ſaid to have defeated the deſign, and to have cauſed the aſſaſſination of the projector.

In July, 1345, the army, which afterwards ſo memorably diſtinguiſhed itſelf on Creſſy's plains, was embarked at this port. That gallant army of Britons alſo, which gained immortal fame at the battle of Agincourt, under Henry V., in 1415, was aſſembled and embarked at Southampton; and it was here that the foul conſpiracy againſt the life of that monarch was timely diſcovered and puniſhed. The principal conſpirators were Richard, earl of Cambridge, grand-father of king Edward IV., lord Scrope of Maſham, and ſir Thomas Grey of Northumberland. They were brought to trial, condemned, and executed in this town. Lord Scrope, who had been a particular favourite of the king, was hanged, drawn, and quartered: the others were beheaded; and their bodies were interred in the chapel of the Domus-Dei, or God's Houſe; as is recorded by an inſcription on a ſtone, erected by a predeceſſor of the preſent earl of Delaware. Hiſtorians differ widely reſpecting the motive to this plot. Some ſay, that the project was ſuggeſted by the court of France; which, terrified at the preparations of Henry, had engaged theſe three noblemen, for the bribe of a million of livres, to murder the king at Southampton; an account which Shakſpeare ſeems to have credited. See his play of Henry V. act ii. ſc. 2.

> "See you, my princes and my noble peers," &c.

With greater probability, however, others appear to think that the conſpiracy was formed originally by the earl of Cambridge, ſecond ſon of the duke of York; who, having eſpouſed the ſiſter of the earl of March, had zealouſly embraced the intereſts of that family, and engaged lord Scrope and ſir Thomas Grey to ſecond his views. See Holingſhed's Chronicle.

The trade of Southampton muſt have been in a very flouriſhing ſtate in the reign of Henry VI.; or we can hardly ſuppoſe that ſo great a man as the lord mayor of London, and keeper of queen Margaret's wardrobe, ſir Thomas Cooke, would have borne the office of cuſtomer of this port.

In the reign of Edward IV., when the feuds between the houſes of York and Lancaſter raged with their utmoſt violence, ſcarcely a day elapſed which was not marked with ſome hoſtilities of the oppoſite parties. That diviſion of ſentiments, with reſpect to the two contenders for the crown, which pervaded almoſt all England, ſubſiſted at Southampton; and at laſt raged with ſuch fury, that a fierce ſkirmiſh enſued between the partiſans of the white and red roſes, in which ſeveral of the inhabitants loſt their lives. The Yorkiſts being at length victorious, the leaders of the Lancaſterian party were made priſoners. Edward was of a temper too jealous and ſevere to pardon ſo great an inſult on his government. Haſtening immediately to Southampton, he commiſſioned Tibetot, or Tiptoft, earl of Worceſter, to ſit in judgment on the priſoners. About twenty of them were tried, condemned, and executed; but the malice of the monarch, not ſatisfied with that infliction, which ought to have cloſed the ſcene of human puniſhment, permitted their breathleſs carcaſes to be impaled, and expoſed in this horrid ſtate to the public gaze: a mean gratification of impotent revenge, uſeleſs as it was unpopular, which brought a deſerved odium on the king, and on Tiptoft, as the miniſter of his vengeance. Leland's Collectanea, i. 502.

Among the number of royal viſitors who have occaſionally honoured Southampton with their preſence, it reckons the emperor Charles V., who, in 1522, embarked here on board the Engliſh fleet, which conveyed him to Spain. We have alſo to mention Edward VI. In the year 1552 this prince, having been attacked by both the meaſles and ſmall-pox, his conſtitution was ſo much weakened, as to render relaxation abſolutely neceſſary. By the advice of his phyſicians, therefore, he made a tour of amuſement through the weſtern and ſouthern parts of his kingdom, attended by 320 ſoldiers, and courtiers and ſervants to the amount of 4000 horſe. Amongſt other places, he viſited Southampton, and was received by the inhabitants with much reſpect, and coſtly preparations. In 1534, Philip, then prince of Spain, but who afterwards reigned as Philip II., landed here, when he came to marry Mary I. queen of England. Queen Elizabeth kept her court here in 1569; and in 1575 granted to the corporation the arms, which are now uſed in the town-ſeal.

Camden, who wrote in the reign of queen Elizabeth, ſays, that the town was, in his time, famous for the number and beauty of its buildings, its affluent inhabitants, and the reſort of numerous merchants. But after this, Southampton appears to have declined in its trade and conſequence; being, in the year 1695, (as Gibſon, in his edition of Camden, obſerves,) "not in the ſame flouriſhing ſtate as formerly: for, having loſt its trade, it has loſt alſo moſt of its inhabitants; and the great houſes of its merchants are now dropping to the ground, and only ſhew its ancient magnificence." Since that time, however, trade has again brought its advantages to Southampton: numerous opulent families alſo have been attracted, by the beauty of its neighbourhood, to ſettle in and around it; and it is at preſent a town of the firſt beauty and conſideration in the weſt of England.

Commerce and Trade.—Southampton has many conſiderable wine, corn, and timber merchants. Hemp, iron, and tallow, from Ruſſia, and tar and pitch from Sweden, are imported. Engliſh iron is brought coaſt-ways from Wales; and coals, lead, and glaſs, are conveyed by the colliers from Newcaſtle. The importations from Portugal are chiefly wine and fruit. To Jerſey and Guernſey 6000 tons of unwrought wool are allowed to be exported annually; great part of which is again returned, manufactured into coarſe knit hoſe. During the laſt war, large quantities of Spaniſh wool were landed here. Contracts for biſcuits for the navy, and bread and clothing for the army, were executed to a conſiderable extent. A ſilk-manufactory employs a number of children. Ship-building is alſo carried on at different docks near the town. At Woodmill, in the neighbourhood, the late Mr. Walter Taylor's curious machinery for the manufacture of blocks and pumps for ſhipping ſtill exiſts; but the chief buſineſs of ſupplying the navy is now transferred to Portſmouth dock-yard. The lateſt bye-laws for the regulation of the port and harbour of Southampton were arranged in an act of parliament, paſſed 43d Geo. III.

The corporation, according to its laſt charter, granted by Charles I., conſiſts of a mayor, a recorder, nine juſtices, a ſheriff, two bailiffs, twenty-four common-councilmen, and as many burgeſſes. All who have paſſed the chair are aldermen. The town, which was made a borough by Henry II., and by king John (or, as others ſay, by Henry VI.) a county in itſelf, is independent of the lord lieutenant and ſheriff of Hampſhire. The mayor is admiral of the liberties, from South-ſea caſtle to Hurſt caſtle, and half ſea over from Calſhot to the Iſle of Wight. There are about 700 voters for the two members in parliament for this place; and not only thoſe who pay ſcot and lot, but out-burgeſſes alſo vote. It may be here obſerved, that ſeveral royal burgeſſes have been enrolled among this corporation: the late prince of Wales, in 1750, at his particular requeſt; the late dukes of York, Cumberland, and Glouceſter; his preſent majeſty; the prince regent; the dukes of York, Kent, Cumberland, Suſſex, and Cambridge; the duke of Wirtemberg alſo, who paſſed through this town immediately after his arrival from the continent.

There are two annual fairs, the principal of which is Trinity fair, held near Chapel Mill, adjoining to the town. It commences on Saturday noon in Whitſun-week, and continues till Wedneſday noon in Trinity-week; but Monday is the chief day of buſineſs, when there is a tolerable ſhow of cattle. The ſenior bailiff preſides during the fair, having a tent, in which he entertains the corporation, and his other viſitants. During the continuance of the fair, no one can be arreſted for debt within its precincts. St. Mark's fair is held above Bar, on the 6th and 7th of May. Three weekly markets, on Tueſday, Thurſday, and Saturday, are well ſupplied with excellent fiſh, poultry, meat, butter, fruit, and vegetables.

The ſalmon taken in the Southampton Water is excellent, though much leſs plentiful than formerly; when it is ſaid to have been neceſſary to ſtipulate in indentures, that apprentices ſhould not be obliged to eat of this fiſh oftener than once a day.

Public Buildings, &c.—Of late years Southampton has been much frequented as a watering-place; for which purpoſe its peculiarly healthful and pleaſant ſituation is extremely favourable. The aſſembly-rooms are ſituated near the weſt quay, and very elegantly fitted up. A theatre was erected here in 1766; but not being found large enough, a new one, on a much more commodious and extenſive ſcale, has ſince been built on the ſcite of St. John's hoſpital.

The population of Southampton, as returned under the act of 1801, was 7913, *viz.* 3390 males, and 4523 females; the number of houſes was 1582. But the return of 1811 ſtated the population at 9617, *viz.* males 4130, and females 5487; the number of houſes 1669.

As already noticed, the northern extremity of the old High-ſtreet is terminated by an ancient fortified gate-houſe, called the Bar-gate. This is a curious ſtructure, and conſiſts of a central arched paſſage, about eighteen yards in length, and four in width. On both ſides of this are two lateral paſſages, or poſtern door-ways. This majeſtic portal was principally built in the reign of Edward III.; and, according to the architecture of that time, it is both machicolated and embattled. On its north front are portrayed two gigantic figures, one on each ſide of the gateway; which are traditionally ſaid to have been intended to repreſent, the one, Aſcupart, or Aſcapard, a terrible giant and mighty warrior; and the other, ſir Bevois, or Bevis, of Southampton, who, according to the popular legends, ſlew him in combat. Over the arches of the gate is the town-hall, which is 52 feet long, and 21 feet wide.

The Caſtle was ſituated on the weſt ſide of the town, but very little of the ancient building itſelf is remaining. Its area was of a form approaching to a ſemicircle, or rather of a horſe-ſhoe; in the ſouthern part of which ſtood the keep, on a very high artificial mount. This keep was circular, but has given place to a ſmaller and more modern round tower, erected with the materials of the former one. The view of the town and the adjacent country from this ſpot is extremely intereſting. The caſtle was purchaſed by the late marquis of Lanſdowne, who made great additions and alterations to it, and fitted it up in a coſtly, but fantaſtic ſtyle.

There were formerly in Southampton ſix pariſh churches: thoſe of Holy-Rood, St. Michael, All-Saints, St. Lawrence, St. John, and St. Mary. But in the reign of Charles II. the pariſhes of St. John and St. Lawrence were united, and the church of the former was taken down: a burying-ground now occupies the ſpot on which it ſtood.

Holy-Rood church has a fine organ, and ſeveral handſome monuments; one of which, by Ryſbrack, to the memory of Miſs Stanley, has an inſcription from the pen of the author of “The Seaſons,” Thompſon. St. Michael's church is the moſt ancient in the town, and has a fine ſlender octangular ſpire, which greatly adds to the beauty of many proſpects: it was erected for a mark or guide to ſhips entering the port. In the north aiſle of the chancel is a handſome monument to the memory of the lord chancellor Wriotheſley; and in the oppoſite aiſle, on the ſouth, is a curious antique font. In this church the mayor is always ſworn into office. All-Saints church is a modern ſtructure, which does honour to the genius of its architect, the late Mr. Revely. St. Mary's and St. Lawrence's churches are not particularly remarkable.

A ſpacious manſion in Porter's-lane, near the ſcite of the Water-gate, diſplays conſiderable antiquity. It has been minutely deſcribed by ſir H. C. Englefield (Archæologia, vol. xiv.), in a “Walk through Southampton,” who conjectures it to have conſtituted a part of the palace occaſionally inhabited by the Saxon and Daniſh ſovereigns. The length of the building in front is 111 feet.

The Domus-Dei, or God's Houſe, is an hoſpital, founded, according to Leland, in the reign of Henry III., by two merchants, brothers, of the names of Gervaſius and Protoſius. “Theſe two brethren, as ther lerned, dwellyd in the very place, where the hoſpitale is now, at ſuch tyme as old Hampton was brent by pyrates; theſe two brethren, for Goddes ſake, cauſed their houſe to be turnid into an hoſpitale for poor folkes, and endowed it with ſome landes.” By a charter of 6 Edw. III., however, it ſeems that Roger Hampton founded it; but at what time is not known. It was given by Edward III. to Queen's college, Oxford, which had been founded by Philippa, his conſort; and to that inſtitution it ſtill belongs. The preſent eſtabliſhment conſiſts of a warden, four aged men, and as many women, who are allowed two ſhillings each, weekly, from the college; and have a yearly donation of coals, under the will of the late Mrs. Fifield, of Southampton.

Among other ancient inſtitutions in this town was a houſe of Grey friars, founded in the year 1240, but of which ſcarcely any remains are now ſtanding; part of its ſcite being occupied by Glouceſter-ſquare; and another part by a building now uſed as a warehouſe, “for the vaſt quantities of Spaniſh wool, which, *by ſtreſs of weather*, are landed here every year.” St. John's hoſpital, for the inſtruction of ſix boys in the woollen manufacture, has been lately given to the poor-houſe by the corporation, with the conſent of the heirs of the founder.

A free grammar-ſchool was eſtabliſhed in Southampton by Edward VI., in an old building in Winkle-ſtreet, now uſed as a carpet-manufactory; from which, many years afterwards, it was removed to its preſent ſituation, an ancient manſion, known by the name of Weſt-Hall. Here are alſo a charity ſchool, a Sunday ſchool, and a ſchool of induſtry; and near the entrance of the town, on the right, is a neat range of alms-houſes, for eighteen poor widows, who are allowed two ſhillings each, weekly, from the produce ariſing from a bequeſt by Robert Thorner, eſq. of Baddeſley, who died in July, 1690.

The environs of Southampton are noted for pictureſque ſcenery, handſome villas, and intereſting objects of antiquity. About one mile north-eaſt of the town is the ſcite of the ancient Clauſentum. The ſituation of this ſtation has been a matter of diſpute among antiquaries, nor was it exactly ſettled till the year 1792, when the Rev. Mr. Warner publiſhed an eſſay to prove it to be at Bittern, and rendered any farther doubt on the ſubject ſuperfluous: moreover, ſome late diſcoveries made there, in the formation of the bridge over the Itchin, and of the road connected with it, have fully confirmed whatever Mr. Warner had previouſly advanced as conjectural. An account of theſe diſcoveries has been publiſhed, with an engraved plan of the ſituation, in the firſt volume of “The Hampſhire Repoſitory.” The time when Clauſentum became a ſtation has alſo been a ſubject of diſpute; but Mr. Warner pronounces it to have been formed under the direction of Veſpaſian, during his continuance in the ſouthern parts of Britain.

In 1804 and 1805 other diſcoveries were made at Bittern, by the late proprietor, Henry Simpſon, eſq. of which a detailed account has been given by ſir H. C. Englefield, bart. in his “Walk through Southampton,” 2d edit.

Immediately facing Bittern, on the weſt ſide, is Bevis-Hill, ſo called from a tradition, that ſir Bevis, the famous knight of Southampton, lies buried under it. It now makes part of the gardens formed by the late earl of Peterborough, and in which his lordſhip was uſed to walk with Arbuthnot and Pope.

About half a mile north of Southampton is Belle-Vue, a handſome building, with highly pictureſque pleaſure-grounds, belonging to Joſiah Jackſon, eſq. Two miles from this town, towards the north-eaſt, is Portſwood Houſe, a manſion of the late Giles Stibbert, eſq. who erected it in 1771, from deſigns by Mr. Crunden, architect. Since then it has been much altered. Seated on an eminence, it commands extenſive and diverſified views of the Itchin river, Southampton Water and town, and much fine wooded ſcenery. In the pariſh of South Stoneham is Wood-Mill, built by the late Walter Taylor, for the manufactory of blocks and pumps for the navy. The improvements made in theſe articles by Meſſrs. Taylor and ſon, have been of great importance in naval tactics. In 1759 theſe gentlemen exhibited ſpecimens of blocks, ſhivers, and pins before the Board of Ordnance, who immediately commiſſioned the inventors to prepare and ſupply all the gun-tackle blocks for the navy. From this time ſeveral improvements were made in the machinery and mechanical formation of blocks, &c. and equal improvements in the conſtruction of ſhip-pumps. By one of theſe, called the double bailing machine, four tons of water may be raiſed in two minutes and a half, and even with or without

out the atmoſphere. (Prints and deſcriptions of theſe machines are publiſhed in the “Hampſhire Repoſitory.”) North Stoneham Park, the ſeat of Mrs. Fleming, is a handſome houſe, in a fine park, the latter of which was laid out by the late Mr. Brown. In the adjoining church is a ſuperb monument to lord Hawke, who died October 17, 1781. See Hawke.

The remains of St. Dionyſius's priory form a pleaſing object from Bittern. They ſtand at the diſtance of two miles from Southampton, on the weſtern ſide of the Itchin, in the grounds which belonged to the late general Stibbert.

At the diſtance of four miles from Bittern, in a ſouthern direction, are the ruins of Netley, or Letley abbey, on the eaſtern bank of the Southampton Water. Their ſituation is very beautiful. The field on which they ſtand commands ſeveral views of the river beneath, equally beautiful, but various according to the ſpot whence they are ſeen. The profuſion of ivy which covers the mouldering walls; the various ſhrubs and trees that now occupy the ſcite and walls of the church; the fragments of architecture lying around in diſorderly ruin; and the elegance of thoſe few parts which have yet eſcaped deſtruction; combine to form a ſcene which contemplation cannot leave without reluctance. The founder of this abbey, it is believed, was Henry III., who took a certain number of monks from the abbey of Beaulieu, and placed them at Netley, about the year 1229. The monks were of the Ciſtercian order, and the houſe itſelf was dedicated to the Virgin Mary and St. Edward. The ſcite of Netley abbey, with all the buildings, was, at the diſſolution, granted by Henry VIII., in the twenty-eighth year of his reign, to ſir William Paulet, afterwards marquis of Wincheſter: they next became the property and reſidence of the earl of Hertford; and ſince then were inhabited by the marquis of Huntingdon. The whole is at preſent the property of lady Holland, widow of the late ſir Nathaniel Dance Holland, bart. who has a life-intereſt in them by virtue of her marriage with her former huſband, the late Mr. Dummer, who purchaſed them of Henry Clift, eſq. The principal parts of Netley abbey that remain, are the walls of the church, the kitchen, and the refectory. Theſe are in a ſtate of ruin, but diſplay ſuch elegancies of architecture, as convince us, that the fabric muſt have been originally of great beauty. On the ſhore, at a ſhort diſtance from the abbey, ſtands a fort, or ſmall caſtle, called Netley caſtle, in a dilapidated ſtate, which appears to have been erected by Henry VIII. at the time of his building Cowes and Hurſt caſtles. The paſſage by water to the Iſle of Wight, about fifteen miles diſtant, is delightfully pleaſant.

As natives of Southampton, who have rendered themſelves eminent, we cannot omit to mention the names of Nicholas Fuller, a learned divine, born in 1557, who died in 1622-3; Dr. Iſaac Watts, born in July 1674, who died in 1748; and Richard Pococke, a diſtinguiſhed traveller, and biſhop of Meath, born in 1704, who died in 1765. See accounts of theſe under their reſpective heads.

Southampton lies S.W. from London, at a diſtance of ſeventy-four miles, by the way of Baſingſtoke.

“A Walk through Southampton,” by ſir Henry Engleſield, bart. 8vo. 1805, an intereſting and truly rational eſſay on the antiquities of Southampton and Clauſentum. “The Southampton Guide;” “A Companion in a Tour round Southampton,” 12mo. 1809; “A Viſit to Netley Abbey,” 2d edition, all by Mr. John Bullar, a ſchoolmaſter of Southampton, are uſeful and intereſting topographical volumes, and contain much original information. “The Southampton Guide,” 18th edition, by T. Skelton, is a well-digeſted eſſay on the hiſtory, &c. of the town and of objects in its vicinity. In the Beauties of England, vol. vi. is a copious account of the town and county, by J. Britton and E. W. Brayley.

Southampton, a county of Virginia, between James's river and North Carolina, containing, by the cenſus of 1810, 13,497 inhabitants, of whom 6406 are ſlaves.

Southampton, a town of Maſſachuſetts, in the county of Hampſhire, ſeparated from Eaſt Hampton by Pawtucket river; about 9 miles S.W. from Northampton. It was incorporated in 1753, and in 1810 contained 1171 inhabitants.

Southampton, or *South Hampton*, a townſhip of New Hampſhire, in Rockingham county, on the ſouth line of the ſtate, which ſeparates it from Maſſachuſetts; 16 miles S.W. of Portſmouth. It was taken from Hampton, incorporated in 1742, and contains 427 inhabitants.

Southampton, a poſt-townſhip of New York, in Suffolk county, on the S. ſide of Long iſland; 100 miles E. of New York; bounded N. by Riverhead and Southold, E. by Eaſt Hampton, S. by the Atlantic ocean, and W. by Brookhaven. Its length E. and W. is about 23 miles, and its medial breadth 4½ miles. The ſoil is light and ſandy on the W. and N., but fertile in the S. and E. It is well wooded with pine, oak, walnut, &c. and ſupplies New York with large quantities of cordwood for fuel. The land requires manure, but with good management yields tolerable crops of grain and graſs. Fiſh is much uſed for manure. In 1810 this townſhip contained 3899 inhabitants, including 61 ſlaves, and 475 electors. By means of Sagg-harbour, which is a port of entry in the N.E. corner of this townſhip, it carries on a ſmall trade.

Southampton, a townſhip of Pennſylvania, in Bucks county, containing 739 inhabitants.—Alſo, a townſhip in Franklin county, containing 1060 inhabitants.—Alſo, a townſhip in Bedford county, with 932 inhabitants.—Alſo, a townſhip in Somerſet county, having 455 inhabitants.

Southampton, or *South Hampton*, a townſhip in the eaſtern part of Nova Scotia, in Halifax county, formerly called Tatmagruche; 35 miles from Onſlow.

Southampton, or *South Hampton*, a poſt-town of New York, in Geneſee county; 486 miles from Waſhington.

Southampton *Water*, or *Triſſanton Bay*, a bay of the Engliſh Channel, on the coaſt of Hampſhire, extending from about three miles above Southampton to the channel that ſeparates the Iſle of Wight from the continent. N. lat. 50° 48′. W. long. 1° 7′. See Southampton.

SOUTH BOSTON, a ſmall town in Virginia, in Halifax county, on the N. ſide of Dan river.

SOUTH BRANCH House, a ſtation of the Hudſon's Bay Company, in North America, ſituated on the E. ſide of Saſkaſhawen river.

SOUTH BRIMFIELD, a townſhip of the Maſſachuſetts, in Hampſhire county; 80 miles W. of Boſton; incorporated in 1762, and in 1810 containing 645 inhabitants.

SOUTHBROUGH, a ſmall townſhip in the eaſtern part of Worceſter county, Maſſachuſetts, incorporated in 1727, and in 1810 containing 926 inhabitants; 30 miles W. by S. from Boſton.

SOUTH BRUNSWICK, a townſhip of New Jerſey, in Middleſex county, containing 2332 inhabitants.

SOUTHBURY, a town of Connecticut, in New Haven county, containing 1413 inhabitants.

SOUTH CAROLINA. See Carolina.

SOUTH EAST, a poſt-townſhip of New York, in the S.E. corner of Ducheſs county; 18 miles E. of Weſt Point; its extent is about ſix miles ſquare; it is bounded on the S. by Weſt Cheſter county, E. by Connecticut, N. by

N. by the town of Patterſon, and W. by the town of Carmel. The face of the country is rocky, mountainous, and hilly, but the ſoil is in general good, and adapted to graſs. It is well watered, and affords tolerably good crops of grain and fruits. It abounds with iron-ore of good quality. And the river Crotan, which runs through it, affords excellent mill-ſeats. "Joe's" hill or mountain lies near the centre of this town, and extends to Connecticut. Here are five natural ponds, the largeſt, called Peach-pond, being about two miles long and one wide. The population conſiſts of 1887 perſons, and here is one meeting-houſe. Their domeſtic looms produce 21,000 yards of cloth.

SOUTH-END, a hamlet in the pariſh of Prittlewell, hundred of Rochford, and county of Eſſex, England, is ſituated on the acclivity of a well-wooded hill, at the mouth of the Thames, nearly oppoſite to Sheerneſs, forty-two miles eaſt from London. Within the laſt twenty years this place has obtained ſome repute for ſea-bathing; and though previouſly but little known, has been ſince advancing to importance. Some reſpectable lodging-houſes have been erected for the accommodation of viſitors; and alſo an aſſembly-room. At a ſmall diſtance from the hamlet is a ſtone, placed as a boundary mark of the extenſion of the juriſdiction of the corporation of London over the river Thames, in the eaſtern direction. The village of Prittlewell is built on the declivity of a hill, on the ſummit of which is the pariſh church, a large and reſpectable edifice, the tower of which ſerves as a land-mark to veſſels ſailing into the Thames. About a quarter of a mile north of the church was a priory of Cluniac monks, founded in the reign of Henry II. Beauties of England, Eſſex, vol. iii.

SOUTHERN, THOMAS, in *Biography*, a dramatic writer, is ſaid to have been born at Stratford-on-Avon, about the year 1662, though others aſſume that he was a native of Dublin, and educated at the univerſity there till his eighteenth year, when he came to England. He was entered of Pembroke college, Oxford, in 1680, and ſoon after compoſed a tragedy, entitled "The Perſian Prince, or Loyal Brother," which was acted in 1682. He took up his reſidence at the Middle Temple in 1683, and in the following year another play compoſed by him was acted and publiſhed. When James II. came to the crown, he rewarded Southern for his loyalty in defending his cauſe, when his excluſion from the throne was warmly, or indeed violently agitated, by giving him a captain's commiſſion in the troops intended to oppoſe the landing of the prince of Orange. When his military ſervices became of no account, he returned to his dramatic career, and wrote ſeveral pieces, both in tragedy and comedy, from which he drew a liberal ſubſiſtence. Though Southern does not rank with the higheſt of our dramatic geniuſes, yet he was capable of deeply intereſting the paſſions. His beſt pieces were "Iſabella," and "Oroonoko:" the latter, formed upon one of Mrs. Benn's novels, was ſaid to have been taken from a real ſtory. Southern was apt to mix ſcenes of low and indecent comedy with his tragic ſcenes, but they are ſo managed that they may be eaſily ſeparated, and leave pieces which are occaſionally viewed with applauſe. He lived to a great age, and bore a very reſpectable character. He died in 1746, at the age of 84. His plays were publiſhed collectively by T. Evans, in 3 vols. 12mo. Biog. Brit.

SOUTHERN *Hemiſphere*. See HEMISPHERE.

SOUTHERN *Ocean*. See OCEAN.

SOUTHERN *Sign*. See SIGN.

SOUTHERN *States*, in *Geography*, a denomination comprehending the following ſtates of America; *viz*. Maryland, Virginia, Kentucky, North Carolina, Teneſſee, South Carolina, and Georgia, bounded N. by Pennſylvania. The ſtates above-mentioned contain, by the cenſus of 1810, 3,246,455 inhabitants, including 1,099,523 ſlaves. The principal productions of this diſtrict of the Union are, tobacco, rice, indigo, wheat, corn, cotton, tar, pitch, turpentine, and lumber; and in this diſtrict is fixed the permanent ſeat of the general government, *viz*. the city of *Waſhington*, which ſee.

SOUTHERNWOOD, in *Botany* and the *Materia Medica*. See ARTEMISIA.

SOUTHFIELD, in *Geography*, a townſhip of America, in the ſtate of Maſſachuſetts, and S.E. corner of Berkſhire county; bounded S. by the Connecticut line, containing 147 inhabitants.—Alſo, a townſhip of New York, and the capital of Richmond county, on the S. ſide of Staten iſland; 12 miles S. of New York; comprehending an extent along the ſea, and at the Narrows, of about eighteen miles in length. The ſurface is diverſified, and the land of various qualities. The ſouth part is level, and fit for farming. Here is a tract of natural meadow, around the Great Hills, being a ſmall bay, noted for its dams. Here is a very extenſive ſhad-fiſhery at the Narrows, on the E., within half a mile of which is the plain called "Old Town," which was fortified by the early inhabitants, for defence againſt the Indians. The whole population of this town in 1810 was 1007, with 97 electors. The "Narrows, (which ſee,) leave an opening for the united waters of the Hudſon and Eaſt rivers to communicate with the ocean, 1905 yards wide. On the weſt ſhore are erected the various military works, deſigned for the protection of the trade of New York, and for military defence againſt naval foes. Theſe conſiſt of ſeveral forts and batteries, erected by this ſtate ſince the year 1807, at a very conſiderable expence. Fort Richmond is the principal work, being formed of ſtone, and well ſupplied with all the apparatus and means of defenſive warfare. The telegraph, for ſpeedy communication with New York, ſtands on the high grounds in the rear of fort Richmond.

SOUTH GEORGIA. See *New* GEORGIA.

SOUTH HEMPSTEAD, a poſt-townſhip of New York, in Queen's county, on the S. ſide of Long iſland, 22 miles nearly S.E. from New York. It is bounded N. by North Hempſtead, E. by Oyſter bay, S. by the Atlantic ocean, and W. by Jamaica. This townſhip has the greateſt aggregate population of any in the county, and there are ſeveral ſmall villages, the largeſt of which is of the ſame name with the town. Although it has ſome ſmall ſtreams of water, it principally depends upon tide-mills. The land is generally under good cultivation. The whole population in 1810 was 5804, and at this time it had 445 ſenatorial electors. Rockaway beach on the ſea-ſhore is much frequented in ſummer for ſea-bathing, and the various pleaſures of fiſhing, ſhooting, &c. Game is very plentiful.

SOUTHILL, a pariſh in the hundred of Wixamtree and county of Bedford, England, is ſituated about four miles diſtant from Biggleſwade, nine miles from Bedford, and forty-three N. from London. In ancient records it is called South-Yevel. The manor is the property of lord Ongley, who alſo holds the manor of Stanford, or Stamfordbury, in this pariſh. The monks of Warden abbey had a manor here in 1369, called Gatelin's Bury. Sir George Byng, a naval officer of eminence in the reigns of queen Anne and George I., purchaſed an eſtate and ſettled in this pariſh. In 1721 he was created a peer, by the title of baron Byng of Southill, and viſcount Torrington. He died in 1733, and lies buried in the pariſh church. His unfortunate ſon, admiral John Byng, who was ſhot by ſentence of a court-martial, March 14, 1757, was born and interred at Southill. He is generally conſidered to have fallen a victim to the violence of party. There is an inſcription in the church to his memory, written, it may be thought, with too much aſperity for ſo ſacred a place. There are alſo ſeveral other inſcriptions in memory of other branches of the family. The preſent lord Torrington ſold his eſtate at Southill, in 1795, to Mr. Whitbread, who left it to his ſon, Samuel Whitbread, eſq. M.P. lately deceaſed. This manſion, which is called Southill-Houſe, ranks among the firſt in the county. It was built about the year 1795, by Holland the architect. The internal decorations are very elegant. Over the doors of ſome of the principal rooms are ſubjects in baſſo-relievo of animals by Garrard, and paintings of game by Gilpin. In the billiard-room is a collection of Garrard's models of ſheep and cattle. Over the book-caſes, in the library, are portraits of the principal clerks in Mr. Whitbread's brewery; and over the chimney-piece, that of Mr. Whitbread, ſen. placed there by his ſon, with this modeſt and appropriate motto, "Nobis hæc otia fecit."

The pariſh of Southill was incloſed by an act of parliament, paſſed in 1797, and was then computed to contain 2600 acres. The population return of the year 1811, ſtated this pariſh (including the hamlets of Broom and Stamford) to contain 185 houſes, and 1024 inhabitants. Lyſons's Magna Britannia, Bedfordſhire, 4to. 1806.

SOUTHOLD, or South-hold, a poſt-townſhip of New York, in Suffolk county, compriſing the N.E. part of Long iſland, bounded N. by Long iſland Point, ſoutherly by the waters that ſeparate it from the towns of Eaſt Hampton and Southampton, and W. by Riverhead. The extent of Southold from W. to E., where it terminates in a point, excluſive of the iſlands, is twenty-two miles, and its greateſt width three miles. In 1810 its population was 2613, including 30 ſlaves, and it then had 306 electors. Southold town has a ſtreet five miles long, in which are the poſt-office, a meeting-houſe, and two ſchool-houſes, with 160 families; 100 miles E. of New York.

Southold, a townſhip of Upper Canada, in Suffolk county, W. of Yarmouth, and bounded on the S. by lake Erie.

SOUTH HUNTINGTON, a townſhip of Pennſylvania, in Weſtmoreland county, containing, in 1810, 1656 inhabitants.

SOUTHING, in *Navigation*, the difference of latitude a ſhip makes in ſailing to the ſouthward.

SOUTHINGTON, in *Geography*, a townſhip of America, in Connecticut, and county of Hartford; 20 miles S.W. of Hartford, containing 1807 inhabitants.

SOUTH KINGSTON, a townſhip of Rhode iſland, in Waſhington county, on the W. ſide of Narraganſet bay, containing 3560 inhabitants.

SOUTH-MOLTON. See Molton, *South*.

SOUTHWALLS, a town on the S. coaſt of the iſland of Pomona. N. lat. 58° 40′. W. long. 3° 3′.

SOUTHWARK, commonly called *The Borough*, a town of Surrey, England, alſo a ſuburb of the city of London, and generally regarded as part of that vaſt metropolis. It is, however, completely ſeparated from London by the river Thames, which at this place is 915 feet acroſs; and over which a bridge was conſtructed anterior to the Norman conqueſt. Southwark occupies an area of about one mile and three quarters from eaſt to weſt, by one mile in an oppoſite direction. Nearly the whole of this extent is now covered with houſes, public edifices, and ſtreets, whilſt the bank of the river is occupied by numerous warehouſes, manufactories, timber and coal-yards, glaſs-houſes, &c. The Borough is alſo noted for its number of hop-warehouſes. On the eaſt it is bounded by the pariſh of Rotherhithe, on the ſouth by that of Newington-Butts, on the weſt by Lambeth, and on the north by the river Thames. For accounts of each of which, ſee the reſpective words.

Ancient Hiſtory.—Although part of the preſent diſtrict was probably occupied by ſome Roman villas during the dominion of the Romans in Londinium, yet there is no evidence of its having been a ſtation, or military poſt. Indeed, it was moſt probably at that time a marſhy tract of land. By the Saxons it was called *Suth*, or "South Work," in reference to ſome military work or fortification, bearing that aſpect from London: it was alſo called the Borough, or Burg, probably for the ſame reaſon. It was anciently a diſtinct corporation in itſelf, and was governed by its own bailiffs; but in conſideration of the inconveniencies ariſing from the eſcape of malefactors from the metropolis into this place, it was, in 1327, granted by Edward III. to the corporation of London, on payment of 10*l.* annually. It was then called the *village* of Southwark; it was afterwards ſtyled the *bailiwick* of Southwark, and the mayor and commonalty of London appointed the bailiff. This power, however, not being ſufficient to remedy the evil, a more intimate connection was thought neceſſary; and in the reign of Edward VI. it was united to the city of London, at the earneſt and inceſſant requeſt of the citizens to the lord protector, who was at length prevailed on to grant it; perhaps induced to comply by the conſideration of 647*l.* 2*s.* 1*d.* paid for the charter. It was formed into a 26th ward, by the title of "Bridge Ward Without;" and 500 marks more were paid for certain privileges, antecedently enjoyed by the archbiſhop of Canterbury, the abbot of Bermondſey, the priors of St. Mary Overy's, or Charles Brandon, duke of Suffolk. In conſequence of this, it was ſubjected to the lord mayor of London, who has ſince appointed the ſteward and bailiff. Southwark, however, being divided into two parts, this is to be underſtood only of the diviſion called the *Borough Liberty*, which conſiſts of three of the pariſhes belonging to the town, with the greater part of a fourth pariſh. For the city diviſion, the lord mayor, by his ſteward, holds a court of record every Monday at the ſeſſions-houſe on St. Margaret's Hill in this borough, for all debts, damages, and treſpaſſes, within the limits of his juriſdiction. To this ward of Bridge Without, which is not repreſented in the court of common-council, the ſenior alderman, or father of the city, as he is called, is always removed, as to an honourable ſinecure, which exempts him from the fatigues uſually incurred in the other twenty-five wards. The other diviſion of Southwark is called *The Clink*, or *The Manor* of Southwark, and is ſubdivided into the great liberty, the guildhall, and the king's manor; for each of which ſubdiviſions a court-leet is held, where the conſtables, ale-conners, and fleſh-taſters, are choſen, and other buſineſs of that kind tranſacted. This diviſion is in the juriſdiction of the biſhop of Wincheſter, who, beſides a court-leet, keeps here a court of record on the bank-ſide near St. Saviour's church, by his ſteward, or bailiff, for pleas of debt, for damages, and treſpaſſes. Court-leets are alſo kept at Lambeth, Bermondſey, and Rotherhithe, three diſtricts adjoining to the Borough.

The firſt time that Southwark is mentioned in hiſtory, is on the occaſion of earl Goodwin's ſailing up the river to attack the royal navy of fifty ſhips, lying before the palace of Weſtminſter. This was in 1052; when, we are told, he went *ad Suthwecree*, and ſtaid there till the return of the tide.

Although the borough of Southwark has ſo long been a ward a ward of the city of London, it ſtill retains the privilege of ſending two members to parliament, as it has done ever ſince the 23d Edward I.; but it is not aſcertained when it firſt ſent repreſentatives. The right of election is in the inhabitants paying ſcot and lot, amounting to about 3200.

The things moſt worthy of note in the borough-town of Southwark, properly ſo called, are the churches, the hoſpitals, and the priſons.

The pariſhes are St. George the Martyr, St. Olave, (part of this pariſh is in the city of London,) St. John Horſelydown, St. Saviour, (commonly called St. Mary Overy's,) St. Thomas, and Chriſtchurch: theſe pariſhes were found, in 1811, to contain 12,217 houſes, and 72,119 inhabitants; *viz.* 33,611 males, and 38,508 females. The families chiefly employed in agriculture were 116, and thoſe occupied in trades, manufactures, and handicraft, 10,510.

Churches.—The pariſh church of St. George the Martyr is ſituated a little to the ſouth of the Marſhalſea. The original edifice was of very ancient foundation, and belonged to the abbey of Bermondſey, to which it was given, in 1122, by Thomas Arderne. Being in a very ruinous ſtate, the pariſhioners obtained an act of parliament for taking down the old church, and erecting another; in conſequence of which the preſent ſtructure was begun in 1734, and finiſhed in 1736. In the old church was interred Edward Cocker, the celebrated arithmetician; and the infamous biſhop Bonner, who died miſerably in the Marſhalſea in 1569, is ſaid to have been buried in the church-yard, under the eaſt window.

St. Olave's church is ſituated in Tooley-ſtreet, near the ſouth end of London-bridge. The original edifice is mentioned as early as 1281, but the date of its erection is unknown. Part of this old church having fallen down in 1736, an act was obtained to rebuild it, and the preſent ſtructure was finiſhed in 1739.

Eaſtward of St. Olave's is the pariſh of St. John Horſelydown, corruptly ſo called from Horſe-down having been originally a grazing-ground for horſes. St. John's is one of the fifty new churches ordered by act of parliament to be built in the metropolis, and was finiſhed in 1732, when this diſtrict was ſeparated from St. Olave's, and conſtituted a diſtinct pariſh.

St. Saviour's church, commonly called St. Mary Overy, originally belonged to a nunnery founded by a female, prior to the Norman conqueſt, and endowed by her with the profits of the ferry acroſs the river Thames at this place before the erection of London-bridge. This houſe was afterwards converted into a college for prieſts, by whom the firſt bridge over the Thames was built of wood, and kept in repair, till they were enabled, by the munificence of benefactors, to ſupply its place by another of ſtone. In 1106 the college was transformed into a priory of canons regular; but theſe were ſcarcely ſettled, when the biſhop of Wincheſter brought in ſecular canons in their ſtead. The revenues of this priory, at its ſurrender in 1539, were valued at 624*l.* 6*s.* 6*d.* *per annum.* On its ſuppreſſion, the inhabitants of Southwark purchaſed the church belonging to it, which was by charter appropriated to the joint uſe of the pariſhioners of St. Mary Magdalen and St. Margaret, by the name of St. Saviour's. This church is built upon the plan of a cathedral, though of ſmaller dimenſions. Part of the original architecture is perceived in the interior, near the weſt front of the church; as all the reſt of the fabric exhibits the ſtyles in uſe between the 13th and 16th centuries. The tower, ſtanding in the centre, riſes in three ſtories, the walls finiſhing with battlements, and being adorned at the angles with turrets and pinnacles. It was from this tower that Hollar took his celebrated views of London, both before and after the great fire in 1666.

This church has three chapels: *viz.* our Lady's, or the New Chapel, at the eaſt end of which is run out a ſmall monumental chapel, and which, after this edifice became parochial, was let for upwards of 60 years, by the churchwardens, for the purpoſe of a bake-houſe; St. John's, now the veſtry, on the north ſide of the choir; and St. Mary Magdalen's, on the ſouth ſide. In our Lady's chapel is a grave-ſtone, ten feet in length, on which was formerly a border, and a figure in braſs of a biſhop in his pontifical habit; it is ſuppoſed to cover the remains of the celebrated William of Wykeham, biſhop of Lincoln, and afterwards of Wincheſter, who died in 1395. Eaſtward of the altar is the monument of Lancelot Andrews, biſhop of Wincheſter, who died in 1626, aged 71. His effigy, in full proportion, habited as a prelate of the order of the Garter, lies on a tomb of black and white marble. At his feet are his arms, within a garter, between two ſmall figures of Juſtice and Fortitude. Here alſo is a pleaſing mural monument, from a deſign of Mr. Soane, to the memory of Abraham Newland, eſq., late caſhier to the bank of England, who was interred here November 28, 1807. In the north aiſle is a curious monument, with a ſtatue for Gower, one of the earlieſt Engliſh poets, and a benefactor of this church, to the rebuilding of which he contributed about the year 1400. On the wall are painted three female figures, crowned with ducal coronets, repreſenting Pity, Mercy, and Charity. See "The Hiſtory and Antiquities of the Church and Pariſh of St. Saviour," by Concanen and Morgan, 1 vol. 8vo, 1795.

St. Thomas's church ſtands on the ſouth ſide of St. Thomas's-ſtreet. The original church, being old and ruinous, was taken down, and rebuilt in 1702.

The pariſh of Chriſtchurch was taken out of that of St. Saviour, and was originally part of the diſtrict called the liberty of Paris Garden. The firſt church was erected at the expence of Mr. John Marſhall, of Southwark, and finiſhed in 1671; when he endowed it with an eſtate of 60*l.* *per annum*, towards the ſupport of the miniſter. This edifice, however, in conſequence of the badneſs of the foundation, ſoon became ſo ruinous, that, in 1737, Mr. Marſhall's truſtees applied to parliament for power to rebuild it, with the ſum of 2500*l.*, which had accumulated in their hands from the truſt; and obtained an act for that purpoſe. The preſent ſtructure was accordingly erected. It ſtands on the weſt ſide of the road leading from Blackfriars-bridge.

For the hoſpitals in and near the borough of Southwark, ſee *St. Thomas's* HOSPITAL, *Guy's* HOSPITAL, and *Magdalen* HOSPITAL.

Here we may mention ſome other charitable eſtabliſhments in the vicinity of Southwark. The Aſylum is a foundation for preſerving friendleſs and deſerted girls under twelve years of age from the danger of ſeduction and proſtitution. This excellent charity was ſet on foot by the well-known magiſtrate of Bow-ſtreet, ſir John Fielding. The firſt female children were admitted in July, 1758; and they are inſtructed in ſuch a manner as to render them moſt uſeful to ſociety. This building ſtands at an angle, formed by the meetings of the Weſtminſter-road from the Borough to the Stone's-End, and the direct road to Kennington and Vauxhall.

A little farther on the north ſide of the Weſtminſter-road is a neat modern edifice, called the Freemaſons' Charity-School, appropriated for female children from five to ten years of age; though no child who has not had the ſmall-pox, or who has any defect in her ſight or limbs, or is weak or ſickly, can be admitted. Every child applying for admiſſion, muſt produce a certificate from the maſter and wardens of the lodge in which her father was made a maſon, with a certificate of the marriage of her parents. Sixty girls are maintained and educated in this benevolent inſtitution, which owes its origin to the philanthropic mind of the late chevalier Bartholomew Ruſpini, of Pall-Mall.

To the ſouthward of this, and on the ſcite of the Dog and Duck tea-gardens, is a noble edifice, the new Bethlehem hoſpital, which coſt about 150,000*l.* in building. The edifice is large, commodious, and admirably adapted to its deſtination. It is intended to accommodate 400 patients, and has very recently been completed from the deſigns of James Lewis, eſq., architect. It was commenced in 1812, is about 580 feet in length, and is built chiefly with brick, having ſtone dreſſings, a bold portico in the centre, and a dome. About twelve acres of garden ground, &c. attach to this hoſpital, where ſome of the patients are allowed to exerciſe. Among the important improvements and reformations of the preſent time, is the humane and rational ſyſtem of managing inſane patients, that has been very recently adopted; and in the further improvement of which the Engliſh legiſlature is now engaged. See *Bethlehem* HOSPITAL.

At the point of conflux of the London, Weſtminſter, and Blackfriars-roads, we find an extenſive range of buildings for the protection and ſupport of the indigent blind, maintained, like the other inſtitutions that we have mentioned, by voluntary contributions. The unfortunate objects are taught to manufacture baſkets, clothes-lines, and ſaſh-cord, which are ſold at the ſchool. See BLINDNESS.

On the right-hand ſide of the London-road ſtands the building belonging to the Philanthropic Society, incorporated in 1806. See *Philanthropic* SOCIETY.

Near Cuper's bridge is eſtabliſhed the Refuge for the Deſtitute. The object of this moſt benign and excellent charity is to provide a place of refuge for perſons diſcharged from priſon, or the hulks, unfortunate and deſerted females, and others, who, from loſs of character, or extreme indigence, cannot procure an honeſt maintenance, though willing ſo to do. They are engaged in uſeful trades and manufactures ſuited to their ſexes; and as an incitement to good conduct, a certain portion of their earnings is ſet apart, and allowed them, if diſcharged with credit to themſelves.

Priſons, &c.—At the end of the Borough High-ſtreet is St. Margaret's Hill, the ſcite of the ancient church of the ſame name; which, being forſaken on the union of the pariſh with St. Saviour's, was converted into a ſeſſions-houſe and priſon, ſince removed to Mill-lane, and called the Borough compter. The whole has lately been rebuilt, but has nothing worthy of particular notice. In the front, facing Blackman-ſtreet, which is a continuation of the High-ſtreet, the huſtings for the election of repreſentatives for this borough are uſually erected. On the oppoſite ſide of the ſtreet was the Tabard Inn, which was the reſidence of the abbots of Hyde, in Hampſhire, whenever buſineſs or their parliamentary duty required their preſence in the metropolis. This was the houſe celebrated by Chaucer as the place of rendezvous for pilgrims repairing to Becket's ſhrine at Canterbury; and the very building deſcribed by him exiſted till 1676, when it was burnt, with the ſeſſions-houſe, and other contiguous edifices. When rebuilt, it was ignorantly called The Talbot, under an idea that this was the ſame with Tabard; and by that appellation it ſtill continues to be known.

On the north ſide of Tooley-ſtreet, next to the Thames, is the Bridge-houſe, a foundation which ſeems to be coeval with London-bridge; having been uſed as a ſtore-houſe for ſtone, timber, and other materials employed in its repairs. It is under the ſuperintendance of two officers, called bridge-maſters, who are elected by the livery of London. Below the Bridge-houſe, on the banks of the Thames, ſtood the inn of the abbot of Battle. The ſpot, ſtill called Battle-bridge, was thus named from a bridge over a water-courſe flowing out of the Thames, built and repaired by this prelate, on whoſe ground it was ſituated. In the front of this manſion were the gardens belonging to it; the recollection of whoſe embelliſhment is yet perpetuated by the Maze, and the Maze-pond.

On the eaſt ſide of Blackman-ſtreet is the Marſhalſea, a court of law and a priſon, originally intended for the determination of cauſes and differences between the king's menial ſervants, and under the controul of the knight-marſhal of the royal houſehold. It had particular cognizance of murders and other offences committed within the king's court. To this place alſo, perſons guilty of piracies and other offences on the high ſeas are committed, though the offenders are tried at the Old-Bailey, in London. The priſon, which contains about ſixty rooms, is too ſmall, and much out of repair. In 1377 it was broken open by a mob of ſailors, and four years afterwards by Wat Tyler's followers. It eſcaped, however, in the riots of 1780, though the King's Bench, the Borough priſon, and the Clink, were all at that time the objects of popular fury. See COURT *of Marſhalſea.*

The county-gaol and houſe of correction is ſituated in Horſemonger-lane, at the ſouth-eaſt end of Blackman-ſtreet. This gaol, which has been recently built, is excluſively for the county of Surrey. It was rendered remarkable in the year 1802, when colonel Edward Marcus Deſpard, and ſix of his aſſociates, were hanged upon a platform on the top of the gaol, being convicted of high treaſon, upon the evidence of an accomplice. The heads of theſe wretched perſons were ſevered from their bodies, and held up to the view of the ſpectators, numbers of whom fainted at the ſight.

At the ſouth-weſt end of Blackman-ſtreet is the priſon of the King's Bench, a place of confinement for debtors, and for all perſons ſentenced by that court to ſuffer impriſonment. It conſiſts of one large pile of brick buildings, comprehending 224 rooms. The ſouth centre has a pediment, under which is a chapel. The place is ſurrounded by a brick wall about thirty feet high, defended by *chevaux de friſe;* without which the marſhal, or keeper of the priſon, has very handſome apartments. Priſoners in any other gaol may remove here by habeas corpus. The liberties, or *rules,* as they are termed, extend about three miles round the priſon; and the right of reſiding in any part of them may be purchaſed by debtors at the rate of ten guineas for the firſt hundred pounds, and about half as much for each ſucceeding hundred pounds, of the ſums for which they are in cuſtody. Day-rules, of which three may be obtained in every term, may be purchaſed for four ſhillings and two-pence the firſt day, and three ſhillings and ten-pence the others. Each perſon muſt alſo give good ſecurity to the marſhal. The day-rules, however, only authoriſe the priſoner to go out on the days for which they are bought. The inſide of this extenſive priſon reſembles a ſmall town, from the circumſtance of its being furniſhed with butchers' ſhops, bakers', green-ſtalls, &c.; while the throng of people conſtantly at play give it the appearance of a fair. See COURT *of King's Bench.*

The Clink was a gaol at Bankſide for the confinement of ſuch as ſhould "brabble, fray, or break the peace on the ſaid bank, or in the brothel-houſes." This priſon ſtill exiſts, and has been repreſented as a filthy, noiſome dungeon. The biſhop of Wincheſter's ſteward tries pleas of debt, damages, or treſpaſs within the Clink liberty for any ſum.

Palaces, Theatres, &c.—Contiguous to the priory of St. Mary Overy, and nearly at the foot of London-bridge, was ſituated the biſhop of Wincheſter's palace. The houſe was built about 1107, by William Gifford, at that time biſhop of Wincheſter, upon a piece of ground belonging to the prior of Bermondſey. Biſhop Beaufort, uncle to Henry VI., on being created a cardinal on his return from France, was met by the mayor and aldermen of London, and conducted by them in great pomp to this his palace in Southwark. During the civil wars this place was for ſome time a priſon for the royaliſts. Sir Francis Doddington and ſir Kenelm Digby were both confined here at once; and here the latter wrote his book on "Bodies, &c." Wincheſter houſe was ſold by parliament, in 1649, to Thomas Walker of Camberwell, for 4380*l.* 8*s.* 3*d.* with the park included. The buildings, in the old plans of London, appear to have formed two court-yards, with various offices, &c. The ſouth ſide was bounded by beautiful gardens, ſtatues, fountains, &c.; the north ſide by the river; the eaſt by the monaſtery of St. Saviour; and the weſt by the Bear-gardens. The greater part of the building, which is ſtill remaining, is occupied by corn-lofts, warehouſes, &c.

What is now denominated Bankſide, was formerly a range of dwellings, licenſed by the biſhops of Wincheſter "for the repair of incontinent men to the like women," and denominated the Bordello, or ſtew-houſes. Theſe brothels were ſubject to various laws and regulations enacted by parliament; among which we find the following: "that they were to be kept ſhut on Sundays and holidays; that no married women ſhould be received into them; that no man ſhould be drawn or enticed thither; and that no ſtew-holder ſhould keep any woman who had on her the venereal diſeaſe, then termed the 'perilous infirmity of burning,' or ſell bread, ale, fiſh, or any victuals." (See BURNING.) In 4 Rich. II. theſe houſes, then belonging to ſir William Walworth, lord mayor of London, were rented of him by froes, or bawds, of Flanders, and were deſtroyed by the Kentiſh rebels under Wat Tyler. It ſeems probable, that reſentment for the perſonal injury ſuſtained on this occaſion may have had its ſhare, as well as loyalty, in producing the action for which Walworth is particularly diſtinguiſhed. The ordinances reſpecting theſe houſes were, however, again confirmed by Henry VI.; but in 1506 they were for ſome time uninhabited. It was not long, however, before they were again opened, that is, ſo many as were permitted; "for whereas," ſays Fabian, "before were eighteen houſes, from thenceforth were appointed to be uſed but twelve only." Theſe privileged ſtews had ſigns painted on the fronts, which looked towards the Thames; as the boar's head, the croſs keys, the gun, the cardinal's hat, &c. Stow relates, that the women who frequented them were forbidden the rites of the church, and excluded from Chriſtian burial, unleſs they were reconciled to it before they died. A plot of ground, called the Single Women's church-yard, at ſome diſtance from the pariſh church, was therefore appointed for their interment. In 1546, theſe ſtews were ſuppreſſed by Henry VIII.; and it was proclaimed by ſound of trumpet, that they ſhould be no longer privileged and uſed as a common brothel, but that the inhabitants were to keep good and honeſt rules, as in other places of this realm.

Not far from St. George's church ſtood the magnificent palace of Charles Brandon, duke of Suffolk, the deſerving favourite of Henry VIII. After his death, in 1545, it devolved to the king, who eſtabliſhed here a royal mint. At that time it was called Southwark Place, and in great meaſure preſerved its dignity. Edward VI. once dined in it. His ſiſter and ſucceſſor preſented it to Heath, archbiſhop of York, as an inn or reſidence for him and his ſucceſſors whenever they repaired to London. As to the mint, it became a ſanctuary for inſolvent debtors; and at length, becoming the peſt of the neighbourhood, by giving ſhelter to villains of all ſorts, it arouſed the attention of parliament; which, by the ſtatutes 8 & 9 Will. III. and 9 & 11 Geo. I. entirely took away its abuſed privileges.

In the pariſh of Chriſtchurch, near the water on the Bankſide, ſtood Paris Garden, one of the ancient playhouſes of our metropolis. Ben Jonſon is reproached by Dekker, an envious critic, with his ill ſucceſs on the ſtage; and, in particular, with having performed the part of Zuliman at Paris Garden. It ſeems to have been much frequented on Sundays. This profanation, however, was at length fully puniſhed by a dire accident which befel the ſpectators in 1582; when the ſcaffolding ſuddenly fell, and multitudes of people were killed or miſerably maimed. The omen ſeems to have been accepted; for in the next century the manor of Paris Garden was erected into a pariſh, and a church founded under the name of Chriſt's church.

Near this ſcene of amuſement were the Bear-garden, and a place for baiting of bulls. "Herein (Stow tells us) were kept bears, bulls, and other beaſts to be baited, as alſo maſtives in ſeveral kennels nouriſhed to bait them. Theſe bears and other beaſts are there kept in plots of ground ſcaffolded about for the beholders to ſtand ſafe." This was at that time an amuſement for perſons of the firſt rank: our great Elizabeth cauſed the French ambaſſadors to be carried to this theatre, to divert them with theſe bloody ſpectacles.

Not far from the ſpot in which the Bear-garden was, near Bankſide, is Globe-alley; ſo called from that theatre which flouriſhed in 1603, with a licence under the privy ſeal, granted by James I. to Shakſpeare, Fletcher, Burbage, Heming, &c. and where the plays of our inimitable Shakſpeare were firſt repreſented. See PLAYHOUSE.

About ten years after it had been licenſed, "by the negligent diſcharging of a peal of ordnance, cloſe to the ſouth ſide thereof (ſays Stow), the thatch took fire, and in a very ſhort ſpace the whole building was quite conſumed, and no man hurt, the houſe being filled with people to behold the play of Henry VIII." In the following ſpring it was rebuilt; but in the next reign it fell into diſrepute. See an intereſting account of and diſquiſition on the Globe theatre and the old playhouſes in the Gentleman's Magazine for 1816, and in Malone's and Chalmer's accounts of the Engliſh ſtage, in the third volume of the edition of Shakſpeare's Plays, 1813.

St. George's Fields, which have borne their ſhare of celebrity in ancient times, having frequently been the ſcene of grandeur and cavalcade, and ſometimes the rendezvous of rebellion and tumult, and which, leſs than half a century ago, were mere marſhes, and only paſſable to foot-paſſengers, are now almoſt covered with newly-erected buildings, from the ditch at the end of Great Surrey-ſtreet, or Burrow's buildings, to the Fiſhmonger's alms-houſes, in one direction; and from the Marſhalſea priſon to the late Dog and Duck, in the other direction; with ſeveral irregular indentions in its circumference. Where the principal roads meet, an Obeliſk was erected in 1771, in honour of Braſs Croſby, eſq. the patriotic lord mayor of London, who had been confined in the Tower, with alderman Oliver, for the conſcientious diſcharge of his magiſterial duty. An inſcription on one ſide of it expreſſes the cauſe of its erection; and thoſe on the other three ſides mark the diſtances from Fleet-ſtreet, London and Weſtminſter bridges. This obeliſk is about a mile from the one at the end of Bridge-ſtreet, on the city ſide of Blackfriars-bridge.

One of the new bridges for which acts of parliament have recently been obtained, is deſigned to croſs the Thames from the bottom of Queen-ſtreet, Cheapſide, to Bankſide, and to be called the Southwark bridge: it is alſo propoſed to form a handſome ſtreet from the foot of it to St. Margaret's Hill.

In Union-ſtreet, northward of the mint, is Union-hall, a handſome ſtructure, appropriated to the purpoſes of a police office for the Borough.

At the foot of Blackfriars-bridge is a large range of buildings, which were erected by a company of gentlemen ſome years ſince, with a view of counteracting the impoſitions too common in grinding of corn. There was a ſteam-engine, made by Meſſrs. Boulton and Watt, of Birmingham, which turned ten pair of ſtones, each pair grinding nine buſhels of corn every hour, without intermiſſion by day or night; beſides which, it gave motion to the various apparatus for hoiſting and lowering the corn and flour out of and into the barges; for fanning the corn, to keep it free from impurities; and for ſifting and dreſſing the meal from its firſt ſtate, till perfectly cleared for the uſe of the baker. The accidental burning of theſe mills, on the 3d of March 1791, forms a kind of epoch among the remarkable fires that have occurred in and about the metropolis. Such a body of light and heat was ſcarcely ever known as diſplayed itſelf on this occaſion. The fire broke out about ſix in the morning, and burnt with ſuch amazing rapidity, that the houſe of the ſuperintendant, at one corner of the building, was all that eſcaped the fury of the flames. Out of 4000 ſacks of flour, 36 only were ſaved. The front, &c. remained ſome years unrepaired; but the whole range has lately been formed into a row of handſome private houſes.

On the oppoſite ſide is Albion-place, containing the houſe belonging to the Britiſh plate-glaſs manufactory. This company, incorporated in 1773, carries on a flouriſhing concern here, and at their works at Ravenhead, in Lancaſhire.

On the weſt ſide of Blackfriars-road, near the bridge, is the building occupied a few years ſince by ſir Aſhton Lever's muſeum, removed thither from Leiceſter-ſquare, when, by lottery, it became the property of Mr. Parkinſon. This aſtoniſhing collection of ſubjects of natural hiſtory here experienced the moſt mortifying neglect, till, in 1806, it was finally diſperſed by public auction, in a ſale which laſted 40 days. The premiſes are now occupied by the Surrey Inſtitution, one of thoſe uſeful eſtabliſhments which are intended to promote the diffuſion of ſcience, literature, and the arts, and which was opened March 25, 1808.

Surrey chapel, on the eaſt ſide of Blackfriars-road, is a large octagonal building, for the uſe of Proteſtants of the Methodiſt perſuaſion, under the Rev. Mr. Rowland Hill, a rather eccentric preacher, but a moſt worthy man. It is calculated to hold nearly 5000 perſons, and can ſeldom contain the numbers that flock to it for admittance. The organ, by Elliot, has been much admired for its ſweetneſs of tone, as well as for its extenſive powers: it has, in fact, been aſſerted, that on the performance of one of the hymns deſcriptive of thunder, many of the congregation have fainted.

The Royal Circus is ſituated at the end of Blackfriars-road, near the Obeliſk, before-mentioned. It originated in a ſubſcription in favour of Mr. Hughes, a riding-maſter, who, in conjunction with the late Mr. Dibdin, exhibited ballets, pantomimes, and horſemanſhip, with conſiderable ſucceſs. Through ſome diſagreement this houſe was ſeveral years ſhut up; but was at length opened by Meſſrs. Jones and Croſs. In Auguſt 1805, the whole building was conſumed by fire, but in the courſe of the following year it was rebuilt in a manner ſuperior in taſte and elegance to the former ſtructure. Under the management of Mr. Elliſton, of Drury-lane theatre, the exhibition of horſemanſhip was aboliſhed; and, with the new appellation of the Surrey theatre, this place has acquired more of the ſpirit and character of the legitimate drama. Bray's Hiſtory and Antiquities of Surrey, 3 vols. folio. Deſcription of Surrey in the 14th vol. of the Beauties of England, &c. by F. Schoberl, 1813. Picture of London, 1815. Pennant's Account of London. Oldfield's Repreſentative Hiſtory of Great Britain, 6 vols. 8vo. 1816. See the article LONDON, in a preceding part of this work; alſo LAMBETH, SURREY, NEWINGTON-BUTTS, and ROTHERHITHE.

SOUTHWARK, *Eaſt*, a townſhip of Pennſylvania, in Philadelphia county; containing 7264 inhabitants.

SOUTHWARK, *Weſt*, a townſhip of Pennſylvania, in Philadelphia; containing 6443 inhabitants.

SOUTH WASHINGTON, a town of North Carolina, on the N.E. branch of Cape Fear river, which is navigable ſo far for boats; 36 miles from Winnington.

SOUTHWELL, or SUELL, called *Suthell*, an ancient market-town and pariſh in the wapentake of Thurgarton, and county of Nottingham, England, is 14 miles N.E. of the county-town, and 138 N.N.W. from London. It is ſeated on a gentle eminence, on the bank of the river Greet, celebrated for its red trout. Some writers have conjectured it to have been the Ad Pontem of the Romans, but without ſufficient grounds of authenticity. There is, however, an ancient intrenchment in the vicinity. Its modern appellation is ſaid by Dugdale to owe its origin to a ſpring or well to the ſouthward of the church. The government of the town is divided between the clergy, called prebends, and laity, or juſtices: the former exerciſing authority over one part of the town, called the Prebendage, including the collegiate church and its property; and the latter over the other part, called the Burgage, which comprehends all that part between the market-place and the river. The cuſtos-rotulorum, and the magiſtrates for this juriſdiction, who are nominated by the archbiſhop of York, and conſtituted by a commiſſion under the great ſeal, hold their ſeſſions both at Southwell and at Scrooby, and perform all other judiciary acts diſtinct from the county. A collegiate church is ſaid to have been founded here by Paulinus, archbiſhop of York, about the year 630, and this ſeems to have been always under the patronage of the prelates of that ſee, though the firſt grant we meet with of this is by king Eadwy to archbiſhop Oſcytel, in 958. It appears by Domeſday book, that here were ſeveral canons at the Conqueſt, but the number of ſixteen was not ſettled till the next century, and ſo many continue to this day; for though the then archbiſhop ſurrendered this church to king Henry VIII., 1540, yet he eſtabliſhed the chapter ſhortly after, and endowed it with the greateſt part of its ancient poſſeſſions; and though it ſuffered again in the time of Edward VI., it was reſtored by Elizabeth, and confirmed by James I.

The collegiate church is a large, ancient, and very curious edifice. It conſiſts of a nave, with two aiſles, two towers at the weſt end, a tranſept, a choir with aiſles, and a chapter-houſe. The extreme length from E. to W. is 306 feet, width of tranſept from N. to S. 121 feet, and breadth of nave 59 feet. The oldeſt parts, the nave, weſtern towers, and tranſept, are commonly ſaid to be of Saxon architecture, built during the ſhort reign of Harold; but we ſhould rather refer them to an age after the Norman conqueſt. The choir, with its ſplendid ſtone ſtalls, as well as the very beautiful chapter-houſe, are all about the date of Edward III.'s reign. Between the nave and the choir is a ſtone ſcreen of very elaborate workmanſhip, with niches, pilaſters, pinnacles, crockets, &c. A large alabaſter altar-tomb is raiſed in this church to the memory of archbiſhop Sandys. In the church-yard was a college for chanting-prieſts. Here is now a free-ſchool, under the care and government of the chapter, who chooſes the maſter. Two fellowſhips and two ſcholarſhips in St. John's college, Cambridge, are in the preſentation of Southwell college. Theſe were founded by Dr. Keton, canon of Saliſbury, in the time of Henry VIII. The archbiſhops of York formerly had a palace here, ſituated on the ſouth ſide of the church-yard, and which was once a large and elegant building: the ruins of it are ſtill extenſive, but diveſted of all its architectural forms. Some windows, and a circular chimney of the age of Henry VIII., yet remain, and being deeply overſhadowed with ivy and emboſomed in trees, add much to the romantic beauty of the place. The archiepiſcopal parks were once four in number; or, according to Leland, three; but they have been divided and encloſed ſince the deſtruction of the palace in the civil war of Charles I. During thoſe unhappy times the king was often here; and the town frequently experienced the fate of war. Southwell, according to the population return of 1811, contained 561 houſes, occupied by 2674 perſons: though not a place of much trade, it has a reſpectable market on Saturdays, and an annual fair. Dickinſon's Hiſtory and Antiquities of Southwell, 4to. 1787. At the end of Dugdale's Hiſtory of St. Pauls, is an account of the church of Southwell. Thoroton's Hiſtory, &c. of Nottinghamſhire, by Throſby, in 3 vols. 4to. 1790.

SOUTH WEST Point, a poſt-town of Teneſſee, at the confluence of the Clinch with Teneſſee river, where a block-houſe is erected; 40 miles from Knoxville.

SOUTHWICK, a townſhip of America, in the ſtate of Maſſachuſetts, and county of Hampſhire; 110 miles from Boſton: incorporated in 1770, and containing 1229 inhabitants.

SOUTHWIST. See Wist.

SOUTHWOLD, a market-town in the hundred of Blything, and county of Suffolk, England, is ſituated on an eminence overlooking the German ocean, but nearly ſurrounded by the river Blyth, which here diſcharges itſelf into the ſea. Its ancient name was Sudwald, or Southwood. It is diſtant from Ipſwich 36 miles N.E., and 105 miles, in the ſame bearing, from London. The manor was an ancient donation from Alfric, biſhop of the Eaſt Angles, to the abbey of Bury St. Edmunds, by which it was held for the victualling of the monks. From the dimenſions of this manor given in Domeſday Survey, Gardner, in his Hiſtory of Dunwich, calculates that the ſea has ſince gained upon this coaſt one mile, one furlong, and nineteen perches. In the tenth year of Henry IV. Southwold was exempted from the payment of any cuſtoms or tolls, for their ſmall boats, paſſing in or out of the river or port of Dunwich. Henry VII., in conſideration of the induſtry and good ſervices of the men of Southwold, made the town a free burgh or corporation, to be governed by two bailiffs, a recorder, and twelve aldermen; to whom and the commonalty he gave his lordſhip, called Queen's demeſne revenues, and alſo the privilege of admiralty, for the annual payment of 14*l.* He further granted them exemption from all dues and cuſtoms payable to Dunwich, and conferred on the town the rights of a haven, which probably cauſed the denomination of the port of Dunwich to be changed to that of Southwold. Henry VIII. not only confirmed all his father's grants, but added many gifts, franchiſes, and immunities. Theſe royal favours gave great encouragement to the trade and navigation of the town, of which the fiſhery conſtituted a material part, being carried on by merchants, who annually fitted out veſſels for taking cod and other fiſh in the North ſea. The herring-fiſhery off their own coaſt was highly conducive to the proſperity of the town. Though in ſome degree affected by the diſſolution of religious houſes, yet Southwold retained an extenſive trade, and ſurpaſſed all the neighbouring towns in ſhipping and commerce. But the greateſt calamity that ever befel it was on the 25th of April, 1659, when a fire, heightened by a violent wind, conſumed, in the ſpace of a few hours, the town-hall, market-houſe, priſon, granaries, warehouſes, and 238 dwelling-houſes, and other buildings, with the principal part of the goods and merchandize of the inhabitants; the total loſs exceeded 40,000*l.* to the ruin of more than 300 families, ſo that the town never recovered its former importance. About a century afterwards the commerce was conſiderably improved: the entrance to the haven being ſubject to be choaked up, an act of parliament was obtained for repairing and improving it: one pier was erected on the north ſide of the port in 1749, and another on the ſouth in 1752. The eſtabliſhment of the Free Britiſh Fiſhery, about the ſame time, alſo contributed to the proſperity of the town; two docks were conſtructed, and various buildings erected for making nets and depoſiting ſtores. A chapel appears to have been built here in the reign of king John, by the prior and monks of Thetford, who were patrons of the church of Reydon, to which Southwold was then only a hamlet. This chapel being deſtroyed by fire about 220 years after its erection, the preſent edifice was erected about 1460, and was then made parochial, and in 1751 was ſeparated from Reydon, and made a diſtinct curacy. The length of this fabric is 143 feet; the width 56 feet: it has two aiſles, ſeparated from the nave by ſeven arches, and ſix pillars of elegant workmanſhip. The tower, about 100 feet in height, is a fine piece of architecture. Though Southwold has many good houſes, it has no other building worthy of particular notice. On the cliffs are two batteries, one of which is a regular fortification, with a parapet and ſix guns; the other has but two. On a hill called Eye-hill, veſtiges are ſeen of an ancient encampment, which Gardner conjectures to have been a camp of the Danes, when they invaded the country in 1010. The population of Southwold in the year 1811 was returned to parliament as 1369; the houſes 326. A reſpectable market is held on Thurſday; and here are two annual fairs.

Southwold-bay, commonly called Sole-bay, is celebrated as the ſcene of a moſt obſtinate and ſanguinary engagement in 1672, between the combined fleets of England and France on one ſide, and the Dutch on the other. The former, conſiſting of 101 ſail, were lying in this bay on the 28th of May, when the Dutch fleet, compoſed of 91 men of war, 54 fire-ſhips, and 23 tenders, commanded by the famous De Ruyter, bore down upon them ſo unexpectedly, that many of the ſhips were obliged to cut their cables, that they might get out more expeditiouſly, and arrange in order of battle. The French bore but a ſmall part in the engagement, which was vehemently conteſted by the Engliſh and Dutch during the whole of the day, till at nine at night, the Dutch veſſels being dreadfully ſhattered, were obliged to retreat, and the Engliſh, having equally ſuffered, were not in a condition to purſue them. In this conflict the Engliſh loſt ſix ſhips, and about 2003 men killed and wounded. The Dutch loſt only three ſhips; their loſs in men muſt have been very great, but the States forbade the publication. Hiſtorical Account of Dunwich, &c. 4to. 1754. Beauties of England and Wales, vol. xiv. Suffolk, by F. Schoberl.

SOUTO MAJOR, a town of Portugal, in the province of Beira; 14 miles N.W. of Pinhel.

SOUTOUX, an Indian village of Louiſiana, on the W. ſide of the Miſſiſippi river, oppoſite to the Nine-mile Rapids, and 28 above Riviere de la Roche. N. lat. 41° 50′.

SOUTSONE, a town of Little Bucharia; 150 miles W.N.W. of Caſhgar.

SOUVERABO, a town of Africa, on the Grain Coaſt.

SOUVERINHO, a town of Portugal, in the province of Alentejo; 17 miles W.N.W. of O Crato.

SOUVIGNY, a town of France, in the department of the Allier, and chief place of a canton, in the diſtrict of Moulins; 6 miles W. of Moulins. The place contains 2659, and the canton 10,022 inhabitants, on a territory of 340 kiliometres, in 11 communes.

SOUZA, LOUIS DE, in *Biography*, a Portugueſe writer, born at Santarem, was ſon of a man of rank, governor of the caſtle of St. George de la Mina. He was educated to the profeſſion of arms, and ſerved firſt in the order of Malta, when he was taken priſoner by the Turks. After recovering his liberty, he ſerved with the troops in America and the Eaſt Indies. After this he married, but the loſs of a child and other afflicting circumſtances impreſſed both him and his wife with a ſpirit of devotion, and they took the religious habit in the Dominican order, De Souza changing his baptiſmal name of Manuel for that of Louis. He had already acquired a good ſhare of literature, and had written an elegant preface to the Latin poems of Falcone. He was, therefore, choſen to write the hiſtory of his order in Portugal in the vernacular tongue, of which he printed the firſt volume, folio, in 1623. From his papers two other volumes were printed after his death. He was author alſo of the "Life of Dom. Bartholemew, one of the Martyrs," printed in 1619, and of which a French tranſlation has been given; and "A Hiſtory of John III. King of Portugal," which has not been publiſhed. De Souza is accounted one of the beſt writers of his country.

SOW, in *Geography*, a river of England, in the county of Stafford, which runs into the Trent, 3 miles E. of Stafford.—Alſo, a river of England, in the county of Stafford, which runs into the Avon, 4 miles N. of Warwick.

SOW, in *Zoology*. See SUS, HOG, and SWINE.

SOW, in the *Iron-works*, the name of the block or lump of metal they work at once in the iron-furnace. The ſize of theſe ſows of iron is very different, even from the ſame workmen and the ſame furnace. Theſe furnaces having ſand-ſtone for their hearths and ſides, up to the height of a yard, and the reſt being made of brick, the hearth, by the force of the fire, is continually growing wider; ſo that if it at firſt contains as much metal as will make a ſow of 6 or 7 cwt., at laſt it will contain as much as will make a ſow of 20 cwt.

SOW, in *Ancient Military Language*, a kind of covered ſhed, fixed on wheels, under which the beſiegers filled up and paſſed the ditch, ſapped or mined the wall, and ſometimes worked a kind of ram.

Some ſay it derived its name from the ſoldiers lying under it cloſe together, like pigs under a ſow; though another reaſon is given for that appellation, namely, its being applied to digging and rooting up the earth. The former was alluded to by the counteſs who defended the caſtle of Dunbar againſt king Edward III., when ſhe threatened, that unleſs the Engliſhmen kept their ſow better, ſhe would make her caſt her pigs. Camden, who mentions this circumſtance, ſays, "the ſow is yet uſed in Ireland." Two machines, the one called the boar and the other the ſow, were employed by the parliamentarians in the ſiege of Corfe-caſtle, Dorſetſhire. The ſow was ſimilar in conſtruction to the *Cattus*, (which ſee), cat-houſe, or cat, ſo called becauſe under it ſoldiers lay in watch, like a cat for its prey; ſome of theſe cats had crenelles and chinks, from whence the archers could diſcharge their arrows; theſe were called caſtellated cats.

SOW, or *Hop-ſow*, in *Agriculture*, a name applied in ſome diſtricts, as in the county of Eſſex, to a tool or contrivance for pulling or forcing up hop-poles out of the earth in which they have been fixed. It is conſtructed of a ſtout ſtrong tapering ſort of pole or ſtake, about three inches in diameter, and five feet in length, to which, at the diſtance of nearly a foot from the lower or larger end, is firmly fixed and clinched a ſmall bar of iron, about half an inch ſquare, and a foot long, which is bent nearly in the middle, ſo as to form an acute angle with the ſtake, four inches or rather more being open at the upper end of it, which make a ſort of hook with the ſtake, by which the pole is graſped, and the inſide of the iron bar being raiſed and roughed by the ſmith, ſomewhat in the manner of teeth, when fixed upon the lower end of the hop-pole, near the ſurface of the ground, is enabled to bite and hold it faſt; when, by the lower end of the tool being made to reſt upon the ground on the oppoſite ſide of the hop-pole to that on which the workman ſtands, and the whole acting as a lever, is readily, and with facility, made to raiſe or lift the hop-pole out of its ſocket in the ſolid ground, though it may be ſet a foot or more into it.

It is a ſimple, cheap, and effective invention for accompliſhing this neceſſary purpoſe in hop-management. In the county of Kent, the implement employed in the ſame intention is denominated a *hop-dog;* and thoſe in other hop diſtricts have moſt probably the ſame name given to them. See HOP.

SOW-*Bread*, in *Botany*, &c. See CYCLAMEN.

The roots of the round-leaved ſow-bread with a purple under-ſide, have a nauſeous, acrid, biting taſte: by drying their acrimony is abated; nevertheleſs, when taken internally, they betray a great degree of irritating power. Dried and powdered they have been given in doſes of a drachm, and found to operate as a ſtrong, inflammatory, but ſlow cathartic. The juice is ſaid to purge when applied externally to the belly in ointment; and the juice or bruiſed root to be of great efficacy for ſoftening and diſcuſſing indolent hard tumours. The flowers are of a different nature, and have not been uſed medicinally; and the uſe of the roots is now, among us, in a great meaſure, laid aſide. Lewis.

SOW-*Thiſtle*. See SONCHUS.

The common ſow-thiſtle has been much recommended by authors as a refrigerant and attenuant. It was preſcribed by many of the old phyſicians in ſtranguries, and other diſorders of the urinary paſſages; and ordered externally in cataplaſms, in all kinds of inflammations.

SOW-*Thiſtle, Downy*. See ANDRYALA.

SOW *and Pigs*, in *Geography*, rocks in the German ſea, near the E. coaſt of England, and the county of Northumberland; 3 miles E.N.E. of Blythe. N. lat. 55° 9′. W. long. 1° 12′.—Alſo, rocks on the coaſt of Maſſachuſetts, in Buzzard's bay, lying off the S.W. end of Catahank iſland.

SOWAGEPOUR, a town of Hindooſtan, in Bahar; 27 miles N.N.W. of Hajypour.

SOWERBÆA, in *Botany*, was ſo named, by the writer of the preſent article, in commemoration of his friend and fellow labourer, Mr. James Sowerby, F.L.S., &c. an excellent botaniſt and artiſt, to whoſe accuracy and acuteneſs of obſervation he acknowledges himſelf to have been often indebted, in the courſe of his own botanical ſtudies and publications; and to whom various other authors have been no leſs obliged.—Sm. Tr. of Linn. Soc. v. 4. 218. Ait. v. 2. 231. Brown Prodr. Nov. Holl. v. 1. 285.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Spathaceæ*, Linn. *Aſphodeli*, Juſſ.

Gen. Ch. *Cal.* Common Sheath of ſeveral membranous, permanent ſcales; the outer ones ovate, concave; inner in many fine ſegments. *Cor.* Petals ſix, ovate, equal, permanent; three of them interior. *Stam.* Filaments ſix, ſhort, broad, flattened, obtuſe, three of them barren; anthers three, on the three filaments oppoſite to the interior petals, oblong, each of two linear ſpreading lobes, of one cell, ſlightly connected a little above their baſe only, divaricated at each end, permanent. *Piſt.* Germen ſuperior, roundiſh, with three furrows; ſtyle thread-ſhaped, permanent; ſtigma ſimple. *Peric.* Capſule roundiſh, three-lobed, of three cells and three valves; the partitions from the centre of each valve. *Seeds* one or two in each cell, angular, rough.

Eſſ. Ch. Sheath of many valves. Petals ſix. Stigma ſimple. Anthers with diſunited cells. Three alternate filaments barren. Seeds nearly ſolitary.

1. S. *juncea*. Ruſh-leaved Sowerbæa. Sm. Tr. of Linn. Soc. v. 5. 159. t. 6. Ait. n. 1. Br. n. 1. Ker in Curt. Mag. t. 1104. Andr. Repoſ. t. 81.—Native of Port Jackſon, New South Wales. Firſt cultivated by Meſſrs. Lee and Kennedy, in 1792. It is a hardy greenhouſe herbaceous plant, flowering in the early part of ſummer, and eaſily increaſed by parting its fibrous perennial *roots* in the ſpring, planting them in peat-earth. The whole *herb* is ſmooth, deſtitute of a ſtem. *Leaves* numerous, radical, ſheathing, erect, linear, acute; channelled above; ſemi-cylindrical beneath; their ſheaths crowned internally with a ſimple membranous *ſtipula*, like that of a graſs. *Stalk* ſolitary, erect, ſimple, above a foot high, taller than the leaves, bearing a rather denſe umbel, of copious, elegant, roſe-coloured, ſcentleſs *flowers*, much reſembling thoſe of ſeveral ſpecies of *Allium*, on capillary partial *ſtalks*, each of which has, as Mr. Brown remarks, a joint under the flower. The *capſules* become pendulous as they ripen, each encloſed in its ſhining, ſcarcely altered, *corolla*. *Anthers* yellow.

The authority of Mr. Brown, who has examined this plant in its native country, induces us to correct ſome of our ideas concerning it, which indeed had never been very firmly impreſſed in our mind. The cells of the *anthers* prove to be ſimple, and though they firſt open at the top, by a ſeeming pore, they ſoon ſplit all the way down, by a furrow, which gives them the appearance of being two-celled. Though nearly ſeparate, therefore, through their whole length, theſe cells together conſtitute but one *anther*, as in the SCITAMINEÆ, ſee that article, whoſe cells are ſtill further disjoined. The genus of *Sowerbæa* is, nevertheleſs, perfectly diſtinct, though nearly related to *Allium*. The herb, when bruiſed, has no peculiar ſcent.

SOWING, in *Agriculture*, the act of ſcattering, or putting the ſeeds of grain, plants, &c. on or into the ground, in order to their producing crops. See SEED.

With regard to the period or ſeaſon of ſowing, or putting crops into the ſoil, it is remarked, that the moſt proper and advantageous ſeaſon for ſowing or ſetting ſuch as poſſeſs the habit, or are capable of perfecting and ripening their ſeed or produce in the ſame year, is that of ſome of the more early ſpring months, according as they are more forward or late in their kinds, and the climate more mild, or the contrary; while, on the other hand, ſuch as are, from the peculiarity of their nature or habits, incapable of completing their vegetation in the ſame year, the moſt favourable period will be ſome of the more early autumnal months, according to the differences of their habits, and the variations of climate and ſeaſon: as by theſe means, in the former caſe, the ſeeds, grains, or roots, become perfectly evolved, and the radicles of the young plants firmly eſtabliſhed in the ſoil, and capable of ſuſtaining themſelves againſt the hot ſeaſon ſets in, which is to bring them to maturity; and, in the latter, the ſeeds have attained ſuch a ſtate of growth, and ſo far fixed their roots in the ground, as to be capable of ſupporting themſelves, without ſuſtaining much injury from the ſeverity of the winter ſeaſon, and conſequently advance with greater rapidity in their vegetation in the ſpring, in order to perfect their ſeed by the heat of the ſummer ſeaſon.

And it is further ſtated, on the authority of lord Orford, that the practice is adviſed of ſowing certain ſorts of grains and ſeeds, and alſo of ſetting particular kinds of roots, at much earlier periods in the ſpring than is commonly had recourſe to by the farmer. Thus, it is ſaid, by putting barley into the ground in the beginning of February, great advantage has been ſuppoſed to have been derived in the forwardneſs and fineneſs of the grain. But againſt this method it has, however, been ingeniouſly ſuggeſted by Dr. Darwin, that as much moiſture, with or without ſubſequent froſt, is more liable to deſtroy the embryo in its very early ſtate in the ſeed, than after it has ſhot out roots and a ſummit, and thus acquired ſome habits of life, ſuch early ſowing muſt, in ſome caſes, be practiſed with caution. But that ſuch an objection cannot be brought againſt the early autumnal ſowings.

The crops of autumn-ſown wheat ſhould be conſtantly put into the ground in the latter end of September, or beginning of the following month; but the former, if poſſible. And the ſpring-ſown kinds ſhould not be later than the end of March; as, when later ſown, they never ripen well. And with oats and barley crops, February, March, and April, are the ſeaſons uſually had recourſe to. But from grain ſeeds and roots requiring ſuch different lengths of time in arriving at maturity, the particular period at which each ſort of grain, ſeed, or root, ſhould be ſown, ſet, or put into the earth, with the greateſt chance of ſucceſs, will be more fully noticed, ſeen, and pointed out, in ſpeaking of the cultivation and growth of the different ſorts of crops.

The laſt mentioned ingenious writer has likewiſe remarked, that the difficulty of determining the beſt ſeaſon for ſowing, or putting in ſeeds in the ſpring, owing to the variation of the weather in the ſame latitude, as well as of laying down or fixing the exact ſeaſons for ſowing in different latitudes, occaſioned Linnæus to form or conſtruct what he terms a calendar of Flora, which was afterwards adapted to this climate by Stillingfleet; and which conſiſted in obſerving the firſt appearance of the root-ſcions, or flowers of the uncultivated native vegetables; with directions to ſow the *cerealia*, or harveſt-ſeed, when ſuch plants or flowers became viſible. By attention to obſervations of this kind, on ſuch ſorts of uncultivated plants, in many climates, the above writer conceives ſuch tables might be conſtructed, as would point out the moſt proper times of ſowing the moſt uſeful ſeeds or grains in every latitude and ſituation. And he further adds, that another tabular view of the climates where plants grow naturally, and of their native ſituations, in reſpect to moiſture or dryneſs, hill or valley, with the kind of ſoil where they were originally found, might alſo contribute to their ſucceſsful cultivation.

The following is the order of leafing of a few trees and ſhrubs, which Mr. Stillingfleet has put down, as noticed by himſelf, in the county of Norfolk, in the year 1755.

Plants.	Seaſons.	
1. Honeyſuckle	January	15
2. Gooſeberry	March	11
3. Currant		11
4. Elder		11
5. Birch	April	1
6. Weeping willow		1
7. Raſpberry		3
8. Bramble		3
9. Briar		4
10. Plum		6
11. Apricot		6
12. Peach		6
13. Filbert		7
14. Sallow		7
15. Alder		7
16. Sycamore		9
17. Elm		10
18. Quince		10
19. Marſh elder		10
20. Wych elm		12
21. Quicken-tree		13
22. Hornbeam		13
23. Apple-tree		14
24. Abele		16
25. Cheſnut		16
26. Willow		17
27. Oak		18
28. Lime		18
29. Maple		19
30. Walnut		21
31. Plane		21
32. Black poplar		21
33. Beech		21
34. Acacia robinia		21
35. Aſh		22
36. Caroline poplar		22

Alſo, the conformity between vegetation and the arrival of certain birds of paſſage is, he ſays, extraordinary. Of this he gives an inſtance, marked down by himſelf, in the above-mentioned county, in his diary of the ſame year.

April 16th, young figs appear.
17th, the cuckoo ſings.

And he notices, that the word κοκκυξ ſignifies a cuckoo, and likewiſe a young fig; and that the reaſon for it is, that in Greece they appeared together. He alſo ſtates, that the ſame year he firſt found the cuckoo-flower to blow the 19th of April. He likewiſe further adds, that, according to Linnæus, the wood anemone blows from the arrival of the ſwallow. In his diary for the year 1755, he finds the ſwallow appeared April the 6th, and the wood anemone was in blow the 10th of the ſame month. He adds alſo, that the marſh-marigold blows when the cuckoo ſings; and according to his diary, the marſh-marigold was in blow April the 7th, and the ſame day the cuckoo ſung.

It has alſo been remarked, that a due temperature of the ſeaſon, with reſpect to heat or cold, drought or wet, (for all theſe greatly influence the ſtate of the earth,) is eſſentially neceſſary, and ſhould be carefully attended to by the cultivator, when he ſows; but the preciſe time moſt proper for this work cannot, by any means, be invariably fixed, becauſe it will always depend on the concurrence of a variety of circumſtances. The ſeaſons are more or leſs forward, and the ground is more or leſs dry, in ſome years than in others. A proper ſeries of well-made obſervations would furniſh the beſt rules in this reſpect, but certainly would not fix the time of ſowing to any particular day or week, for years to come. Linnæus's method, of carefully obſerving the foliation of trees, &c. would determine the proper time for ſpring ſowing. And Pliny, after mentioning the ſeveral conſtellations by which farmers were guided in his time, inſtructs the farmer with regard to autumnal ſowing, upon a principle ſimilar to that of the great modern naturaliſt. Why, ſays he, does the huſbandman look up to the ſtars, of which he is ignorant, whilſt every hedge and tree point out the ſeaſon by the fall of their leaves? This circumſtance will indicate the temperature of the air in every climate, and ſhew whether the ſeaſon be early or late. This conſtitutes an univerſal rule for the whole world; becauſe trees ſhed their leaves in every country, according to the difference of the ſeaſons. This gives a general ſignal for ſowing; nature declaring that ſhe has then covered the earth againſt the inclemency of the winter, and enriched it with this manure.

It can, therefore, only be obſerved in general, that it is better, as has been ſuggeſted, to ſow early in autumn than too late, provided the ſeaſon will admit of it; becauſe the plants are better able to reſiſt the ſeverity of the winter, after they have acquired a certain degree of ſtrength; and their roots being then longer, and conſequently better fixed in the earth, they will be leſs liable to be thrown out by the froſt. For this reaſon, in particular, perhaps the colder the climate is, the earlier the wheat ſhould be ſown. Some lands are of ſuch a nature, that they ſwell greatly in hard froſts; and ſubſiding again upon a thaw, leave the roots of plants quite bare upon their ſurface. There have indeed been years, in which fields ſown very late, for inſtance in December, have done extremely well; but that ought not, on any account, to be made a rule, experience ſhewing that ſuch late ſowings very ſeldom anſwer. On the other hand, the corn is likewiſe expoſed to many dangers, when ſown too early; for the ſtalks, which ſhoot up before winter, cannot well bear hard froſt; though wheat would not be hurt by them, when only in the blade. M. de Chateauvieux is clearly of opinion, that though the proper time of the year for ſowing be come, the corn ſhould not be put into the ground, if the temperature of the ſeaſon be not favourable; and that, on the contrary, the ſowing of it ought to be deferred, in hopes of a change. If, ſays he, the weather is very hot, and the earth extremely dry, it will be abſolutely neceſſary to wait till ſome rain has fallen; for otherwiſe the ſeed will riſe but very imperfectly. This he is ſure of, by which he contradicts the common ſaying of ſome farmers, that the earth is the beſt granary to keep the corn in. Full of this notion, whenever the ſtated times come round, they ſow, without diſtinction, in wet land or in dry. Even heat does not hinder them: they think their ſeed will certainly ſprout well after the firſt rain; but he has always experienced that the plants have come up thin. But to ſatisfy himſelf ſtill farther on this point, he tried an experiment purpoſely to know whether corn can be ſown, with any reaſonable expectation of ſucceſs, when the weather is very hot, and the earth very dry. Upon reading M. Duhamel's Treatiſe on the Preſervation of Corn, he has obſerved that he had found, by his experiments, that wheat dried in a ſtove, heated to 60 degrees of M. de Reaumur's thermometer, had loſt its faculty of growing. From thence he conjectured, that wheat which ſhould undergo a heat, for example, of 30 degrees during a longer time, would be equally parched up, and rendered incapable of vegetating. He conſidered the earth, when hot and dry, as a kind of ſtove, in which the ſeed, if it remain too long without receiving any moiſture, may become ſo dry, that the greateſt part of it will never be able to ſprout. This reaſoning is juſt, and he therefore determined to have recourſe to that truſty guide, experience.

He was ſure that the wheat which he ſowed was perfectly ſound, and in every reſpect capable of growing. It was, therefore, quite clear, that ſo great a number of grains out of the whole, which did not ſprout at all, loſt the faculty of growing, by their being parched up by the heat and dryneſs of the earth. To be ſtill more certain of this, three weeks after he had ſowed theſe grains, he watered half of them ſeveral times, but to no purpoſe; not one of them roſe, and he found ſeveral of them quite whole in the earth where he had ſown them.

Upon the whole he concludes, from his own repeated practice, that the beſt time for ſowing, in ſuch a climate as Geneva, (which differs very little from our's,) is from the 20th of Auguſt to the end of September; and thinks that even the firſt fortnight in October may be taken in, if the land cannot poſſibly be ſowed ſooner. But he allows of this only in a caſe of neceſſity, and judges that, rather than ſow later, it is beſt to ſtay till ſpring. Thus, ſays he, it is that experience and obſervation teach us to leave off bad cuſtoms, or ſuch as are not founded on principles with which a man of ſenſe may reſt ſatisfied.

In the northern tracts of the iſland, where the ſummer ſeaſon is not of much length, but ſtormy and extremely variable in the ſtate of the weather, early ſowing is ſaid to have been lately found to be attended with many advantages; and that the prejudices in favour of a late performance of this ſort of buſineſs is faſt wearing off; as the good effects of putting ſeed into the ground as early as the ſeaſon will admit, are ſo evident, in ſuch a climate, and the benefit of the practice ſo great and manifeſt, that the moſt prejudiced are beginning to ſuſpect their late ſowings to be bad, and that the practice of thoſe who eagerly catch and embrace the very firſt opportunities which the ſtate of the weather will allow, of ſowing their grain crops, bids the faireſt for ſaving them, at the latter end of the ſeaſon. The hazard to be dreaded from it with ſome ſorts of grain, as oats, is very little, while the benefit to be derived is very great. The advantages of it are very important, in having the beſt part of the ſummer ſeaſon for bringing the crops to full perfection, which increaſes the value of the grain, and in having long days and a favourable ſeaſon for cutting, collecting, and ſecuring the produce in perfect condition: while late ſowing, on the contrary, occaſions the riſk of having the crops expoſed, after being cut, for weeks together, in the fields, under rotting rains, until the ſheaves become each a maſs of vegetation. Inſtead of fixing upon any exact period for commencing the buſineſs of ſowing, which is extremely abſurd, eſpecially in ſuch a climate, the prudent cultivator will regulate his conduct in this reſpect by the ſtate of the weather, and the appearances which have been ſuggeſted above. And as the gardener forms an annual calendar of the weather for himſelf, by what he ſees coming on in his garden; ſo ſhould the farmer, by the courſe of experience and information, learn to diſtinguiſh the proper times for performing the particular operations of his art; not, however, by having recourſe to any preciſe or ſet period of the ſeaſon, but by reference to certain natural appearances, which may indicate the mildneſs or clemency of particular ſeaſons, or the contrary. This may be particularly uſeful in the buſineſs of ſowing different kinds of crops.

In many diſtricts towards the ſouthern extremity of the kingdom, the utility and benefits of early ſowing have been likewiſe noticed and experienced, as the earlieſt ſown crops, eſpecially of the wheat kind, have been almoſt invariably found the beſt. This opinion, which is of ſome ſtanding, is, in ſome meaſure, confirmed by the aſſurance, that nearly the whole of the famous crops which have been produced and talked of by the farmers in theſe diſtricts, were raiſed from early ſowings. Now and then a crop may contradict this concluſion, but they are very rare, and moſtly ariſe from ſome unobſerved circumſtance in the land which produced them. There can, therefore, be no reaſon for doubting that more early ſowing than is at preſent practiſed, in many caſes and circumſtances of land, may be highly advantageous and beneficial to the farmer, not only in the quantity of produce, but in ſeveral other ways.

It is of the greateſt conſequence to the farmer, that ſeed in ſowing be placed in the earth at a proper depth, and in the beſt manner; but experience is yet wanting to determine with due exactneſs, what is the depth which beſt ſuits each kind of grain in different ſoils. In the ſpring ſowings, when there is moſtly much moiſture in the ſoil, from the wetneſs of the previous ſeaſons, leſs depth may be required than in the ſummer, where the land is rendered more dry and parched. From half an inch to an inch and a half, may be fully ſufficient for the ſeeds of the grain, turnip, and carrot kinds, ſo as that they may be fully protected from birds and inſects. And for root-ſets, ſuch as potatoes, from two to four inches, in proportion to the ſtate of the ſoil, may be quite ſufficient.

But, in the very early autumnal ſowings, as from the exceſſive drying heats of the ſummer ſeaſon, there muſt in common be a deficiency of moiſture in the earth, it may be better to have the ſeed put in ſomewhat deeper, as from two inches to three or more, in order that their vegetation may not only proceed more ſpeedily, but their roots be more fully guarded from the effects of the froſty nights, which uſually take place ſoon after ſuch ſowings. And in this way they are more effectually protected from the attacks of birds and other vermin, which are generally more eager and deſtructive in their attacks, from the diminiſhed quantity of food at ſuch periods of the year.

However, in general, as the proceſs of ſprouting or early vegetating is found to be greatly promoted by the ſeed being fully ſupplied with oxygen air, it may be the moſt beneficial practice to have them put into the ſoil, in rather a ſuperficial manner, or but lightly covered, as by ſuch means they may be the moſt fully ſupplied with atmoſpherical air. And for this reaſon, too, it may be the moſt advantageous method to have the ſeeds or roots depoſited in the ſoil as ſoon as poſſible after it has been turned up by the plough or ſpade, as, in ſuch circumſtances, it muſt contain the largeſt proportion of atmoſpherical air among its conſtituent particles; which, it is obſerved by Dr. Darwin, may be neceſſary to ſtimulate into elevation the plume of the embryo plant, as the moiſture of the earth is neceſſary to ſtimulate the root into its elongation downwards.

The particular ſtate of the ſeaſon and climate in which the ſowings or plantings are performed, may likewiſe have ſome influence on the crops. It has been commonly ſuppoſed that the beſt practice is that of ſowing in dry ſeaſons, and ſetting out plants in ſuch as are moiſt; but it is obvious, a late a late writer thinks, that, in ſo far as the ſowing is concerned, this buſineſs ought, in ſome reſpect, to be conducted according to the differences of the qualities of the lands and the nature of the climate, in regard to its warmth, or the contrary. Thus, in the drier and more mellow and porous deſcriptions of ſoils, and the more warm and genial climates, it may, in many caſes, be advantageous, not only to ſow in the wet, or rather moiſt ſeaſons, but alſo at more early periods, than in ſuch as are more retentive of humidity; as from the moiſture being commonly, in ſuch ſorts of lands, quickly diſſipated, a more certain and expeditious vegetation of the ſeed may in this way be ſecured. But in the more heavy and wet kinds of ſoil, where the climate is colder, it will conſtantly be a more beneficial method to chooſe, if poſſible, a dry and warm ſeaſon for performing the buſineſs of ſowing or putting in the crops, as by ſuch means the grain will be more certain of vegetating, and in leſs danger of periſhing by the over-abundant wetneſs, and the want of heat in ſuch lands and climates. And it has been juſtly remarked by Dr. Darwin, that in ſome clayey grounds, much ſoftened by rain, if the ſeed be put into holes and a dry ſeaſon ſucceed, an almoſt impenetrable cruſt may be produced by the quick exhalation of the moiſture, and what is termed by the farmers, the ſetting of the clay; and in this manner the vegetation and early growth of the crop be much retarded, or in a great meaſure prevented. And that though it has been ingeniouſly ſuggeſted that uſeful purpoſes in the early vegetation of ſome ſorts of plants may be anſwered by the ſowing of the fruits or huſks that ſurround particular kinds of ſeeds and berries, no experiments have yet been made to ſhew whether the ſowing the chaff, or covering of the grain with it, might not, in particular circumſtances of the ſoil and climate, be of utility in affording it warmth and protection in the firſt ſtages of its growth.

With regard to the methods of ſowing or putting the ſeed into the earth, there are different ones in uſe, not only in diſtricts where the nature and qualities of the ſoils are different, but in thoſe in which they have have much ſimilarity. It is obſerved, that the moſt general and common mode, as well as that which is more or leſs prevalent in almoſt every part of the kingdom, is that of ſowing or caſting the ſeed over the ſurface of the ground by means of the hand, having it afterwards covered to a proper depth by harrowing. In this method of performing the buſineſs, the moſt uſual practice, eſpecially where the ridges are equal in breadth, and not of too great a width, as five or ſix yards, is that of diſperſing the ſeed regularly over each land or ridge in once walking round; the ſeedſman, by different caſts of the hand, ſowing one half going and the other in returning. In doing this, it is the cuſtom of ſome ſeedſmen to fill the hand from the baſket or hopper which they carry along with them, as they make one ſtep forward, and diſperſe the ſeed in the time of performing the next; while others ſcatter the ſeed, or make their *caſts*, as they are termed by farmers, in advancing each ſtep. Mr. Parkinſon ſtates, in the account which he has given of Iriſh farming, that he found a good ſower the moſt difficult thing to be met with; in fact, he did not himſelf know the true art of ſowing ſeed broad-caſt until he went to America, and the man from whom he took the idea there attracted his notice, from the particular manner in which he walked while ſowing, which was preciſely as if he had been blind, keeping his eyes on the ſeed as he threw it, by continually looking upwards. It is conſequently evident, that in accompliſhing this buſineſs with regularity and exactneſs, upon which much of the ſucceſs of the crop muſt depend, there is conſiderable difficulty, and the proper knowledge and habit of which can only be acquired by experience. Wherever this method of putting in the ſeed is had recourſe to, it is conſequently of importance for the farmer either to perform the operation himſelf, or to be careful in ſelecting ſuch perſons as are converſant with the buſineſs, as he may otherwiſe incur much unneceſſary expence in the waſte of ſeed, and run conſiderable riſk in reſpect to his crop. Mr. Marſhall, finding a great waſte and inconvenience attending the broad-caſt ſowing, ordered his ſeedſman to walk on the left-hand inner furrow, with his face towards the land to be ſown, and to make his caſt diagonally, not acroſs the land. This gave him a great ſcope; and after a few minutes practice he made very good work: before night he walked at the rate of three or four miles an hour, and though a young ſeedſman, made as good work as could be wiſhed. A man walking in the ſmooth, open, inner furrow, may ſow three acres in leſs time, with more eaſe, than one walking among the rough clods and looſe mould could ſow two acres. This method proved ſuperior to the uſual way, being cropped as well, and with leſs ſeed. The extra expence of ſowing is about two-pence an acre, but the ſaving of the ſeed was at leaſt two ſhillings *per acre*. The method obſerved was for the ſeedſman to walk up one ſide of the ridge or bed, and down the other ſide; always keeping his face, and the hand with which he ſows, towards the bed he is ſowing. He always keeps his eye on the edge of the oppoſite interfurrow, and delivers his ſeed principally on the ſide of the bed next to it: as he returns, the ſides of courſe are reverſed, and the beds become evenly ſeeded. An old ſeedſman, who has been uſed to throw large handfuls with all his might, in wide caſts ſtraight acroſs his walk, will find it aukward at firſt to make the ſnug diagonal caſt which is neceſſary in ſowing five-bout beds ſingly.

But it is obſerved, that the uſual way of ſowing in broad-caſt cannot anſwer all the intentions of placing the ſeed properly in the earth, and muſt be attended with ſeveral inconveniencies: ſuch as the ſeed's becoming the prey of various birds and animals; its being laid ſo ſuperficially, that the ſun often parches it, or a long continued rain, inſtead of promoting a kindly vegetation, ſoaks into the grains, and burſts them; the ſeed is very unequally ſown, becauſe of the inequality of the handfuls which different ſowers graſp, and a great part of it neceſſarily falls together into hollows, where the ſurface of the ground is any way unequal, &c. And that, ſenſible of theſe diſadvantages, farmers have, eſpecially for their winter grain, ſometimes adopted the method of ſowing under-furrow, that is, ſowing one half of the ſeed in broad-caſt, and then ploughing it in; and afterwards ſowing the other half, which is covered by harrowing. But this method is alſo liable to almoſt as many objections as the other; for the quantity ſown in each particular ſpot, and the equal diſtribution which ought to take place throughout the whole, cannot but be even more uncertain than in the broad-caſt, where the whole is ſown at once; nor dares the farmer, in this ſowing under furrow, omit ſowing the ſecond quantity, leſt a great part of what has been ploughed down be buried ſo deep that it cannot riſe, eſpecially if the ſoil is at all ſtrong. And another general fault in the common way of ſowing is, that too much ſeed is employed; partly becauſe cuſtom has eſtabliſhed a kind of rule in that reſpect, and partly on account of the allowances which it is neceſſary to make for what the birds eat, and for what lies too deep ever to riſe; the circumſtances by which a very great quantity of corn is abſolutely loſt. See BROAD-CAST *Sowing*.

There are inconveniencies and difficulties in this manner of ſowing, on many other accounts; as where the lands or ridges are liable to vary in their dimenſions or breadths at the different ends or parts, the ſowing is not performed without great trouble and waſte of ſeed, as the ſcattering of it, in turning ſo often on the different parts, is prevented from being effected in ſo regular and exact a manner, as when the ſeedſman is directed by a particular furrow-ſlice. The ſowing is, therefore, ſometimes very imperfect in ſuch caſes, even with good ſeedſmen. In ſowing in this way there are probably, too, leſs economy, leſs exactneſs in many points, and leſs attention provided for the management of the crops, while they are growing afterwards.

Sowing in the broad-caſt manner has, however, many advocates, and is probably the moſt prevailing practice in moſt diſtricts of the kingdom; and ſome think that, in common, all ſorts of grain produce the largeſt quantity on the acre, when ſown in this method. It ſhould, notwithſtanding, perhaps give way to the machine practice of ſowing, wherever it can be had recourſe to with eaſe and facility.

In general it is, however, ſuppoſed, that theſe inconveniencies may be prevented by the drill method of ſowing, which drops the ſeed at whatever depth and diſtance experience has ſhewn to be the fitteſt for the particular kind which is ſown; fills all the furrows with earth, ſo that none of the grain remains uncovered; and lets fall into each furrow the exact quantity of ſeed which has been found to be moſt proper. In this way the ſeed is of courſe diſtributed with greater regularity and exactneſs, both in regard to depth and the diſtance of the rows, by which the crops not only ſucceed better, but are more capable of being aſſiſted in their culture afterwards; while much ſeed is ſaved. It is likewiſe believed to have many other advantages over the common method of ſowing. See Drilling.

It evidently admits more air and light for the growth and maturation of the crops, and produces a better and more abundant quantity of them. In ſowing wheat and other grain crops in this way, they ſhould probably not have more ſpace between the rows than about ſeven inches; but in other kinds it ſhould vary, according to the nature and habits of the growth of the plants, and the ſtate of the ſoil. The ſowing in this way in too thin a manner has often been injurious to the cultivator.

Sowing is ſometimes performed likewiſe in methods between thoſe of the broad-caſt and the drill, as by means of tools with different numbers of ſhares. The ſowing is, in theſe caſes, executed, when the land becomes firm and rather ſolid, immediately after the tool, over the whole ſurface of the land in the broad-caſt way, the ſeed moſtly falling into the little furrows or openings that are left by the implement. In ſowing in this manner, there are the advantages, it is obſerved, of having the land firm between the ſmall drills, of the ſeed taking firmer hold of the ground, of its being readily performed and attended with little trouble, of the ſeed coming up with great regularity, of the crop being leſs liable to accidents, in conſequence of the action of the ſun and air being more free, of its affording a greater facility in the after-culture, and of the quantity of grain being increaſed. On light and dry ſoils, this mode of ſowing is ſaid to be attended with the beſt effects. Some, however, think that one caſt before and another after this tool is the moſt preferable mode of ſowing.

But whatever may be the benefits of ſowing in the drill manner, it has hitherto made no very great progreſs, though it is evidently a moſt uſeful method.

There are alſo other methods of ſowing, as by dibbling, dropping, and ſetting with the hand, which, under different circumſtances, are found very beneficial modes. See Dibbling and Ridge.

Theſe are, however, methods which are only ſuited to particular ſituations and circumſtances of land.

All theſe different ways of ſowing, or putting the ſeed into the ground, may perhaps be found uſeful, and be practiſed with ſucceſs, under different circumſtances and conditions of land; as where one mode is improper, or not capable of being had recourſe to, another may be ſubſtituted, in order to ſupply its place, and accompliſh this important buſineſs of the farmer, in the moſt proper and deſirable manner.

In ſowing ſmall ſeeds for plants, conſtant attention is neceſſary to the times or periods at which the plants will be wanted for ſetting out as crops, and the different ſowings made accordingly. For theſe ſowings, ſmall ſuitable portions of land, in a fine ſtate of preparation and cultivation, and which are well ſecured, are always to be choſen. The ſowings for cabbage, and other ſimilar ſorts of plants, ſhould be made at two or three different times, both for the autumn and ſpring crops, in order that the plants may be ſtrong and healthy. And for raiſing ſpring plants of the ſeveral different other kinds, as thoſe of the lettuce, or other ſimilar ſorts, the ſeeds ſhould be ſown at two or more ſeparate times, in the early ſpring ſeaſon, that good plants may be in readineſs for ſetting out, when wanted. In general, ſmall ſpaces of ground will be ſufficient for theſe purpoſes, as they may contain the quantities of plants which are neceſſary. The ſowings, in ſuch caſes, are to be made in a regular, but not too thick a manner; the plants being afterwards, when of ſome growth, properly thinned, that they may become ſtrong plants. In ſowing ſome ſorts of ſmall ſeeds, it is uſeful to mix a little aſhes, or ſome other ſimilar ſubſtance, with them, to make them ſow better. The ſowing of graſs-ſeeds ſhould always be performed in as regular and exact a manner as poſſible. See Grass and Grass-*Land.*

Sowing *of Seeds*, in *Gardening*, the practice of putting ſeed into the ground, in the garden manner; in which different methods are made uſe of, according to the ſorts: as broad-caſt ſowing and raking-in, drill ſowing, bedding-in ſowing, &c.; in each of which there are ſome advantages in different ways.

The firſt is the moſt common and expeditious method of ſowing, both for many of the principal crops to remain, and for tranſplantation; and is performed by ſowing the ſeed with a ſpreading caſt evenly all over the ſurface of the ground, either in one continued plat, or when divided into beds, which is immediately raked with a large rake, to bury all the ſeeds a due depth in the earth; ſome requiring to be raked in as light as poſſible, others half an inch or an inch or more deep, according to their kinds and ſizes, &c.

In preparing for this method of ſowing, the ground is previouſly dug over in the common way, or in ſuch a manner as is neceſſary; making the ſurface level with the ſpade, as the work proceeds; and, according to the nature of the ſeed, ſowing it as ſoon as poſſible afterwards. And this ſort of ſowing ſhould generally be performed in dry weather, particularly the early ſowings in winter and ſpring; but in hot weather, in ſummer and autumn, it may often be eligible to take advantage of ſowing immediately after a ſhower of moderate rain. And as to the ſowing the ſeed in the broad-caſt way, it is effected occaſionally both with an open and locked hand. In the former caſe, it is performed by delivering the ſeeds with an open hand, and broad-ſpreading caſt, as practiſed in ſowing corn in the open fields, previouſly ſtepping out the ground in breaks, or certain widths, tages of theſe methods, ſee the articles DRILL, DRILLING, HOEING, HUSBANDRY, and *Drill* MACHINE.

Mr. J. Horn of Dover, Kent, conſtructed an *univerſal five-furrow machine* of this nature, which he recommended as ſuited for either broad-caſting or drilling all the different ſorts of grain, pulſe, and ſeeds, with equal regularity and eaſe, as well as in any quantity or proportion, and depth, that may be thought proper. And which alſo poſſeſſes, he ſays, the peculiar advantage of ſowing turnips, ſo as to enſure the crop againſt the ravages of the fly. This advantage is obtained by ſowing the *uſual quantity* of turnip ſeed *broad-caſt* by the machine, and at the ſame time ſtriking furrows at a proper diſtance apart in the land; by this means part of the ſeed is depoſited in the drills, and the reſt ſown in broad-caſt between them, ſo that if it proves a dry ſeaſon, it is favourable for that depoſited in the drills, if a wet ſeaſon, for that which is ſown broad-caſt between them: and if that part of the ſeed which is ſown broad-caſt is carried away by the fly, that which is depoſited in the drills, by coming at another period of time, is ſaved, and *vice verſâ*. If the whole grows, the farmer has then the opportunity of ſelecting the moſt vigorous plants from both. But notwithſtanding theſe ſtated advantages, the machine is, we believe, little employed by the cultivators of land.

No machine, as far as we know, has hitherto been invented, which is well contrived for, and adapted to, the purpoſe of general ſowing, though a great number of attempts of this kind have been made at different times, in the view of ſupplying ſo great a defect in the agricultural machinery of the country. They have all been found on trial, and when put fully to the teſt, to be materially defective in ſome important point or other, which rendered them either wholly uſeleſs, or only capable of being employed under particular circumſtances. This has been equally the caſe, whatever may have been the nature or kind of conſtruction, in which they have been formed. In order to conſtruct a machine to be generally uſeful in this intention, it muſt be free from every kind of fault or defect in the delivery of all ſorts of grain, pulſe, and ſeeds, be capable of very great nicety and variation in ſowing all theſe different articles, be very eaſy and exact in the movements of the internal parts, have great latitude of motion, giving way, and taking up in the ſhares or other parts, which are made uſe of in forming the little furrows or drills in the land, be capable of being guided and directed with eaſe and facility in a regular, ſteady, and exact manner, be cheap and reaſonable in the expence of its conſtruction, &c. But very few of theſe materially important points and objects have yet been accompliſhed in a full, complete, and ſatisfactory manner, in any of the ſowing machines which have been contrived and conſtructed. Some of them, as already ſuggeſted, have a defect in ſome one of the particulars, ſome others in another, by which means they become neglected and of no uſe to the farmer, whoſe ſowing muſt at leaſt be performed with a certain degree of correctneſs.

It is evident, therefore, from what has been ſaid, that the conſtructors of ſuch ſorts of machinery, to render it generally uſeful, ſhould have a full and competent knowledge of the moſt proper proportions or quantities of the above ſeveral kinds of articles which are to be ſown, as well as of the moſt ſuitable widths, diſtances, or ſpaces between the rows, which are neceſſary to be ſown and left, in different caſes and circumſtances, in ſowing with machines of this nature, as where this is not the caſe, there muſt frequently, if not generally, be much loſs ſuſtained in making ſuch machines to ſow too much or too little ſeed, as the differences in the ſeed, and the ſpaces which are required in different ſtates and circumſtances, and conditions of land and ſeaſon, are very great. The proportions of ſeed that are the moſt beneficial for early and late ſowing are by no means the ſame; nor does different kinds and ſtates of the ſoil admit of the ſame. They may differ alſo on ſome other accounts. The ſpaces, which are the moſt uſeful, likewiſe vary greatly in different kinds of ſoil, crops, and cultivation. It is conſequently ſeen, that a perfect knowledge of this ſort is abſolutely neceſſary, and that ſuch ſowing machines as are incapable of ſowing any kind of grain or ſeed in any proportion or quantity which may be required, are by no means fit for public or general uſe. In the internal parts of machines of this ſort there ſhould be great ſimplicity and incapability of being put out of order, the moving cylinders, or other parts ſupplying their places, being made ſo as to admit of great variation in the degrees of their motion or velocity. The utility of tin cylinders for this purpoſe is ſomewhat doubtful, and the ſhaking or ſifting principle has not been found to ſucceed well, except in the caſe of round ſeeds, ſuch for inſtance as thoſe of the turnip, cabbage, rape, clover, and ſome other ſimilar kinds, and even in theſe caſes ſometimes, with ſome of theſe ſeeds, a ſeed will ſtick in a hole which will permit another ſort to paſs in a free manner, and in thoſe ſorts which moſt readily paſs, there is rarely a deficiency of ſome ſmall ſeeds, of which two are capable of entering the ſame hole at the ſame time, which, by ſticking faſt together, impede and prevent the delivery in ſuch machines. On this account, ſome ſowing machines ſow too much of one ſort of ſuch ſeeds and ſcarcely half enough of another. Pierced cylinders of the tin kind might probably be made to ſow peas, which are nearly round in their form; but they would not be found to anſwer the ſame purpoſe for wheat or beans, and ſtill leſs for barley or oats. And the ſame may perhaps be the caſe in ſowing ſome other ſorts. It is therefore probable, that wooden or metal cylinders, which have grooves on their ſurfaces, and bruſhes to promote and regulate the delivery, are the beſt modes which have yet been diſcovered for effecting the purpoſe of ſowing in a proper manner in theſe machines, though they are far from approaching any ſort of perfection in the buſineſs.

The ſhares, or other contrivances, which are made for the purpoſe of forming the little drills or furrows in the ground for the reception of the ſeed, ſhould have great power and facility of moving and giving way in an upward direction in caſe of their meeting with any hard impeding ſubſtances in the ſoil, and that they may be uſed on all ſorts and forms of ridges. They ſhould alſo have the capability of being wholly taken up, when occaſion may require, as in turning at the ends of the ridges, and in removing from one place or field to another, in order to prevent the machine from being broken and deſtroyed.

Theſe machines ſhould likewiſe have great eaſe and capability given them of being directed and guided, while in their work, by the exact regulation of the ſhare or ſowing parts only, or by theſe in connection with the other parts, as where there is a want or any material incorrectneſs in this reſpect, the after-culture of the crops may be greatly impeded or wholly hindered from taking place.

There is, conſequently, a variety of points and circumſtances which ſhould engage the attention and conſideration of the agricultural artificer and mechanic, who is anxious to ſucceed in the conſtruction of uſeful machinery of this ſort, and particularly that of a general or univerſal ſowing-machine.

The article *Drill* MACHINE contains an account of ſowing

ing-machines that are intended to ſow the ſeeds in drills, and a minute deſcription of one invented by Mr. Salmon, which is very ſuperior to the others, as it is capable of being guided, and thus laying the drills in exact ſtraight lines, a circumſtance of the firſt importance in the operation of drilling, that the horſe-hoe, which is to paſs in the ſpaces between the drills, may not cut the young plants.

The term *ſowing-machine* is almoſt excluſively confined to ſome implements lately introduced for ſowing ſeeds in the broad-caſt manner, that is, for diſtributing them equally over the whole ſurface; and this operation can be much better performed by the aid of a machine, than by ſcattering it abroad by hand, as in the ordinary method. The moſt approved ſowing-machine is that of Mr. Bennet's, which is extremely ſimple: a ſlight wooden box, or trough, of a triangular figure, about five inches each ſide, and five or ſix feet in length, is held horizontally by the ſower, who carries it ſuſpended by a belt round his neck, ſo that the length of the trough is before his breaſt croſswiſe. The trough is filled with the ſeed which is to be ſown or diſtributed; and at the bottom angle of the trough is a ſlight wooden axle, extending the whole length of it. This axle is turned round by an endleſs band and a wheel, which is mounted in a frame upon the top of the trough, and furniſhed with a ſmall handle, conveniently ſituated for the ſower to turn it round, and thus give motion to it. The axle has ſeveral notches, or ſmall cups, cut in it at various places, and the bottom angle of the trough is open all the length; but the axle lying immediately beneath, cloſes the opening, and by hair-bruſhes is made ſo cloſe, that no ſeed can paſs, except when the axle is cauſed to revolve; the cups or notches then become filled with the ſeed, which is contained in the bottom of the trough, and they carry down their contents of ſeed through the bottom of the box, and it drops on the ground in a ſlight ſhower before the ſower. The cups or notches are ſo arranged at intervals round the axle, that they will diſtribute the ſeed in the moſt equal manner poſſible, upon the whole breadth of ground over which the trough moves, when it is carried forwards as the ſower walks in a ſtraight line from one ſide of the field to the other; but the regular diſtribution of the ſeed, in the direction lengthwiſe of his walk, will altogether depend upon the preciſion with which he turns the handle of the wheel with a regular motion. As this is rather difficult to effect, Mr. Bennet has made another machine, which runs upon a wheel, like a wheel-barrow; and the motion of this wheel is communicated by wheel-work to the central axle, ſo that it turns regularly, and diſtributes the ſeed always in a given proportion to the diſtance of land over which it travels. The trough of this latter machine is the ſame as the former; and the axle, with the notches, is ſituated at the bottom of it; but, inſtead of the belt, the trough is carried, by being fixed tranſverſely acroſs two long rails, which, at the fore-end, have the wheel between them, and the other ends are formed into handles, by which the ſower ſupports the machine, and wheels it before him in the ſame manner as a wheel-barrow. A pinion is fixed on the axle of the wheel cloſe to the ſide of it, and turns a wheel and ſpindle, extending to the wheel on the axis of the trough, to keep the ſame in conſtant motion, and deliver the ſeed regularly upon the ground, in proportion as the machine advances; and means are provided by which the rate at which the axle delivers the ſeed can be increaſed or diminiſhed at pleaſure, to diſtribute more or leſs ſeed upon the ground.

Another claſs of ſowing-machines are called dibblers, and are intended to make a ſmall round hole to receive the ſeeds, and then to drop them into it. We have ſeen ſeveral attempts to perform this operation by machines, but they have not fully ſucceeded. One of them was by means of a wheel provided with points projecting from its circumference, and placed at ſuch diſtances from each other as the holes were intended to be. The machine being wheeled along in the ſame manner as a wheel-barrow, the points of the wheel were intended to dibble or pierce holes in the ground over which it paſſed, and the machinery in the ſeed-box, which was fixed upon the handles behind the wheel, followed, and let fall the intended quantity of ſeed into each hole ſo made. The objection to this machine was, that the points of the wheel, in lifting up or drawing out of the ground, drew up with them lumps of earth, and ſoon clogged the whole.

An ingenious dibble or ſowing-machine, for acorns, was preſented to the Society of Arts by Mr. Waiſtell in 1811, an account of which is publiſhed in their Tranſactions for that year. The dibble, or piercer, which makes the hole in the earth, is an iron rod, a quarter of an inch in diameter, and about four feet in length, round pointed at the lower end, that it may penetrate the ground. At the upper end of the rod a handle is fixed, to draw it up and force it down by. This rod is contained within the hollow of a wooden tube or ſtaff, of the ſame length as the iron rod, and about two inches in diameter externally, ſo that the iron rod can be drawn up and down therein in the ſame manner as a rammer in the barrel of a muſket: the lower end of the ſtaff terminates in an iron tube, to which the iron rod is cloſely fitted, and the tube is made taper on the outſide. The point of the dibble, when put down into the tube, projects a very ſmall quantity beyond the end of the tube, and the whole is formed to a regular conical point, proper to pierce the ground. On one ſide of the ſtaff a tin tube is united to it, and communicates ſideways with the interior paſſage, or bore of the ſtaff, at about ſix inches from the point. This tube is continued nearly up to the top of the ſtaff, and is withinſide of the ſame bore as the aperture through the ſtaff.

The dibble is forced into the ground, to make the hole, by two handles, which project from it croſsways, on each ſide, at the upper end; and on each ſide of its point, or rather on each ſide of the iron tube which contains the iron rod, and forms the point of the dibble, are fixed two wings, or leaves of iron, projecting on each ſide about three inches. The operation of ſowing with this implement, is to force the dibble into the ground by its handles, and thus make the hole; then draw up the iron rod, ſo that its point riſes above the place where the tin tube communicates with the interior paſſage of the ſtaff, and drop the acorn down the tin tube, and it will paſs through that communication, and drop into the hole; the rod being preſſed in again, carries the acorn down to its place, in the bottom of the hole made by the point of the dibble. In drawing out the dibble from the ground, it muſt be gently turned round backwards and forwards, by which means the wings, or leaves, projecting ſideways from its point, will looſen the ſurrounding earth, and cover up the acorn.

A great advantage propoſed by the inventor of this implement is, that acorns can be planted by it in the middle of any buſh, without firſt removing it. For this purpoſe, the dibble is to be preſſed down into the ground through the buſh; then raiſing up the rod, ſo that its point will be raiſed above the point of communication between the interior of the tin tube and the cavity of the ſtaff, an acorn is to be dropped into the tin tube, which will fall down through the tube into the hole made by the point of the dibble. In drawing up the dibble out of the ground with the motion above-deſcribed, the earth will be covered in upon the acorn. Thorns, buſhes, and thickets, ſays Mr. Waiſtell, are the natural guardians of young oaks from the depredations of cattle of all kinds, in foreſts and other grounds where they paſture; and by this means, acorns may be depoſited in the interior of buſhes, as well as in open grounds, with rapidity and accuracy.

SOWING-*Plough*, that inſtrument of this kind which is employed for the purpoſe of ſowing, or of forming the land in a proper manner for the ſeed being put into it, after it has undergone the neceſſary ploughing. There are many ploughs of this ſort in uſe in different diſtricts of the kingdom, and they are conſtructed in ſeveral different ways in different places, and with very different numbers of ſhares, or contrivances for forming the little drills, or ſmall furrow-openings in the land, which are to receive the ſeed. They are made with three, five, ſeven, and nine of theſe ſhares or parts, according to circumſtances, and the intentions of ſowing which they are to ſerve. Low iron wheels, in combination with tines or teeth, are ſometimes likewiſe made to anſwer the purpoſe of forming the little openings for the ſeed in theſe ploughs. And they have many other variations in their ſtructure in other parts. Theſe kinds of ſowing-ploughs are now beginning to make their way, ſomewhat rapidly, in the mouldering chalky-land diſtricts of the country, particularly where the ſoils are of a light, dry, friable nature. They conſtitute, in ſome meaſure, a plan between the drill and broad-caſt methods of ſowing, as the ſeed is ſown or ſcattered over the land by the hand, after it has been furrowed by the plough in a ſuitable manner. The Berkſhire nine-ſhare ſowing-plough is ſaid to be uſed with the moſt beneficial effects. After the land is properly prepared and rolled, this plough is paſſed over it, and the grain or other ſeed ſown broad-caſt and harrowed in; by which means it comes up, it is obſerved, with as much regularity as if it had been drilled. It is indeed ſuggeſted, that in many ſoils and ſituations this ſowing-plough might undoubtedly be found preferable to the beſt drill-machine. See SOWING.

The preſſing-plough, and probably ſome others, are of this kind, though they may poſſeſs other highly uſeful properties, in different intentions. See *Preſſing*-PLOUGH.

The utility and preference in favour of theſe ſorts of ſowing-ploughs, probably, in a great meaſure, depend upon their being attended with but little labour, trouble, or difficulty in the performance of the buſineſs, and their requiring little knowledge in the perſons who conduct and manage them. There may alſo be ſomething on ſuch light ſoils, in their rendering the land more ſolid, in putting in ſome ſorts of crops, as thoſe of the wheat kind, &c. See TREADING and WHEAT.

SOWING-*Roller*, that ſort of implement of this kind which is conſtructed for the purpoſe of ſowing different ſorts of grain and ſeeds. Implements of this nature have been lately contrived, and formed in ſeveral different modes and manners, in the view of effecting this intention in a more complete and ſatisfactory manner than has been commonly the caſe formerly. They are, however, for the moſt part, ſtill defective in all or ſome of the ways which have been noticed in ſpeaking of ſowing-machines, and to be remedied, moſt probably, in the ways, and by the means, which have been there ſuggeſted and pointed out. See ROLLER.

In a ſowing-roller which has been lately invented, the heavy expence commonly attendant upon conſtructing ſuch implements, and their being moſtly applicable only to one particular purpoſe, has induced the inventor to fix and attach a complete ſeed-diſtributing apparatus to the common field-roller, which is capable of ſeeding, it is ſaid, any given number of little rows or furrows made in the ground by itſelf, or of ſowing the land broad-caſt, if that mode ſhould be preferred. This ſowing implement, which is wholly formed on the above principles, from its very great powers, the eaſe with which it may be conſtructed, being ſuch as that any tolerable good village wheelwright may put together, and the little liability there is of its being out of order, warrant, it is ſuppoſed, the aſſertion, that it is a more effectual ſowing tool than any which has yet been offered to the public. It is in this caſe calculated and conſtructed on a narrow ſcale, that is, with a roller of only four feet two inches in length, and twenty-eight inches in diameter; as ſuch a block of wood is eaſily to be procured in almoſt any ſituation, but it may be formed of much larger dimenſions.

This ſowing-roller conſiſts of a roller-part, the gudgeons of which pierce the ſhafts of the tool, and after paſſing through them about two inches, are bent at right angles, ſo as to form cranks, which, by means of parallel bars of communication, give a rotatory motion to a tin cylinder, which, for the ſowing of ſmall ſeeds, ſuch as thoſe of turnips, rape, cabbage, clover, and others of the ſame nature, may be about a foot in diameter, but for different ſorts of grain larger, and perhaps ſomewhat differently modified. This tin cylinder is to be ſhut at each end, by means of a piece of ſtout board, turned ſo as to fit exactly, and to be faſtened in with very great nicety and firmneſs. The whole ſurface of it is to be pierced with ſmall holes, ſo that when it is furniſhed with ſeeds, the revolutions of it may cauſe them to paſs through into the funnel for their diſtribution. It is alſo internally divided and ſeparated by ſeveral diaphragms of the tin kind, by which the ſeed is prevented, when the implement is on a declivity, from being thrown all to one end of the cylinder, by the force of its own weight or gravity. Each compartment is provided with a ſmall ſlider, which moves in a groove internally, by means of which it is ſupplied with ſeed when it is wanted. The axis, or axle-tree, is ſquare, from the end or place of its entrance into the cylinder, to that of its exit at the oppoſite end. Both ends of this axis, as well as thoſe of the gudgeons in the ends of the roller, are turned for cranks; but in order that there may be no poſſible check given to the motion of the cylinder, the two cranks, that is thoſe of the roller and of the cylinder, on the right ſide of the implement, are to be ſet at right angles with the direction of thoſe on the left ſide of it, ſo that when the former are vertical, the latter will be horizontal; as is ſeen to be the caſe in many pieces and ſorts of machinery, as in thoſe of windlaſſes for pits and wells, hand-mills, and ſome others, where two perſons are employed, one at each end of the power which gives the motion.

There is a ſtrong plank, about two inches in thickneſs, and two feet at leaſt in depth, which reaches all acroſs the tool; the whole of it that is above the ſhafts, reſting upon them by means of a ſhoulder at each end. It is ſupported by a ſtrong iron ſtay, as it is a part which muſt be very firm, on account of the whole ſtreſs of the ſhares bearing upon it. All of it that is above the ſhafts, which need not be more than eight inches, ſerves as a foot-board, while that part which is under the ſhafts forms the front part of the ſeed-funnel. A ſtrong wooden ſlip or ſtrap, for a ſupport, ſhould be faſtened firmly, at its upper end, to the ſide of the ſhaft, taking care that it be out of the way of the crank on the axis of the roller. The other end may be fixed as a buttreſs, at the back of the projecting elbow of the above plank or board, ſo as to ſtrengthen and enable it to reſiſt the preſſure occaſioned by the action of the ſhares. The back part of the funnel is formed by a thin deal board, which is ſecured at its upper part to the ſhafts. The ſides of the funnel are cloſed under the ſhafts with moderately thin deal boarding. The funnel, when ready for directing the ſeed, reaches within four or five inches of the ground; it has no bottom, ſo that when the implement is in motion, it will, in this ſtate, ſow broad-caſt with much regularity and exactneſs. When thus employed, however, inſtead of having the chain which hangs in loops, at ſix inches apart, all along the bottom part of the back-board, for the purpoſe of covering in the ſeed, and filling up the little furrows made by the ſhares in the buſineſs of drill-ſowing, a broad but ſhort harrow is to be fixed to, and appended from, the bottom part of the back-board, which, paſſing before the roller, covers the broad-caſt work, which is immediately afterwards compreſſed by the roller coming over it, and finiſhed. It muſt be noticed, that the loops of the chain uſed in drill-ſowing hang in thoſe parts of the back-board that lie over the intervals between the ſmall furrows. This is managed by having a number of tenters, into which a long chain may be looped, as the occaſion may require. The ſhares have each a ſtandard, the latter being long enough to meaſure the whole depth of the front board or plank noticed above. The foot part of theſe ſpreads a little at the heel, ſo that it may ſtand open to about two inches and a half at that part; the length of the ſole part may be five inches, and the inſtep about three inches, the point and the upper part being ſharp. At the back part of each ſtandard are two ſlit-ſprings, which ſerve to keep them tight, when they are put into the groove in the front board or plank. At the top, in the front part, for about eight inches downwards, the ſtandards are furrowed in an horizontal manner, ſo as to form teeth or cogs, which fit into the grooved bar that paſſes all acroſs the tool, whereby the ſeveral ſtandards, and the ſhares that are fixed to them, are capable of being either raiſed or lowered. This is effected by means of the ſmall winch handle. There are two rows of ſtaples driven through the front board or plank, and rivetted firmly within the funnel. Theſe ſtaples ſhould admit the ſtandards to paſs up them from below, when fitting into their places, and ſhould fit them exactly in breadth; but in depth ſome allowances ſhould be made for the play of the two back ſprings. The upper row of ſtaples ſhould be juſt between the ſhafts, the lower one within four inches of the bottom of the board. Great care ſhould be taken to place thoſe in the upper row perfectly in a line with thoſe below; and both lines ſhould be in a correct parallel with the grooved bar, otherwiſe they never will work up and down ſo freely, or in ſo proper a manner, as they ought to do. The ſtandards ſhould be about half an inch in breadth and nearly an inch in depth, from front to back, excluſive of the ſlit-ſprings, which are not to be rivetted, but welded on, that they may not weaken the ſtandards, which muſt alſo be perfectly ſmooth and ſtraight. The number of the ſtaples in each row is ſeventeen; but as it is ſuppoſed that ſix inches will be as ſmall an interval as will ever be wanted in this method of ſowing by means of drills, no more than nine ſhares can ever be required for the purpoſe.

The tabular form and repreſentation which is introduced below will give a clear view of the manner in which the ſhares ſhould be diſtributed in the ſeventeen ſets of ſtaples, which are calculated for ſowing any number of rows in this implement; conſidering always that the tool, in returning, muſt paſs more or leſs diſtantly from its preceding track, according as the vacancies on the right of the row of ſhares may indicate: thus, for inſtance, when ſowing at a foot interval, as both ends of the line will bear ſhares, a foot diſtance ſhould be allowed, as is exemplified in the third column below.

Sowing-Diſtance Table.

Staples.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	In returning leave a ſpace of
Intervals of ſix inches.	+		+		+		+		+		+		+		+		+	Six inches.
Nine inches.	+			+			+			+			+			+		Six inches.
Twelve inches.	+				+				+				+				+	Twelve inches.
Fifteen inches.	+					+					+					+		Nine inches.
Eighteen inches.	+						+						+					Three inches.
Twenty-one inches.	+							+							+			Twelve inches.
Twenty-four inches.	+								+								+	Twenty-four inches.

It is to be noticed, that the croſſes in the above table ſhew in which of the ſtaples the ſhares ſhould be ſet, in order to ſow at the diſtances expreſſed in the firſt column of it; all the other ſhares may be drawn up, or wholly taken out and removed.

The ſtaples are counted from the left of the implement;

calling that which is neareſt to the winch of the cylinder of it the firſt. The driver is alſo conſidered as beginning on the left of the field, and making up the broken parts, on the right of the numbers, &c. by preſerving about the diſtances ſpecified in the right-hand column of the table, taking the mark of the roller for his guide. In broad-caſt work he muſt return cloſe to his former track.

It remains now to be ſhewn how, or in what manner, the grain is brought into the little furrows made by the ſhares; for this purpoſe, the funnel is divided into ſixteen compartments; and for the very ſame reaſon, to make the ſeed fall equally through the bottom, when the implement may be working on a declivity. But all the partitions are made to ſlide out, they being formed in battened grooves. This is for the purpoſe of introducing the *drill bottoms*, as they are called; one of which is for nine rows, and another for three. Each of them, it is ſaid, is nothing more than a wedge-like block, which being let down into the bottom of the funnel, fits exactly at the edges; and by means of holes of a conical form, which are ſcooped out in it, and correſponding ſmall tin ſpouts below to direct what ſeed they reſpectively receive, in a forward manner, ſhooting it, as it were, under the hollow heel of the ſhare, diſtribute the ſeed into the number of furrows which are made for receiving it.

The middle hole or ſcoop only, however, is of equal extent to the right and left of the tin ſpout; the other two ſcoops are neceſſarily of a ſomething ſhelving or ſlanting form; it being indiſpenſable to allot to each ſpout an equal ſurface on the block; and to ſhelve the ſcooping to the ſpot where its ſpout is fixed.

The drill bottoms may thus be changed at pleaſure; the partitions will keep them duly in their places. But although there are ſixteen compartments in the funnel, no more partitions are to be uſed than may be neceſſary to correſpond with the number of ſcoops and ſpouts in the drill bottom. It is to be remembered, that, as there will be ſeed falling from the whole length of the cylinder into the funnel, and that as there will be occaſionally a portion of the drill bottom parted off, which has no ſpout, ſuch compartment ſhould when neceſſary be emptied, and the ſeed be put into thoſe diviſions only of the cylinder which are over the ſpouts.

The two ſhafts of the tool are connected firmly together by a ſtrong thwart or tie, and which, when the other parts are united with it, render the whole completely ſubſtantial. Under the hinder end or part of the ſhafts, a ſcraper is carried quite acroſs, and is bolted in with the croſs piece, which has an iron edge, and ſerves to diveſt the roller of the adheſive ſoil that would otherwiſe accumulate about it. The upper and under edges in the back part of the thwart are completely rounded off, ſo as to be ſemicircular. This thwart ſhould be inſerted as cloſe as poſſible to the back of the cylinder; becauſe its purpoſe is to aid a ſheep-ſkin wrapper in lapping round under it, thus keeping the ſeed in, when the cylinder ſhould not ſow. The wrapper extends the whole way acroſs, and ſhould be about two feet deep; each edge, that is of the top and bottom, but not of the ſides, ſhould be affixed to a lath, in order to make it draw backward and forward in a ſtraight line. The place ſhould be cut to about half an inch in length, by which means it will, when paſſed under the cylinder with the wool ſide upwards, repel the ſeeds when they attempt to preſs through the perforations. This wrapper ſhould always be paſſed under, while the implement is turning at the ends of the lands; but at other times it draws over the cylinder, the fleſh ſide uppermoſt, and ſerves to keep out wind and rain. There are two little pullies affixed into the ſhafts, cloſe under the fore-board, which ſerve to paſs cords over, ſo that by the aid of the rounded back of the thwart, the wrapper may glide eaſily, either over or under. When brought round under the cylinder, its front lath hitches to two hooks, under the half foot-board, in order to prevent its receding, and to keep it tight to the cylinder. It may be noticed, that it is of more importance to keep the wrapper tighter to the front than to the back part of the cylinder; becauſe the revolution of the latter being againſt that of the ſun, the ſame as that of the roller's when viewed from the left ſide, it is obvious, it is ſaid, the grain will caſt forward, and have a tendency to relinquiſh the hinder part of the cylinder, as it riſes in that part. It is likewiſe ſuggeſted, that although the axis of the cylinder in this implement is made to paſs through the ſhafts, it would ride on them to more advantage, and render it far eaſier to ſhift the drill bottoms and the partitions in the funnel. Indeed, it is thought, that the former might be made to fit in by a flap, made to open at the bottom of the back-board.

There is a ſmall ſtiff bolt affixed to a croſs-piece, for the purpoſe of ſliding into the grooves of the bar near the cylinder, ſo as to keep it fixed, and prevent its turning either way, when preſſed by the action of the ſhares. In ſetting the ſhares to any deſired depth, by turning the winch, the bolt muſt be drawn back, otherwiſe the grooved bar cannot turn; but as ſoon as it is put to the proper depth, the bolt is to be puſhed in again to its oppoſite groove.

The ends of the cranks on the axis of the roller are ſplit like ſpring keys, and have a catch, over which the hind end of the parallel iron ſlides, and is kept in its place. This is more clearly evident in the terminations of the ſame cranks. When the cylinder of the implement is not to turn, as in paſſing from one place to another, &c. the ſprings are to be pinched together, and the parallel iron to be drawn off; which is then to be hitched up to a hook at the ſide of the driver's ſeat, which ſeat is ſupported by the ſtandards which are let into the ſhafts. The ends of the cranks might, it is ſuppoſed, be perforated and keyed, but theſe modes would not be ſo good as the plan which is here adopted.

It will be readily remarked, that by far the greater part of the machinery in this ſowing-roller relates to the drill practice of putting in the ſeed; as when it is made only to broad-caſt, nothing but the cylinder and two thin boards, forming a directing funnel, will be neceſſary. It is alſo ſuggeſted, that the great ſtrength of the fore-board, already noticed, would likewiſe be unneceſſary, as there would be no ſhares, no ſtaples, nor grooved bar; and that there would not be any occaſion for a drill bottom, though an immenſe ſaving of ſeed, and great facility of hoeing the young crops, would ariſe, it is aſſerted, from adopting ſuch a mode of committing the ſeed to the ſoil. The tin ſpouts, in ſuch caſe, it is ſuppoſed, ſhould rather point backwards than forwards; for, if unprotected by preceding ſhares, they might be liable to injury from clods, &c.; their diameter ought to be, it is ſaid, about an inch for white corn, but that for ſmall ſeeds half an inch might anſwer better and in a more perfect manner. The harrow, prepared with a ſufficient number of ſharp tines, ſuited in length to the kind of ſeed, would cover it ſufficiently; and the roller would finiſh the work in a complete manner. Thus, if corn were ſown at nine inches or a foot aſunder, it would, it is contended, be ſo little diſturbed by the harrow, as to come up in rather broad lines, but with interval enough for the free action of a ſix-inch hoe. It is farther alſo to be well noticed, that, as the roller and the cylinder each revolve in the ſame period of time, that the larger the cylinder, the more ſeed will be ſown; unleſs a ſmall one be more pierced, that is, have more holes in it, in proportion as it is ſmaller than the roller. In the proportions which have been made uſe of in the above inſtance, the roller being twenty-eight inches in diameter, its circumference will be more than ſeven feet, whereas the cylinder is but one foot in diameter, therefore little more than a yard in circumference. Conſequently, as the roller will paſs over full ſeven feet of ground, while the cylinder preſents only three feet of revolving ſurface, the latter muſt be ſo much pierced as to allow the ſeed to fall *very freely*, otherwiſe the ground will be but thinly ſown, and the buſineſs, of courſe, imperfectly performed.

The one-foot cylinder has been already conſidered, and ſuggeſted as being the moſt applicable to ſmall ſeeds, and which the conſiderations juſt ſtated ſeem more fully to confirm. They likewiſe ſeem to ſtrengthen the ſuggeſtion, that, for white corn, peas, and other ſimilar ſorts of articles, the cylinder would be more ſuitable, if it were enlarged, according to the number of pecks or other meaſures required to ſow an acre. It is a neceſſary caution that, in ſowing with this implement, the cylinder be never filled too full; it ought indeed, in no caſe, to be more than three-fifths filled, and, if only filled up to the axis of it, ſo much the better. While the ſeed is putting in, which ſhould be done by means of a ſhort, broad, tin funnel, the wrapper ſhould be paſſed under the cylinder to keep it in, as ſeen in deſcribing the tool.

It is ſuggeſted further too, that, by previouſly ſetting the centre ſhares of the implement rather higher than thoſe towards the ſides, which may be eaſily done by taking out the grooved bar, by unkeying the ſtrap by which it is held down into the box near the winch, it may be made to ſow on narrow ridges, which is very neceſſary and deſirable in different ſituations, but it will then require that a ſuitable roller ſhould be uſed; or by ſetting the middle ſhares deep, pulling off thoſe towards the ſides, the implement might be made to work with a common furrow-roller. In either caſe the points and tops of the ſhares ſhould, it is ſaid, form a curve correſponding with the ſhape of the roller, but more eſpecially where the ridges are very narrow, and much raiſed in the crown.

It is obvious, the inventor ſays, that the whole of the above ſowing apparatus is capable of being attached to any common well made *field-roller* which is of a good ſize in the barrel, and fitted into a proper frame, with a ſeat, and other neceſſaries; and that every part of the broad-caſt machinery may be connected with it at very little expence. Theſe are very important conſiderations in ſuch ſorts of tools; but, beſides, the roller will ſtill be a roller, and uſeful as ſuch; while the ſowing part, being only neceſſary when that operation is to take place, may at other times either be left at reſt, or be altogether removed.

It is ſtated in concluſion, that by means of this ſowing-roller, the work of ſowing, harrowing, and rolling may go on all at one time, and that, by a change of horſes once in the day, a field of ten acres may be eaſily ſown and finiſhed in that time. That in hot dry ſeaſons, when farmers are under the neceſſity of catching and taking the advantage of ſmart ſhowers, for the ſowing of their turnip ſeed in particular, a tool that is capable of effecting ſo much cannot but be highly uſeful. The land will not only be better and more expeditiouſly ſown, but be left in a more ſuitable ſtate for preventing the effects of the weather. It will probably too not be much leſs beneficial for the purpoſes and intentions of ſowing in other caſes.

The great power, together with the ready and extenſive application of the roller, hold out to the agricultural mechanic, means which ought not to be overlooked in the conſtruction of tools and machinery of this nature, as they afford prodigious facility in forming and giving them motion.

SOWINS, or Sowings, in the manufacture of linen-cloth, are uſed in a rather coarſe and pretty thick but not over thick ſtate, by weavers, in dreſſing and preparing their yarn of this kind for the loom, or being woven into cloth. It takes away, combines, and hardens the looſe parts of the threads or *ſleeſings*, as they are called, and gives a ſort of body to the whole divided parts of the yarn before the operation of weaving begins to be performed, and conſequently greatly facilitates the work. In this proceſs or practice the beſt flour is likewiſe ſometimes employed in the ſame way, as going farther and anſwering better, eſpecially for fine cloths.

SOWLEE, in *Geography*, a town of Bengal; 17 miles E. of Boglipour.

SOWNE, a term uſed in the exchequer; ſeeming to be a corruption from the French *ſouvenu*, *remembered*.

Such eſtreats and caſualties as the ſheriff by his induſtry cannot get or levy, are ſaid to be eſtreats that *ſowne* not, that is, are not to be remembered, or are not in demand. On the contrary, eſtreats that ſowne, are ſuch as he may gather.

SOWRAY, in *Geography*, a town of Hindooſtan, in the circar of Chanderee; 40 miles S.S.E. of Chanderee.

SOWREE, a town of Hindooſtan, in Bengal; 15 miles N.E. of Jellaſore.

SOXALÆ, or Camelobosci, in *Ancient Geography*, a people of Germany, who inhabited the vicinity of the deſerts. Ptolemy.

SOXINI, or Soccini, Mariano, in *Biography*, denominated the elder, an eminent canoniſt, was born at Siena in 1401. He ſtudied firſt at his native place, and then in Padua, in which laſt univerſity, after he had taken his degree, he was for ſome years profeſſor of the canon law. He then returned to Siena, where he taught as a profeſſor during the remainder of his life. He was very intimate with Eneas Sylvius, afterwards pope Pius II., who has written a panegyric upon him in one of his letters in the moſt magnificent terms, aſſigning to him almoſt univerſal proficiency in ſcience and the arts, with the greateſt excellence of moral character. Soxini was ſent by the ſtate to compliment Sylvius when he aſcended the papal throne, on which occaſion he was nominated conſiſtorial advocate. He died in 1467, leaving behind him a conſiderable reputation for learning and integrity. His works, conſiſting of "Conſultations," "Commentaries on the Books of Canon Law," and tracts upon "Legal Subjects," have been frequently reprinted.

Soxini, or Soccini, Bartolomeo, a celebrated civilian, ſon of the preceding, was born at Siena in 1436. He ſtudied the law under different maſters at Siena and Bologna, and after he had been admitted to a doctor's degree he became profeſſor of the civil and canon law in his native city. He was, in 1473, invited to Piſa, where he taught both branches of law, and in this city he reſided twenty years, with ſome occaſional abſences. He took an active part in the civil diſſentions of Siena, and was, at one time, in the liſt of the baniſhed citizens. He was employed in embaſſies from the Sieneſe to the Florentines, and it is ſaid he engaged in a military attempt to change the conſtitution of Siena. At Piſa the famous Jaſon del Maino was his rival, and they held frequent public diſputations, at one of which Lorenzo de Medici was an auditor. Jaſon being hard preſſed by the arguments of his antagoniſt, quoted, in his own favour, a text which he had invented for the occaſion. Soxini, with equal readineſs, invented

vented another to oppoſe it, and being aſked by Jaſon where he had found it, "Next to that which you have juſt now quoted," he replied. The fame which he had acquired cauſed him to be invited to Padua in 1489, with the offer of a large ſalary, which he determined to accept, but his intentions being known he was detained. For ſome time he was profeſſor at Padua. He died in 1507, having been three years deprived of the uſe of his ſpeech. His works as an author were "Conſultations," "Comments on the Code and Digeſt," the "Rule of Right," and other pieces of a ſimilar kind. He was not eſtimable as a practical moraliſt. He was addicted to gambling, and would ſometimes leave his ſcholars without a leſſon, and paſs whole nights at the gaming table, the conſequence of which moſt deſtructive habit was, that he did not leave money enough behind him to pay the expences of his funeral. He was extremely greedy of money, charged very high for his opinion, which he would ſometimes give to both parties in a ſuit. He was free of ſpeech, ſarcaſtic and jocular. His faults were borne with on account of his high profeſſional character. Angelo Politiano, ſpeaking of his intended correction of the Pandects, ſays, "I muſt have recourſe to the aſſiſtance and advice of that ſingularly excellent doctor of Siena, Bartolomeo Soxini, whom I may boldly denominate the Papinian of our age."

Soxini, Mariano, denominated the younger, grandſon of the firſt Mariano, was born at Siena in 1482: he ſtudied the law under his uncle Bartolomeo, and after taking his degree, taught alternately the civil and canon law at his native city, till he removed to Paris in 1517. Returning to Siena in 1524, he was employed as ambaſſador to the republic of Florence, and alſo to pope Leo X. He was engaged in the following year by the republic of Venice, to occupy a profeſſorſhip at Padua. He remained at that univerſity till the year 1542, when the offer of a higher ſalary drew him to Bologna. Here he continued till his death, though he received the moſt flattering invitations, with the promiſe of large ſalaries, from Coſmo, duke of Florence, the king of Portugal, and other princes and ſtates. He died in 1556, and his German ſcholars in Bologna ſhewed their reſpect for his virtues and talents, by carrying his body on their own ſhoulders to the tomb. He was author of many works, which were once in conſiderable eſtimation, though they are now forgotten.

Soxini, Lelio, ſon of the preceding, was born at Siena in the year 1525. He was deſtined by his father for the legal profeſſion, but having in the courſe of his ſtudies attended to ſcriptural truths, he felt reaſon to queſtion the validity of the doctrines of the Catholic church. For the purpoſe of farther enquiry, he made himſelf acquainted with the languages in which the Old and New Teſtament were written, alſo with the Arabic and other oriental languages. About the year 1546 he joined himſelf to a ſociety attached to the principles of reformation in religion, and the members of which ſpeculated very freely on the myſteries contained in the doctrines of the Trinity, and the atonement. Their objects being diſcovered, ſome were apprehended, and others gladly fled from the iron arm of perſecution. Two of thoſe who fell into the hands of the prieſts ſuffered death as heretics, and thoſe who remained concealed themſelves, or withdrew into foreign countries. The ſubject of this article quitted Italy in 1547, and travelled during the four following years into France, England, Germany, and Poland. He then fixed at Zurich, where he maintained a correſpondence with the reformers in various parts of Europe, by whom he was held in high eſteem, till he ſhewed a leaning to the doctrines of Arianiſm. Calvin, who was ever eager in detecting hereſy, wrote him a letter of admonition, which was followed by a ſtill ſtronger warning, the burning of Servetus, and which was ſufficient to deter Lelio from taking a very active part in propagating the doctrines to which he adhered. On the death of his father, in 1556, he obtained letters of legation from the king of Poland to Venice and Florence, which enabled him to ſettle the affairs of his inheritance. He died in 1562. He was mild and gentle in diſpoſition, averſe from all controverſy, and was evidently led by conſcience to differ from thoſe with whom he lived. Some writings have been attributed to him, but critics are very doubtful as to what he really wrote. Bayle.

SOYDE, in *Geography*, a town of Norway; 36 miles N. of Stavanger.

SOYDPOUR, a town of Bengal; 25 miles S.W. of Silhet.

SOYLAND, a townſhip of the pariſh of Halifax, Yorkſhire. See Halifax.

SOYOLLA, the principal iſland of a cluſter in the Red ſea. N. lat. 14° 2′. E. long. 59° 38′.

SOYON, a town of France, in the department of the Drôme, on the Rhone; 6 miles S. of Valence.

SOZ, a river of Ruſſia, which runs into the Dnieper, 16 miles S. of Bilitzi, in the government of Mogilev.

SOZO, in *Ancient Geography*, a town of Aſia, in the interior of Media. Ptolemy.

SOZOMEN, Hermias, in *Biography*, an eccleſiaſtical hiſtorian, contemporary with *Socrates* (ſee his article), was born of reſpectable parents, as ſome ſay at Salamis, in the iſle of Cyprus, but according to others, at Gaza or Bethelia, in Paleſtine. Having ſtudied the law at Berytus, he practiſed as an advocate at Conſtantinople, devoting his leiſure hours to the compoſition of his eccleſiaſtical hiſtory. This work contains, in nine books, an account of the affairs of the church, from the third conſulſhip of Criſpus and Conſtantine, Cæſars, to the 17th conſulſhip of Theodoſius the emperor, in whoſe time he wrote, and to whom he dedicated his performance; that is, from the year 324 to the year 439, or during a period of 115 years. Cave repreſents him as flouriſhing about the year 440. In his hiſtory, which is written in a more florid and elegant ſtyle, but with leſs judgment, than that of Socrates, he has introduced many eulogiums of a monaſtic life, to which he was attached in conſequence of his education among monks, and he has added many narrations of the actions and manners of the recluſe, and his teſtimony to the early practice of public penance in the Roman church, together with a detail of the particular ceremonies of which it conſiſted. To the orthodox, however, he has given offence by his commendations of Theodore of Mopſueſta, with whom originated the hereſy of two perſons in Chriſt. His hiſtory is chargeable with ſeveral notorious errors in the relation of facts. He is ſuppoſed to have died about the year 450. Sozomen's hiſtory is printed with that of Socrates, and the other Greek eccleſiaſtical hiſtorians. A work of Sozomen, not now extant, containing, in two books, a ſummary account of the affairs of the church, from the aſcenſion of Chriſt to the defeat of Licinius, was written before his hiſtory. In moderation and candour Sozomen reſembled Socrates; and it is true of the former, as well as the latter, that he always ſpeaks with great reſpect of the ſacred ſcriptures. Dupin. Lardner.

SPA, or Spaw, in *Geography*, a town of France, in the department of the Ourte, belonging to the biſhopric of Liege, in Germany, and ſituated in the marquiſate of Franchimont, on a ſmall river which runs into the Ourte. It was formerly a ſmall village, but ſince the diſcovery of its mineral waters, about the year 1326, and the celebrity which they have acquired, it has been conſiderably enlarged; and now conſiſts of two ſtreets, joined by a bridge over the ſtream that runs through it, together with ſeveral ſmaller ſtreets and rows of houſes; thoſe of more ancient date being irregularly arranged, and conſtructed of wood and plaſter, and the more modern built with brick and ſtone. The ſoil about the town is rocky, gravelly, or loamy, intermixed more or leſs with iron ore. The country about it abounds with hills and woods, ſo that it is not fertile in grain, but it has plenty of ſheep, kine, and poultry, and great quantities of game, and the ſtreams furniſh an ample ſupply of various kinds of fiſh. During the ſeaſon in which the waters are uſed, the town reſembles a fair in its variety of booths, toys, &c. Its vicinity affords pleaſant and ſalubrious rides, and many agreeable and romantic walks: and its viſitors are gratified with evening amuſements in public rooms adapted for this purpoſe. Some have ſuppoſed that the medicinal waters of this place are thoſe that are mentioned by Pliny in his "Natural Hiſtory," but others apprehend that thoſe were the waters of Tongrés. Theſe waters were at firſt the property of the community of Spa, but they were afterwards taken poſſeſſion of by a biſhop of Liege, until an appeal was made to the imperial chamber, which reſtored them to the original proprietors, who impoſe a ſmall duty on every flaſk exported under their ſeal. In the year 1794, Spa was taken by the French; 16 miles S.E. of Liege. N. lat. 50° 31′. E. long. 5° 30′. The waters are furniſhed by various ſprings. Thoſe of the Pouhon ſpring have been preferred, by our chief phyſicians, to any others in or near the country of Liege; particularly to the waters of Bru, which they complain have been impoſed on the public, to their and their patients' frequent diſappointment.

However, as the Spa waters are impregnated with different proportions of the ſame ingredients, they may be choſen differently, according to the intentions with a view to which they are uſed. The Pouhon is the ſtrongeſt chalybeate. This is in its moſt perfect and natural ſtate in cold dry weather; but in warm moiſt weather it loſes its tranſparence, appears turbid or wheyiſh, contains leſs fixed air, or carbonic acid gas (ſee CARBONIC *Acid*), and is partly decompoſed. This water, which is colder by many degrees than the heat of the atmoſphere, is ſuppoſed to contain the greateſt quantity of fixed air of almoſt any acidulous water; and in conſequence of this ingredient, it has a remarkable ſprightlineſs and vinoſity, and boils by mere warmth; but this ſoon flies off if the water be left expoſed, though it may, in a great meaſure, be preſerved in well-corked bottles. It is capable of diſſolving more iron than it naturally contains, and of thus becoming a ſtronger chalybeate, on account of the great quantity of fixed air which it contains: and for the ſame reaſon an ebullition is raiſed in it on the addition of acids, which diſengage its fixed air. This water mixes ſmoothly with milk, whether it be cold or of a boiling heat.

The Tonnelet and Geronſterre waters are weaker chalybeates, but briſker and more ſpirituous. The Groeſbeck, Sauveniere, and Wartroz, are ſtill weaker chalybeates, but highly impregnated with calcareous and ſelenitical earths, and contain alſo a greater proportion of the foſſile alkali. The Geromont is likewiſe a weak chalybeate, but contains a great deal of calcareous and ſelenitical earths, and about three times as much alkaline ſalt as any of the others. The four laſt waters, therefore, will be better in diſorders ariſing from an acid cauſe, and as diuretics, particularly the Geromont. The Bru, or Churon water, approaches to the nature of the Tonnelet, and though it has been decried, is ſaid, in conſequence of every trial, not to be inferior to any of the Spa waters.

All the waters that are comprehended under this denomination, abound with fixed air; they alſo contain more or leſs iron, foſſile alkali, and calcareous and ſelenitical earths, together with a ſmall portion of ſea-ſalt, and an oily matter common to all waters. All theſe ingredients are kept ſuſpended, and in a neutral ſtate, by means of the fixed air, on which the virtues chiefly depend; though they are probably rendered more active and penetrating, both in the firſt paſſages, and alſo when they enter the circulation, by means of that ſmall portion of iron, earth, ſalt, &c. with which they are impregnated.

Theſe waters are diuretic and ſometimes purgative; and, like other chalybeate waters, they tinge the ſtools black. They exhilarate the ſpirits much better than wine or ſpirituous liquors, and their general operation is by ſtrengthening the fibres. They cool and quench thirſt much better than common water.

They are found excellent in caſes of univerſal languor or weakneſs, proceeding from a relaxation of the ſtomach, and of the fibres in general, and where the conſtitution has been weakened by diſeaſes, or by a too ſedentary life; in weak, relaxed, groſs habits; in nervous diſorders; at the cloſe of fits of the gout and rheumatiſm; in ſuch aſthmatic diſorders and chronic coughs as proceed from too great a relaxation of the pulmonary veſſels; in obſtructions of the liver and ſpleen; in ſcorbutic and other putrid diſorders; in hyſterical and hypochondriacal complaints; in paralytic diſorders; in gleets; in the fluor albus; in fluxes of the belly; in the gravel and ſtone; in female obſtructions; in barrenneſs; and in moſt other caſes where a ſtrengthening and briſk ſtimulating reſolving chalybeate remedy is wanted: but they are generally hurtful in hot, bilious, and plethoric conſtitutions, when uſed before the body is cooled by proper evacuations; they are alſo hurtful in caſes of fever and heat, in hectic fevers, and ulcerations of the lungs, and of other internal parts, and in moſt confirmed obſtructions attended with fever. The uſual ſeaſon for drinking them is in July and Auguſt, or from May to September. The quantity to be drank is ſuch as the ſtomach can bear without heavineſs or uneaſineſs: but it is adviſeable to begin with drinking a glaſs or two ſeveral times in a day, and ſo increaſe the quantity daily, as the ſtomach can bear; and during the courſe to continue that doſe, and to diminiſh the quantity at the cloſe in the ſame degree as it was augmented at the beginning. Moderate exerciſe is proper after drinking. Previous to the uſe of the water, the firſt paſſages ſhould be cleanſed by gentle purges, and, if neceſſary, an emetic ſhould be given; and during the courſe, coſtiveneſs ſhould be prevented, by occaſionally adding Rochelle ſalts or rhubarb to the firſt glaſſes of water in the morning; and a cooling regimen ſhould be obſerved.

The Spa water is alſo uſed externally, in a variety of caſes, with good ſucceſs. It is uſed as an injection in the fluor albus, and in ulcers and cancers of the womb, and alſo in the gonorrhœa; it is ſerviceable for waſhing venereal aphthæ, and ulcers in the mouth, phagædenic ulcers, by way of gargle for relaxed tonſils, and for faſtening looſe teeth, and in other caſes of relaxation. It is alſo ſaid to cure the itch, and ſimilar complaints, by waſhing and bathing, an internal courſe being obſerved at the ſame time. Elliott's Mineral Waters, p. 201, &c.

The town of Spa being reſorted to by perſons from all parts of Europe, on account of its waters, has always been allowed a neutrality during the hotteſt wars.

SPAAD, or Spalt, *Spatum*, a word uſed in ſeveral different ſenſes; ſometimes for a ſpecies of Engliſh fibroſe talc, or of gypſum; and ſometimes for ſpar.

The various kinds of ſpaad are found pretty frequently in England and Germany, and ſometimes brought from the Levant: they are all ſoft, and eaſily pulverized.

SPACE, Spatium, a ſimple idea, the modes of which are diſtance, capacity, extenſion, duration, &c.

Space, conſidered barely in length between any two bodies, ſuggeſts the ſame idea which we have of diſtance.

If it be conſidered in length, breadth, and thickneſs, it is properly called *capacity*.

When conſidered between the extremities of matter, which fills the capacity of ſpace with ſomething ſolid, tangible, and moveable, it is then called *extenſion*.

So that extenſion is an idea belonging to body only; but ſpace, it is plain, may be conſidered without it.

Space, therefore, in the general ſignification, is the ſame thing with diſtance conſidered every way, whether there be any ſolid matter in it or not.

Each different diſtance is a different modification of ſpace; and each idea of any different ſpace is a ſimple mode of this idea. Such are an inch, foot, yard, &c. which are the ideas of certain ſtated lengths, which men ſettle in their minds for the uſe, and by the cuſtom of meaſuring. When theſe ideas are made familiar to men's thoughts, they can in their minds repeat them as often as they will, without joining to them the idea of body, and frame to themſelves the ideas of feet, yards, and fathoms, beyond the utmoſt bounds of all bodies; and by adding theſe ſtill to one another, they can enlarge their idea of ſpace as much as they pleaſe.

From this power of repeating any idea of diſtance, without being ever able to come to an end, we acquire the idea of immenſity.

Another mode, or modification, of ſpace, is taken from the relation of the parts of the termination of extenſion, or circumſcribed ſpace, amongſt themſelves; and this is what we call *figure*. This the touch diſcovers in ſenſible bodies, whoſe extremities come within our reach; and the eye takes, both from bodies and colours whoſe boundaries are within its view; where, obſerving how the extremities terminate, either in ſtraight lines, which meet at diſcernible angles, or in crooked lines, in which no angles can be perceived; by conſidering theſe as they relate to one another, in all parts of the extremities of any body or ſpace, it acquires the idea we call figure, which affords to the mind infinite variety.

Another mode belonging to this head is that of *place*; which ſee.

Another mode of ſpace is the idea which we get from the fleeting, and perpetually periſhing, parts of ſucceſſion, which we call *duration*.

Space is uſually divided into *abſolute* and *relative*.

Space, *Abſolute*, is that conſidered in its own nature, without regard to any thing external, which always remains the ſame, and is infinite and immoveable.

Space, *Relative*, is that moveable dimenſion or meaſure of the former, which our ſenſes define by its poſitions to bodies within it; and this the vulgar uſe for immoveable ſpace.

Relative ſpace, in magnitude and figure, is always the ſame with *abſolute*; but it is not neceſſary it ſhould be ſo numerically: as if you ſuppoſe a ſhip to be, indeed, in abſolute reſt, then the places of all things within her will be the ſame abſolutely and relatively, and nothing will change its place; but ſuppoſe the ſhip under ſail, or in motion, and ſhe will continually paſs through new parts of abſolute ſpace; but all things on board, conſidered relatively, in reſpect to the ſhip, may be, notwithſtanding, in the ſame places, or have the ſame ſituation and poſition, in regard to one another.

The Carteſians, who make extenſion the eſſence of matter, aſſert, that the ſpace any body takes up, is the ſame thing with the body itſelf; and that there is no ſuch thing as mere ſpace, void of all matter, in the univerſe; but this ſee diſproved under Vacuum.

The Carteſians, who do not allow of any diſtinction between ſpace and matter, were naturally enough led to the opinion, that ſpace or extenſion was a ſubſtance. Others, who admit a vacuum, and conſequently an eſſential difference between ſpace and matter, aſſert alſo that ſpace is a ſubſtance. Among theſe we find s'Graveſande, Introd. ad Philoſ. ſect. 19.

Others put ſpace into the ſame claſs of beings as time and number; that is, they make it to be no more than a notion of the mind. Hence, according to theſe authors, abſolute ſpace, of which the Newtonians ſpeak, is a mere chimera. See the writings of the late biſhop of Cloyne, paſſim.

Space and time, according to Dr. Clarke, are attributes of the Deity, and the impoſſibility of annihilating theſe, even in idea, is the ſame with the neceſſary exiſtence of the Deity. See Watt's Phil. Eſſ. Eſſ. i.

Space, in *Geometry*, denotes the area of any figure; or that which fills the interval or diſtance between the lines that terminate it.

The *parabolic* ſpace is that included in the whole parabola.

The *conchoidal* ſpace, or the *ciſſoidal* ſpace, are what are included within the cavities of the conchoid and ciſſoid. By the new methods now introduced, of applying algebra to geometry, it is demonſtrated, that the conchoidal and ciſſoidal ſpaces, though infinitely extended, are yet finite magnitudes.

Space, *Cycloidal*. See Cycloidal.

Space, *Elliptic*. See Elliptic.

Space, in *Mechanics*, the line a moveable body, conſidered as a point, is conceived to deſcribe by its motion.

SPADA, Lionello, in *Biography*, was born at Bologna in 1576, in a very low condition of life; and when a boy he became the ſervant of the Caracci, and ground and prepared their colours. The conſtant opportunity he poſſeſſed, whilſt with theſe great men, of ſeeing pictures, and hearing diſcuſſions on the principles of the art, rouſed a latent diſpoſition to ſtudy and deſign, which his maſters ſaw and encouraged; and at length they admitted him into their academy, where they had the gratification of ſeeing him become one of their moſt eminent diſciples; though he never arrived at any very great degree of grandeur or purity of invention. His ſtyle is a compound of the Caracci and Caravaggio's manners, and is wrought with great boldneſs. His principal productions are, The Miraculous Draught of Fiſhes, in the refectory of S. Procolo at Bologna, and St. Dominic burning the forbidden Books, for the church of that ſaint, in the ſame city. This laſt is conſidered as his very greateſt work. The latter part of his life was paſſed at Parma, in the ſervice of the duke Ranuccio. He died in the 46th year of his age, in 1622.

Spada, in *Geography*, a cape of the iſland of Candia; 24 miles N.W. of Canea.

SPADE, in *Agriculture* and *Gardening*, a well-known ſort of tool, employed in digging the land. There are ſeveral forms and kinds of them in uſe for different purpoſes, as thoſe of common digging, draining, and making of earth fences,

fences and embankments of different ſorts, as well as many others, in the former of theſe arts. The moſt handy and convenient form of them, for common work, is probably that in which they are made ſtrong in the back, and have a ſlight bend or curve in the handle or ſhaft, as by means of this the labour is performed with greater eaſe and facility. Various forms, ſhapes, and ſizes of ſpades are had recourſe to in performing the operations of draining, mound-fencing, and embanking, according to circumſtances; as well as in particular works of other kinds. See Spade, *Draining*.

The ſpade is alſo an uſeful garden implement, which is uſed for digging and preparing the ſoil for the reception of all ſorts of ſeeds and plants. There are ſeveral ſorts and ſizes of ſpades occaſionally employed in this art, though the common large digging ſpade is, in moſt places, almoſt commonly uſed for all kinds of digging and ſpade-work, which, however, in many inſtances, cannot be ſo conveniently uſed as a middling or ſmall ſpade; it is, therefore, eligible for every garden to be furniſhed at leaſt with three different ſizes of ſpades, to ſuit every department of gardening the more commodiouſly; ſuch as the common large digging ſpade, for all common digging and ſpade-work; a middling and a ſmall ſpade, for digging particular narrow compartments, and between ſmall plants cloſely placed in beds and borders, &c.

The firſt ſort is uſually from fourteen to fifteen inches long in the plate, and nine broad, narrowing gradually half an inch or an inch leſs at the bottom. The ſecond ſort ſhould be about a foot long in the plate, and ſeven or eight inches broad. The ſmall ſpade, which is about eight or nine inches long in the plate, and five wide, is convenient in pointing up or ſlight digging, and in freſh looſening the ſurface between cloſe-placed ſmall plants, in beds and borders, &c. where neither of the two former ſpades can be readily introduced: it is alſo uſeful in planting and potting many ſorts of ſmall plants, taking up ſmall roots, and other light purpoſes.

And other ſorts are likewiſe in uſe for different purpoſes, as a very ſmall narrow ſpade, having the plate about ſeven inches long, by three and a half or four wide, which is very uſeful in ſmall compartments of beds, borders, &c. containing ſome particular cloſe-placed, ſmall plants of flowers, and others, both in occaſionally ſlightly digging, or looſening the earth between them with greater eaſe and effect, than a larger ſized ſpade; alſo ſometimes in ſimilar compartments, in occaſionally trimming round the bottom part of ſome ſtraggling fibrous-rooted plants; and it is alſo often uſeful in taking up and tranſplanting ſmall plants, and taking off root offsets and ſlips, in particular ſorts, in which a larger ſpade would not be ſo convenient. And further, a ſemicircular or ſcooped ſpade is another ſort of a ſmalliſh ſize, having the plate made hollow, like a ſcooped garden-trowel, which is very uſeful in taking up ſmall plants with balls of earth, to preſerve the ball more firmly about the roots.

Proper garden-ſpades have the plates wholly of iron, not above a quarter of an inch thick upward, growing gradually thinner from the middle downward; the tree, or handle, being generally of aſh, about two feet long, and an inch and half thick, with a firm open handle at top, formed out of the ſolid wood, juſt big enough to admit of taking ready hold.

Spade, *Draining*, that ſort which is employed for the purpoſe of cutting out field drains. Spades for this uſe are made of different breadths, ſo as to follow each other, and cut the drains narrow at the bottoms. There are uſually a top or upper, middle, and pointed bottom ſpade made uſe of in this work.

And there is a ſort of ſpade or ſhovel, which is turned up on the ſides, that is uſeful in taking out the ſmall pieces of earth from the bottoms of the drains. Likewiſe a ſpade or tool of the ſcoop kind.

Alſo a wooden ſpade, employed in ſoft peaty ſoils, where the common draining-ſpades cannot be uſed. See Spring and Surface-*Draining*.

Spade, *Paring*, that ſort of ſpade which is made uſe of in removing the ſward from graſs-land. See Paring *Spade*, and Shovel.

Spade, *Turfing*. See Turfing.

Spade alſo denotes any gelded beaſt, or a deer three years old.

Spade-*Bit*, the quantity of earth raiſed by the ſpade in one effort. Hence probably *ſpit*. It alſo ſignifies the broad iron part of the ſpade.

Spade-*Bone*, a term provincially applied to the ſhoulder-bone, probably from its being uſed formerly as a ſpade.

Spade *Land*, *To*, provincially to pare ground, or breaſt-plough it.

SPADICEOUS, or Spathaceous *Plants*, in *Gardening*, thoſe the flowers of which are protruded or produced from a ſort of ſcabbard, or ſheath, which is burſt open. There is a great number of flower, as well as other garden-plants, which are of this ſort, as of the former, the narciſſus or daffodil and jonquil, the lily daffodil, the Guernſey lily, the aſphodel lily, the ſea daffodil, the different varieties of crocus, the meadow ſaffron, the common ſnow-drop, the leucoium, or greater ſnow-drop, and many others; and of the latter, the onion, the leek, the garlick, and ſome others.

Theſe are, for the moſt part, uſeful and valuable plants in either the common or flower-garden.

SPADING, in *Agriculture*, a term applied, in ſome diſtricts, to the practice of taking off the ſward or ſurface of graſs-land by means of the paring-ſpade, in the view of burning it. It is a method which is by no means unuſual in many diſtricts, though the paring-plough mode is by far the moſt cheap and convenient. In the county of Devon, when the ſpading of the ſurface of a field or portion of land is determined upon in this intention, it is pared off, in a clean manner, to the extent of from three-fourths to one inch in thickneſs; the ſlices of which are then ſet up edgeways, and when dry, collected into heaps, or what are provincially termed beat-barrows; and by the aſſiſtance of furze, fern, heather, hedge-row, and copſe faggots, or ſome other ſimilar material, the whole pared ſubſtance ſet fire to and reduced to a maſs of aſhes, which, when cool, are ſpread, either with or without being mixed with other matters, ſuch as lime, good mould, or the ſcrapings of roads, as the circumſtances of the caſes may require, over the land in an equal and exact manner. In this way coarſe graſs-lands are ſometimes brought into a ſtate of cultivation, and wheat, as well perhaps as ſome other crops, in different inſtances, well prepared for and got into the ground. See Paring and Burning, and Sod-*Burning*.

It is, however, a tedious and laborious method of cultivating and preparing land, which can probably be only practiſed in particular ſituations and circumſtances.

The paring-plough, which is deſigned to be introduced in the place of the tool employed in this ſort of work, and which is much ſuperior in the facility, expedition, and manner in which it performs it, has a wide-winged flat ſhare, that meaſures about fourteen inches from the land-ſide to the angular point of its right ſide, or cutting wing. In the beam part of this implement, and preceding a ſharp comb, which is welded on to the coulter-margin of the ſhare, is a ſliding-foot, fixed in ſuch a manner as to regulate the exact thickneſs of the ſlice which is meant to be pared off, with great preciſion. And the ſhare and comb of the tool being kept very ſharp by frequent grinding, enable it to perform the paring of the graſſy, or other ſurface, in a very perfect manner. This implement is held in an horizontal manner when at work, ſo as to cut a ſmooth and even furrow at the bottom part; whereas the tool uſually made uſe of is held in an oblique direction, ſo as to cut the ſpine or green ſward to a feather-edge on the furrow ſide, the whole of which is to be gradually lifted up, and turned, with its green ſide, perfectly underneath. The work is performed, in theſe caſes, by what is commonly called ſplitting or dividing. See SPLITTING.

SPADIX, in *Botany* and *Vegetable Phyſiology*, a flower-ſtalk, whether ſimple or branched, included within a *Spatha*, or Sheath. Such occurs in the natural order of *Palmæ*, which tribe Linnæus principally had in view in the technical uſe of this term. Indeed the word, which is Greek, σπαδιξ, *palmes* of the Latins, is almoſt excluſively applied by the ancients to the very ſame thing, the branched fruit-ſtalk of the date-palm. Linnæus, however, extends it to the *Arum* family, by a very fair analogy, though in that tribe it is unbranched; and by a further ſtretch of analogy, to *Acorus*. In ſome of the *Liliaceæ*, compoſing his *Spathaceæ*, though he uſes the term *Spatha*, he does not employ that of *Spadix*. Juſſieu and his followers have perhaps done well in excluding the *Spatha* itſelf from making a part of the generic character, in the natural family laſt-mentioned, though they retain it, as well as *Spadix*, in the *Palmæ*. The *Spadix*, like other flower-ſtalks, is ſolely deſtined to bear the flowers and fruit, and when the latter is perfected, the part in queſtion withers and falls off. See FRUCTIFICATION, CALYX, PALMÆ, and SPATHA.

SPADO, among the Romans, differed from an eunuch only in this, that the latter was deprived both of the penis and teſtes, but the ſpado of the teſtes only.

SPAFFORD, in *Geography*, a townſhip of America, in New York, ſituated in the S.W. extremity of Onondaga county, 13 miles S. of Onondaga; bounded N. by Marcellus and Otiſco, E. by Tully, S. by Preble in Cortlandt county, W. by the Skeneateles lake, or the county of Cayuga. It was erected in 1811, from the N.W. quarter of the military townſhip of Tully, and its population is included in that of Tully. Its area is about five miles ſquare; the central part has an extenſive valley of fine land, extending N. and S., the eaſtern and weſtern extremes being hilly. The ſoil is chiefly a ſtrong and productive loam; the timber, maple, beech, baſs or tilia, butter-nut, and a variety of other kinds. It is well watered by ſprings and brooks, and has ſome ſmall ſtreams for mills, the largeſt of which is the inlet of Otiſco lake. The firſt ſettlements were made about the year 1806, and the inhabitants are farmers from the eaſtern ſtates. Here are two or three mills, and as many ſchool-houſes, in which are alſo held the meetings for worſhip. Spafford compriſes as much of the military townſhip of Sempronius as lies E. of Skeneateles lake.

SPAGIRIC, an epithet given to chemiſtry; which is called the *ſpagiric art*, or *medicina ſpagirica*; and to chemical phyſicians, who are alſo called *ſpagiriſts*.

It is chiefly reſtricted to that ſpecies of chemiſtry which works on metals, and is employed in the ſearch of the philoſopher's ſtone.

Voſſius derives the word from σπαω, *to extract*, and αγειρειν, *congregare, to collect*; which are the two principal offices of chemiſts. Paracelſus firſt introduced the word.

SPAGIRICAL PHYSICIANS. See PHYSICIANS.

SPAGNOLETTO, IL, in *Biography*, the cognomen of a Spaniſh painter, a native of Xativa, in Valencia, whoſe real name was Joſef Ribera. He ſtudied for a ſhort time under Ribalta; but, before he was ſixteen, determined upon viſiting Italy, to cultivate his taſte, and exerciſe his talents in the art he had ſolicited for ſtudy, although he had no other means of ſupport than what he could obtain by the exerciſe of his juvenile powers. It was in the 17th year of his age, in 1606, that he arrived at Naples, where he was captivated by the ſtriking and powerful ſtyle of M. A. Caravaggio, whoſe favour he courted and obtained; and by whom he was encouraged and inſtructed during his reſidence in that city. From Naples he went to Parma, to ſee and ſtudy the works of Correggio, and thence to Rome, attracted by the reputation of Raphael and Michael Angelo; and although the influence of the ſtyle of Caravaggio ſtill predominated in his productions, yet it was not without conſiderable refinement in feeling, obtained by contemplation of the works of thoſe great men.

After a ſhort reſidence at Rome, he returned to Naples, where his proſpect of employment was much more favourable, partly from the number of excellent artiſts then practiſing in the former city, and probably more from the connection between the court of Naples and that of his own country, and its natural partiality to Spaniards. He was there taken under the protection of the viceroy, and employed in ſeveral conſiderable works, which were ſent into Spain. The principal among thoſe detained at Naples are, the Martyrdom of St. Jannarius, in the royal chapel; St. Jerome and St. Bruno, in the church of the Trinita delle Monache; and the taking down from the Croſs, at the Carthuſians.

The ſubjects he choſe for the employment of his pencil are generally of a ſevere or gloomy nature, and his colouring and execution correſpond with their character; being free and bold in ſtyle, and dark and ſtrong in hue and arrangement of light and ſhade. He died in 1656, at the age of 67. He ſometimes indulged himſelf in engraving, and has left about twenty plates of etchings, executed in very much the character of his pictures.

SPAHIS, from the Perſian *eſpawhee*, q. d. *horſeman*, called alſo *Spaogians*, horſemen in the Ottoman army; chiefly raiſed in Aſia.

The great ſtrength of the grand ſeignior's army conſiſts in the janizaries, who are the foot, and the ſpahis, who are the horſe. The aga, or commander of the ſpahis, is called *ſpahilar agaſi*. See AGA.

The ſpahis are the flower of the Turkiſh cavalry, and make a part of the grand ſeignior's guard. They are compoſed of young men brought up in the ſeraglio, of ſoldiers taken from among the janizaries, and others who have diſtinguiſhed themſelves. The ſpahis are ſpread over all the towns, and more particularly in the country places; they are almoſt all married and ſettled; they exerciſe different profeſſions, or ſometimes apply themſelves to the culture of the land; they receive a daily pay, have their appropriate officers, and aſſemble at the firſt order, armed and equipped, under the colours of their diſtrict. Theſe are a more ancient corps than the janizaries; their pay is greater; and they are underſtood to be the ſons of Muſſulmans in a certain degree of affluence; they fight under the ſame enſigns as the ziamets and timariots, and ought to ſucceed them in the poſſeſſion of their fiefs, if the regulations of the firſt ſultans were more reſpected, or the national intereſt a little more conſulted. Under the firſt ſultans, the ſpahis formed the principal ſtrength of the Ottoman armies. Almoſt always in the field, familiarized to military exerciſes, hardened to the fatigues of war, ſtimulated by intereſt, glory, religious fanaticiſm, and the example of the ſultan, it is not ſurpriſing that nothing ſhould withſtand their arms, and that the modern Greeks, enervated by luxury and riches, ſolely occupied by intrigues and idle ſpeculations, ſhould be as ſoon ſubjugated as conquered. The "Timari-ſpahis," who are much more numerous, ſerve in conſequence of their poſſeſſing a "timar," or fief, on condition of bringing into the field a certain number of men, in proportion to the ſtrength of it. Theſe poſſeſſions deſcend to their children or heirs, when of an age to ſerve; otherwiſe, they are given to others, and ſometimes, as a recompence, to old ſoldiers. See Timar, and Timariots.

SPAID, or Spayd, a term uſed by ſportſmen for a red male deer three years old.

SPAIN, in *Geography*, a country of Europe, ſituated between the 36th and 44th degrees of N. lat., and having its weſtern extremity about 9° W. long. from London. Its greateſt length from weſt to eaſt is about 600 miles, and its breadth from north to ſouth is more than 500; ſo that it forms, if Portugal be included, almoſt a compact ſquare, and is ſurrounded on all ſides by the ſea, except where the Pyrenæan range of mountains preſents a grand natural barrier againſt France. The preciſe weſtern boundary is formed by the river Bidaſoa, and the iſle of Pheaſants is near its mouth. The laſt town in Spain is Irum, near the Bidaſoa. Excluding *Portugal* (which ſee), the boundaries betwixt theſe two kingdoms depend more on artificial conventions than on rivers or mountains. The ſuperficial contents of Spain have been eſtimated at about 148,000 ſquare miles. It lies between the fifth climate on the ſouth, and half-way between the ſixth and ſeventh on the north; the longeſt days are, therefore, 14½ hours in the ſouthern part, and 15½ in the northern.

The firſt known diviſion of Spain, into Hiſpania Citerior and Ulterior, took place under the Romans; but theſe were ſoon denominated Luſitania, Bœtica, and Tarraconenſis. (See Hispania.) Luſitania comprehended the eaſtern part, and extended as far as the Atlantic ocean: its limits were marked on the north by the Duero, on the ſouth by the Guadiana, and from one to the other by a ſtraight line drawn from Simancas to Puente de l'Arzobiſpo, and from thence as far as the country of the people called Oretani, in which the town of Almagro at preſent ſtands. It included in its extent the towns of Avila, Salamanca, Coria, the territory of Plaſencia, Truxillo, Merida and Portugal, the kingdom of Leon, and part of Eſtremadura. See Lusitania.

Bœtica was almoſt ſurrounded on two of its ſides by the Guadiana, bounded on the ſouth by the Mediterranean and the ocean, and terminated on the eaſt by a line drawn from Murgis or Muxacra, a village near the ancient promontory of Charidemus, now called the Cape de Gatte, to the territory of Caſtulo, which was nearly in the ſame ſituation as the modern Cazlona, and to the country of the Oretani. It formed what is called Andaluſia, containing the kingdoms of Seville, Jaen, Cordova, and Granada; it alſo included a part of modern Eſtremadura, and extended as far as Badajoz, which was within its boundaries. See Bœtica.

Hiſpania Tarraconenſis comprehended all the other parts of Spain, and was the ſame with that called Citerior Spain. See Hispania.

The diviſion of Spain, now ſtated, underwent ſome alterations under the laſt Roman emperors, and was totally changed after the invaſion of the northern nations. It was ſubjected by the Vandals about the year 415, after the Romans had maintained poſſeſſion of it for about five centuries; and the Viſigoths, under Euric, ſubdued the whole of Spain, excepting Galicia, which was held by the Suevi, who had entered into the country with the Vandals. With this conqueſt, which occurred A.D. 472, commence the modern kingdom and hiſtory of Spain. The Arabs, or Moors, began their conqueſt A.D. 709, and ſoon extended it over the whole of Spain, except the mountains of Aſturias, where, as well as in Biſcay, king Pelagius maintained a limited dominion. The deſcendants of Pelagius, who fixed the royal reſidence at Oviedo, which was built in 761, defended their own ſmall territory, and recovered Galicia, and part of Leon and Caſtile. In the year 914, the kings, as their territory extended towards the ſouth, began to reſide at Leon, from which they took their title; and in the 11th century, *viz.* A.D. 1117, that of Caſtile was added, the kings of Caſtile having become kings of Leon and the Aſturias A.D. 1037. In 1162 the county of Barcelona was transferred to the king of Aragon, whoſe royalty commenced A.D. 1035. The ſmall kingdom of Navarre, the capital of which was Pampeluno, commenced, as ſome ſay, A.D. 857, or, according to others, under Fortunio I. A.D. 880. The reign of Alphonſo the Wiſe began A.D. 1252, and was diſtinguiſhed by the protection which it afforded to the arts and ſciences. Nevertheleſs, the Moors muſt be regarded as the chief poſſeſſors of Spain, until the middle of the 13th century. Their government in Spain was conducted by governors deputed by the caliphs, until the year 756, when Abdoulrahman ſeized the ſceptre of Spain, and became the Mooriſh king of Cordova. This dynaſty, under which Spain extended its commerce, and acquired very conſiderable wealth and power, continued until the year 1098, when the caliphate expired, and the Mooriſh governors of ſeveral provinces uſurped the royal ſtyle, in Cordova, Seville, Valencia, and Granada, and rivalled the ſmall Chriſtian kingdoms, till the middle of the 13th century, when the latter became predominant, and Spain reſumed her ſituation among the ſtates of Chriſtendom. The laſt of the Mooriſh royalties which was ſubdued, was the kingdom of Granada; and the crowns of Caſtile and Aragon were united in the perſons of Iſabella and Ferdinand V. A.D. 1474. Charles V. emperor of Germany, having married the heireſs of Aragon and Caſtile, eſtabliſhed the Spaniſh monarchy on its preſent baſis, A.D. 1516; and in conſequence of the acceſſion of American wealth, the power of Spain arrived at its zenith. In 1580 Portugal was added to Spain by Philip II., the ſon of Charles V.; but it revolted under Philip IV. A.D. 1640, and became a ſeparate kingdom. The Auſtrian dynaſty terminated at the death of Charles II., who died without iſſue, A.D. 1700; and this event was ſucceeded by the acceſſion of Philip V. of the houſe of Bourbon.

From the preceding abſtract of the principal epochs of Spain, it appears that this kingdom aroſe from the union of the provinces of the two crowns of Aragon and Caſtile; the number being four for that of Aragon, and twenty-two for Caſtile, without including the lordſhip of Biſcay and Navarre. The provinces of the crown of Aragon conſiſt of the kingdom of that name, the kingdom of Valencia, the principality of Catalonia, and the kingdom of Majorca:

thoſe of the crown of Caſtile conſiſt of the kingdom of Galicia, the provinces of Burgos, Leon, Zamora, Salamanca, Eſtremadura, Palencia, Valladolid, Segovia, Avila, Toro, La Mancha, Murcia, Guadalaxara, Cuença, Jaen, Granada, and Seville. Although this diviſion of Spain is the moſt ancient, and ſerves as the baſis for the impoſition and levying of the taxes, for the municipal laws, and the nature of privileges, the modern diviſion of Spain, with reſpect to the adminiſtration, is limited to thirteen provinces, kingdoms, or lordſhips, all of which have a captain-general, except Navarre, the intendant of which has the title of viceroy.

The *population* of Spain conſiſted originally of Celts from Gaul, and of Moors from Africa; the latter of whom, being more warlike, expelled the former. Towards the eaſt, it received large colonies of Carthaginians, and afterwards of Romans. In the fifth century it was conquered by the Vandals, and next by the Viſigoths, from whom ſeveral ancient families pretend even now to deduce their origin. The Mahometan Moors were ſo totally expelled, that they may be conſidered as almoſt extinct; and few families of Arabian extract now remain. We may, therefore, regard the modern Spaniards as deſcended from the African Iberians, the Celtiberian or German Gauls, the Romans, and the Viſigoths. The population of this country has varied much at different periods. In the time of Julius Cæſar it has been ſaid, that it contained at one period 40,000,000 of people, and at another period 52,000,000. This eſtimate, though apparently exaggerated, derives ſome degree of probability from the conſideration of the numerous armies which Spain furniſhed for a ſeries of years, during the Punic wars, in the time of the Romans and Carthaginians. The population of the towns ſeems to give us a very high idea of that part of the country in which they were ſituated. Merida afforded a garriſon of 80,000 infantry and 10,000 cavalry; and at the ſame period, the population of Tarragona amounted to about 2,500,000 inhabitants. The population of Spain ſuſtained but little diminution under the dominion of the Goths; but it very ſenſibly decreaſed during the Mooriſh dynaſty, on account of the multitude of victims that fell a ſacrifice to the ſanguinary ſword of the conquerors, and of thoſe who voluntarily exiled themſelves, in order to avoid oppreſſion. Spain, however, was again repeopled by the Chriſtians, who retook from the Moors the lands which they had rapaciouſly ſeized. Navarre, which formed a ſeparate ſtate, contained about 800,000 inhabitants; and near the ſame period, the ſtates dependent upon the crown of Aragon, which conſtituted the kingdom of that name, with thoſe of Valencia and Catalonia, furniſhed a very powerful army; and the town of Tarragona alone contained 80,000 families, or 350,000 inhabitants. The kingdom of Granada, ſubjugated by the Moors, had, at the ſame era, a numerous population. The city of Granada comprehended 70,000 houſes, occupied by 250,000 perſons, and furniſhed 50,000 ſoldiers. The kingdom, of which it was the capital, reckoned the number of its inhabitants at 3,000,000, on an extent of territory 70 leagues long by 30 in breadth. After the union of the different parts of the Spaniſh monarchy, in the reign of Ferdinand V. and Iſabella, its population is ſaid to have been 20,000,000; but as this eſtimate is exaggerated, it ſhould be reduced at leaſt one-third. In the year 1688 it amounted to no more than 12,000,000; and on the death of Charles II. and acceſſion of Philip V., in the year 1700, its numbers were reduced to 8,000,000. During the civil wars, which deſolated Spain in the firſt 13 or 14 years of that monarch's reign, it ſuffered a ſtill greater diminution, ſo that the population of the whole kingdom could not then have exceeded 6,000,000. Under the pacific reigns of the princes of the Bourbon family, the number of people in Spain greatly increaſed. The enumeration made by royal mandates, in the years 1767 and 1768, reported the population at 9,307,804 perſons; and by a new cenſus, taken in 1788 and 1789, by order of the king, the returns preſented 10,061,478. The lateſt eſtimate, formed in the year 1797, contains a much higher number, and is ſaid to have exceeded 12,000,000.

The ſtate of the Spaniſh population, in the year 1788, is exhibited in the following table.

BISCAY.		
Alava	71,399	
Guipuzcoa	120,716	
Lordſhip of Biſcay	116,042	
		308,157
Aragon		623,308
Catalonia		814,412
Aſturias		347,776
Galicia		1,345,803
Eſtremadura		416,922
ANDALUSIA.		
Kingdom of Seville	754,293	
Kingdom of Cordova	236,016	
Kingdom of Granada	661,661	
Kingdom of Jaen	177,136	
Sierra Morena	7,918	
		1,837,024
Kingdom of Murcia		337,686
Kingdom of Valencia		783,084
Kingdom of Navarre		227,322
Mancha		206,160
NEW CASTILE.		
Juriſdiction of Cuença	266,182	
Juriſdiction of Guadalaxara	144,370	
Juriſdiction of Toledo	334,425	
Province of Madrid	58,943	
City of Madrid	156,672	
Aranjuez, royal demeſne	2,655	
Le Pardo, royal demeſne	611	
		933,865
OLD CASTILE.		
Juriſdiction of Avila	115,172	
Juriſdiction of Burgos	465,410	
Juriſdiction of Old Caſtile	74,669	
Juriſdiction of Segovia	167,525	
Juriſdiction of Soria	170,565	
Juriſdiction of Valladolid	196,839	
S. Ildefonſa, royal demeſne	4,331	
The Eſcurial, royal demeſne	2,453	
		1,196,964
KINGDOM OF LEON.		
Juriſdiction of Leon	250,134	
Juriſdiction of Palencia	112,514	
Juriſdiction of Salamanca	210,380	
Juriſdiction of Toro	92,404	
		665,432
		10,143,975

According

SPAIN.

According to a ſtatement publiſhed at Madrid in 1802, the whole population of Spain appears to be 10,409,879; and thoſe who conſtitute the different claſſes as as follow:

Men	5,204,187
Women	5,205,692
	10,409,879

Out of this number, the calculation gives

Of ſingle men, religious, and widowers	3,257,022
Of nuns, widows, &c.	3,262,196
Total	6,519,218
Married perſons	3,890,661

As to the proportion between the extent of territory and the number of inhabitants, no eſtimate ſufficiently accurate has ever been made in Spain. For want of a more exact eſtimate, we ſhall here ſubjoin that of Haſſel, publiſhed at Brunſwick, in the "Statiſtique Européenne," which is ſuppoſed to be pretty accurate. According to this, Spain contains 25,145 ſquare leagues, of 25 to a degree, and 10,730,000 inhabitants, which will allow 425 inhabitants for every ſquare league. It will hence be eaſy to aſcertain the other numbers, by calculating after the proportion of 9 to 25. The equatorial degree is 25 French leagues, and 15 German miles; then reckoning their ſurfaces as the ſquares of their ſides, 9 ſquare German miles are equal to 25 ſquare leagues of France.

	Square German miles.	Inhabitants in general.	Inhabitants by ſquare Miles.
The whole of Spain	9053	10,730,000	1185
Kingdom of Caſtile	6628	7,278,000	1098
Provinces of Madrid, Toledo, Guadalaxara, Cuença, and La Mancha	1731	1,162,000	602
Burgos, Segovia, Soria, and Avila	740	915,000	1236
Leon, Valencia, Toro, Zamora, Valladolid, and Salamanca	805	939,000	1042
Aſturias	240	348,000	1450
Galicia	640	1,350,000	2109
Eſtremadura	682	427,000	527
Seville	424	755,000	1780
Cordova	296	237,000	800
Jaen	240	118,000	491
Granada and Antiquera	580	686,000	1184
Murcia	250	360,000	1440
Kingdom of Aragon	2145	3,152,000	1469
Aragon	710	624,000	878
Navarre	180	190,000	1055
Catalonia	580	1,200,000	2068
Valencia	490	933,000	1904
Majorca	185	205,000	1105
Lordſhip of Biſcay, compriſing Alava, Guipuzcoa, and Biſcay	280	300,000	1071

Others have ſtated the population of Spain at 11,000,000, and allow 74 perſons to a ſquare mile. Of its ancient population, numerous veſtiges exiſt in various parts of the country. And among the cauſes of its depopulation we may reckon the contagious fevers frequent in the ſouthern provinces, inceſſant inteſtine wars, the emigrations to America, the invaſion of the country by the Moors, the want of encouragement to agriculture, the multitude of detached farms, the effect of the *meſta*, (which ſee,) or wandering flocks, the number of unmarried clergy and monks, and, more eſpecially, that fanatic and miſtaken zeal, which proſcribed, on account of their religious tenets, two claſſes of wealthy and induſtrious people, the Jews and the Moors. Theſe were peculiarly valuable, on account of their intimate acquaintance with agriculture, arts, trade, and commerce. An edict iſſued at Granada, March 30, 1492, againſt the advice of the miniſtry, and many members of the ſupreme council, ordained, that every Jew who did not profeſs Chriſtianity within ſix months, ſhould be conſtrained to quit all countries under the government of the Catholic kings. Another equally impolitic edict was publiſhed in the year 1614, by which numbers of Moors, who, after having been ſubdued, had remained peaceably in Spain, were expelled the country. About 100,000 Jewiſh families pretended to be converted, and in the iſſue became victims to the inquiſition. More than 800,000 Jews left the kingdom, and migrated to France, Italy, Africa, and the Levant, and carried with them the wealth and other ſpecies of property which they had acquired by induſtry and trade. All the Moors, to the amount of 2,000,000, departed, leaving their towns and villages deſerted. We might add, as another collateral cauſe of the depopulation of Spain, the depredatory cruiſing of the Barbary pirates, for the ſpace of 300 years, by which they made numerous captives, both at ſea and by incurſions on the coaſts.

Towards the end of the 8th, and commencement of the 9th century, Spain was inhabited by four principal nations; *viz.* the natives, then known by the name of Romans; the Goths, comprehending the remains of the Suevi, Alani, and Vandals, ſeveral of whom were confounded with the natives and Moors, though a conſiderable part had taken refuge in the Aſturias and Navarre; the Moors, with whom the natives of Africa were mingled; and the French, who occupied a great part of Catalonia, Navarre, and the Pyrenees. Each of theſe nations brought with it its own genius, manners, laws, and cuſtoms; and beſides, the expulſion of the Moors from Spain was ſucceeded by the formation of ſeveral independent ſovereignties, each of which had its own laws and particular form of government. Hence reſulted a diverſity of genius, temper, manners and cuſtoms; which, though in ſome degree modified by the preſent uniformity of government, ſtill ſubſiſts; ſo that there are no two provinces exactly reſembling each other in manners and character. Some cuſtoms, however, and ſome traits of character, correſpond to one another in all the provinces. The national pride is every where the ſame, and this the Spaniard energetically expreſſes by his geſtures, words, and actions. In many caſes this is the pride of virtue, or a natural dignity of ſentiment, which ſoars above vice and folly. With this pride, which is diſcernible in all ranks of life, and in all claſſes of ſociety, the Spaniards combine, in a very eminent degree, temperance and valour. Of their valour in more remote ages, Thucydides, Diodorus Siculus, Livy, Strabo, and Lucius Florus, furniſh a variety of inſtances; nor have they altogether loſt this diſtinguiſhing quality of their anceſtors. In this reſpect, ſome ſhades of difference have been obſerved among the military of different provinces. The Galicians are accounted the beſt ſoldiers in Spain. Strabo has ſaid of them, that they were warlike, and that it was difficult to ſubjugate them. The valour of the Catalonian is ſaid to be the moſt intrepid; that of the Aragoneſe the moſt conſiderate; that of the Andaluſian the moſt preſumptuous; that of the Caſtilian the cooleſt; and that of the Biſcayan more active amongſt rocks than on the plain. The Spaniards are reckoned to be, in general, very grave and reſerved; and in their addreſs, cold and repulſive; but blended with their gravity, they manifeſt a degree of gaiety, particularly ſince the acceſſion of the houſe of Bourbon, which is frank and lively. Notwithſtanding this occaſional vivacity, the Spaniard is very tardy and ſlow in all his operations, reſpecting not only buſineſs and politics, arts and ſciences, but even their amours and pleaſures. That indolence and hatred of labour which prevail in their national character, have produced an averſion for agriculture and commerce, the effects of which have been nationally injurious. It has been obſerved, however, that this kind of apathy and indiſpoſition to labour, ſolely, or principally, prevail in thoſe parts where induſtry is without a ſpur, activity without an object, and commodities without a vent. The provinces near the ſea are all induſtrious; the inland provinces, deſtitute of canals and navigable rivers, and, till of late, of roads, and poſſeſſing no cheap or eaſy mode of communication, have no means of ſupporting induſtry.

The Spaniards were formerly very jealous of their wives and miſtreſſes; the women were ſhut up in their own houſes as in a kind of priſon, where thick lattices concealed them from the obſervation of impertinent curioſity. They received few viſits in the apartments to which they were confined, and which no man could enter without great difficulty and many precautions. They were placed under the guardianſhip of one or more duennas, and could not take a ſingle ſtep, either in their own houſes or abroad, which was not ſubject to their inſpection. Whenever they went out, a veil concealed the face from every paſſenger.

Times are greatly altered; huſbands are now much leſs ſuſpicious—more reaſonable, or more eaſy—and women much more acceſſible. Lattices and jealouſy have diſappeared; duennas only exiſt in romances; veils, under the name of *mantelas*, have become an ornament which gives effect to beauty; all houſes are thrown open; the men, gallant and amorous as ever, are become leſs captious; the women have recovered a liberty by which they are, perhaps, leſs tempted to go aſtray than formerly, when their virtue was entruſted to locks and grates, and to a ſuperintendance often faithleſs, and eaſy to be corrupted.

Both the men and women have gained by the change; the former have become leſs moroſe, more frank and agreeable; the women more attractively diſcloſe the many eaſy graces with which they were endowed by nature.

Several of the games, diverſions, and public ſpectacles of the Spaniards, are derived from the Moors, and to the ſame origin we may trace many of their cuſtoms, and even that kind of dreſs and mode of living which were long prevalent in this country. After the expulſion of the Moors, the Goths and native Spaniards, blended together and forming one nation, adopted the ſame coſtume and manners. On the acceſſion of Philip V. the Spaniſh habit was neglected and diſuſed, and the French, which ſtill prevails, ſubſtituted for it. The Spaniards are now as luxurious in their dreſs as they were formerly ſimple; they make uſe of the richeſt ſtuffs and ſilks, as well as of embroidery in ſilk, gold, and ſilver. The moſt varied and conſpicuous colours have ſucceeded to black, which was, for ſeveral centuries, the national coſtume. The common people, however, in ſeveral of the provinces, retain their ancient mode of clothing, with ſome diverſity in different parts of the country. Different profeſſions have their peculiar coſtume in Spain. Uniforms are very numerous, and are not confined to the military. The Spaniſh nobility have an uniform for the holy week; they wear it at court and in town, and the king and royal family wear the ſame. The coat is of black velvet, lined with crimſon ſatin, with gold, or gold embroidered buttons, and facings of gold brocade on a crimſon ground, or of ſatin of the ſame colour embroidered with gold. The waiſtcoat is the ſame as the facings, and the breeches are black. This dreſs is handſome and dignified. Among the amuſements of the Spaniards we may reckon the feſtivals of the church, which in ſeveral of the provinces, particularly in Aragon, are attended with very brilliant and magnificent decorations; the fire-works, which are very common in Spain; the maſquerades, which were formerly much in faſhion in Spain during the carnival, particularly in Aragon; and the bull-fights, which were the true national ſpectacle; but this amuſement was ſuppreſſed ſeveral years ago. The amuſements of people of rank chiefly conſiſt in dancing and cards; and the theatre is much frequented, though the plays and muſic do not correſpond in excellence with the national refinement.

The origin of nobility in Spain cannot be preciſely aſcertained. Of this order of perſons no traces appear, whilſt the country continued under the dominion firſt of the Carthaginians, and afterwards of the Romans. The rudiments of it firſt manifeſted themſelves under the Gothic kings; but it was almoſt totally annihilated by the Saracenic invaſion. After the expulſion of the Moors, a regular order of nobility began to grow up in the newly eſtabliſhed kingdoms of Spain, with peculiar modifications in different ſtates. The only method of acquiring nobility in this country is by a royal grant, as it is not attached to the exerciſe of any office, civil or military: and the price of a patent of nobility varies in the different provinces. Of late years a diſtinction has been taking place, between the titled and untitled nobility. The former are ſo called becauſe they have obtained from the king the title of grandee, of duke, of count, of marquis, or of viſcount. Theſe titles of nobility are hereditary in the families of thoſe to whom they have been granted, and deſcend firſt to the males, according to ſeniority, and then to the females, who have a right to transfer them to their huſbands and to their children. The titled nobility, unleſs they have been advanced to the dignity of grandee, enjoy few privileges above thoſe that are entitled. The grandees, of whom there are ſeveral claſſes, are at the head of the Spaniſh nobility, and at court take precedence of all ſecular dignities, except thoſe of conſtable and admiral of Caſtile. The moſt valued privilege belonging to the grandees is that of being covered in the royal preſence. The number of titled nobility in the year 1787 was as follows; 129 grandees, 535 marquiſes, counts, and viſcounts; of theſe latter, 142 habitually reſided at court, and the reſt in the provinces.

The military orders in Spain were formerly eleven, all of which are become extinct. At preſent there are ſeven different orders, *viz.* thoſe of the Golden Fleece, of San Jago, or St. James of the Sword, of Calatrava, of Alcantara, of Monteſa, of Charles III., and of Maria Louiſa. Of theſe, the firſt has paſſed by ſucceſſion to the Spaniſh crown, the four next are the military orders properly ſo called, and the two laſt are of modern inſtitution. (See GOLDEN *Fleece*, *St.* JAMES *of the Sword*, CALATRAVA, ALCANTARA, *St.* GEORGE *of Alfama.*) For the four laſt named military orders the qualifications at preſent neceſſary are eight years of active ſervice in the Spaniſh army, and proofs of nobility of four degrees, on the ſide of both father and mother. The only advantage that accrues of neceſſity, on admiſſion into any of theſe four orders, is the honour of wearing the croſs, beſides a few unimportant privileges: the commanderies are places of pecuniary profit, belonging to thoſe who have taken the vow of combating the infidels, of fidelity towards the ſovereign, and of conjugal charity. The order of Calatrava has 20 of theſe, valued at 71,250*l.* ſterling; that of San Jago has 87, valued at 81,250*l.*; that of Alcantara has 37, worth 39,000*l.*; and that of Monteſa 13, at 12,588*l.* To each of the orders belong monks, and ſeveral convents of nuns. The order of Charles III. was founded by the king of that name, on the 19th of September, 1771, and placed under the immediate protection of the Holy Virgin, under the title of the Conception. Of this order the ſovereign is chief; he alone nominates the grand croſſes and knights. The order is compoſed of ſixty grand croſſes, two hundred penſioned knights, and an indefinite number of others; of a grand chancellor and miniſter, who is always the patriarch of the Indies; of a ſecretary, a maſter of the ceremonies, and a treaſurer.

The croſs of this order is of eight points, ſurmounted by a royal crown, with a figure of the conception in the middle; it is worn hung to a ribband of three equal ſtripes, the two outer of which are blue, and the inner white. The grand croſſes wear this ribband much broader than the knights, ſaltierwiſe from the right ſhoulder to beneath the left arm, with a conception of ſilver embroidery on the left ſide of the habit and cloak. On days of ceremony they wear a long cloak, and a collar, the links of which are formed alternately of the king's cypher and the arms of Caſtile. The knights wear the croſs hung from the button-hole by a narrow ribband. The penſions of the knights (of which there are 200) are each fixed at the ſum of 4000 reals: they are given to military men, to men of letters, to lawyers, to gentlemen, and to thoſe employed in the miniſterial departments. This order has a ſupreme council, compoſed of the ſovereign, of the grand chancellor of the order, who is alſo vice-preſident, of a ſecretary, a fiſcal, an accomptant, and ten counſellors.

The order of Maria Louiſa is very modern, having been eſtabliſhed in 1792, by Charles VI., who named it after the queen his wife. Only ladies are admitted into this order. The grand-maſterſhip is veſted in the queen, and the number of ladies is thirty. The croſs of the order is a medallion, with a portrait of the queen, hung to a violet ribband, divided in the middle by a white ſtripe, and worn ſaltierwiſe.

In Spain there is a deſcription of perſons denominated "Mayorazgos." The term, derived from the word *mayor*, or firſt-born, implies, ſtrictly ſpeaking, the right poſſeſſed by the eldeſt-born of a family, to inherit certain property, on the condition of tranſmitting it entire and undiminiſhed to thoſe who may be poſſeſſed of the ſame right on his deceaſe.

The import of this term has, however, been much extended by uſe; for, though it properly means only the right of ſucceſſion to a perpetually entailed eſtate, in virtue of primogeniture, yet it now ſignifies, in addition, the cauſe which produces the right, the property which is the object of it, the actual poſſeſſor of the property, and the perſon who ſtands next in ſucceſſion.

Of theſe mayorazgos there are five claſſes or kinds, diſtinguiſhed by certain circumſtances incident to the deſcent or transfer of property. Many diſadvantages have attended the extenſive multiplication of mayorazgos; eſpecially when the ſucceſſion deſcends to females. Inſtead of perpetuating families, for which purpoſe the inſtitution was intended, it very much contributes to their extinction; it injures the general progreſs of agriculture, and it encourages idleneſs, to which the Spaniards are very much addicted.

Literature, Sciences, the Arts, and Language.—The ſtate of ſcience in Spain, before the time of the Romans and Carthaginians, is wholly unknown; but when the Romans introduced with their arms the arts of civilization, the Spaniards began to cultivate literature and the ſciences, and produced ſeveral writers who attracted diſtinguiſhed notice: ſuch were L. A. Seneca, a native of Cordova; the geographer M. Pomponius Mela, of Andaluſia; and J. M. Columella, of Cadiz, whoſe works on agriculture and rural economy are even now held in high eſtimation. Under the Goths, when literature was reſtrained and oppreſſed, Spain furniſhed perſons no leſs diſtinguiſhed by their virtues than by their talents and writings. To this claſs we may refer Hoſius, biſhop of Cordova; Gregorius Boeticus, biſhop of Elvira; S. Ildefonſo, archbiſhop of his native place, Toledo; S. Iſidore, a native, and afterwards archbiſhop, of Seville; Priſcillianus of Galicia; Petrus of Saragoſſa, a diſtinguiſhed orator; Aurelius Prudentius, of Calahorra, an eſteemed poet; and Aquilius Severus, who wrote an account of his travels in Africa. The invaſion of the Moors introduced a period of barbariſm; but at this time we find, without mentioning perſons of leſs note, king Alphonſo IV. of Caſtile and X. of Leon, who was celebrated for his acquirements in various departments of literature and ſcience; who was a legiſlator, orator, hiſtorian, poet, mathematician, and aſtronomer; and who merited the appellation of "El Sabio," the ſage, which was conferred upon him by general conſent. Although the native Spaniards were plunged in ignorance, the Moors united with the moſt romantic bravery, a paſſionate love of ſcience and the arts. Beſides their theatres, public ſhows, and tournaments, they eſtabliſhed public ſchools in every town under their dominion, of which thoſe of Seville, Cordova, and Granada, obtained a high degree of reputation. They eſtabliſhed in various places colleges and academies, as well as libraries, for the promotion of ſcience and literature. The ſciences cultivated by them with eminent ſucceſs were, geography, experimental philoſophy, optics, botany, chemiſtry, medicine, natural hiſtory, geometry, and other branches of the mathematics. When the Moors were expelled, the fortunate and brilliant reign of the Catholic ſovereigns Ferdinand and Iſabella was the era in which knowledge revived, and its boundaries were enlarged during the reigns of Charles V. and Philip II. During the inauſpicious period that ſucceeded the reign of Philip II., ſeveral perſons of diſtinguiſhed genius and attainments exerted themſelves for the protection and encouragement of ſcience; and it would be tedious to mention even the names of thoſe who excelled in various branches of learning. We cannot, however, forbear mentioning Benedict Feyjoo, a Benedictine monk, who died at Oviedo in 1762, and who did honour to his country at a time when literature, ſcience, and the arts, were almoſt wholly neglected and unknown. To him Spain was indebted for the reſtoration of literature, good taſte, and the love of ſtudy. We might alſo enumerate among its diſtinguiſhed poets and hiſtorians, Quevedo, Cervantes, Saavedra, Lopez de Vega, Guevara, Mariana, Granada, Solis, Herrera, &c.

The number of univerſities, or rather academies, in Spain, was formerly twenty-four, but the following ſeventeen are all which now remain, *viz.* that of Pampeluna, in Navarre; of Oviedo, in the Aſturias; of San Jago, in Galicia; of Seville, and of Granada, in the provinces of the ſame name; of Hueſca and Saragoſſa, in Aragon; of Avila, Oſma, and Valladolid, in Old Caſtile; of Toledo, Siguenza, and Alcala de Hamarez, in New Caſtile; of Cervera, in Catalonia;

lonia; of Orihuela and Valencia, in Valencia; and of Salamanca, in the province of Leon. Several of theſe ſcarcely deſerve notice. Thoſe of Saragoſſa, Alcala, and Cervera, retain ſome degree of importance; but the moſt ancient and moſt celebrated is that of Salamanca; for an account of which ſee that article. The moſt popular univerſity at preſent is ſaid to be that of Valencia. The conventual ſchools are numerous; and Spain has four military ſchools, *viz.* at Barcelona, Zamora, Cadiz, and Segovia. Public libraries are alſo numerous.

The native tongue of the ancient Spaniards was utterly loſt during the domination of the Romans, whoſe language in the corrupt form of the middle ages became that of Spain. The Goths brought into the country their own Teutonic dialect; and as the natives continued to ſpeak Latin, their language became at length a mixture of Latin and Teutonic. The Arabs, in their turn, introduced the ſpeech of their country, veſtiges of which remained after their expulſion. Hence it appears, that the Spaniſh language was compounded from three different ſources: the Latin prevailed over the other two, and the Gothic ſtill preponderates over the Mooriſh. Within the laſt two or three centuries the Spaniſh language has undergone conſiderable alterations; it ſtill, however, preſerves the ſame roots, the ſame turn of phraſe, and the greater number of its words, but altered in their inflections and terminations. The Spaniards themſelves boaſt, among other excellencies, of the facility with which it is pronounced; it is ſounded, they ſay, exactly as it is written, but this aſſertion is too general In ſome reſpects this language is very rich; it abounds in compound words, in ſuperlatives, derivatives, augmentatives, diminutives, and frequentative verbs; it has many quite ſynonimous words, and others which well expreſs the different ſhades of meaning. In the technical terms of arts and ſciences, it is, however, extremely poor; a few of theſe it has borrowed from the Latin, and almoſt all the reſt from the French.

On the whole, the Spaniſh is one of the fineſt of the European languages. It is dignified, harmonious, energetic, and expreſſive; and abounds in grand and ſonorous expreſſions, which unite into meaſured periods, whoſe cadence is very agreeable to the ear. It is a language well adapted to poetry, but it alſo inclines to exaggeration, and its vehemence eaſily degenerates into bombaſt. Though naturally grave, it eaſily admits of pleaſantry. In the mouth of well educated men it is noble and expreſſive; lively and pointed in that of the common people; ſweet, ſeductive, and perſuaſive when uttered by a female. Amongſt the orators it is touching and impoſing, though rather diffuſe; at the bar and in the ſchools it is barbarous; and is ſpoken by thoſe about the court in a conciſe and agreeable manner.

The Spaniards articulate ſtrongly, and ſometimes with a kind of guttural ſound, which greatly impairs the grace and dignity of their ſpeech, but the pronunciation differs materially in different provinces. In Catalonia it is harſh and conſtrained; harſh alſo and dry in Aragon; quick and lively in Biſcay; agreeably modified in the kingdom of Valencia; boaſtful and mouthing in Andaluſia; ſofter, ſweeter, and more natural in Caſtile.

The Spaniſh language is not ſpoken with the ſame purity in all parts of the kingdom. Beſides the old provincial dialects, which ſtill prevail in many parts, the Baſque is ſtill ſpoken in Biſcay; and the language is mixed with French in Navarre, with Portugueſe in Galicia, and with Arabic in Murcia and Andaluſia. It is in New Caſtile, and eſpecially in the ancient kingdom of Toledo, that it is beſt ſpoken; and there that a ſtranger ought to learn it who deſires to become acquainted with all its delicacies and beauties. The ancient Limouſine or Provençale forms the baſis of the dialects of Catalonia and Valencia.

Baſque is ſpoken in the lordſhip of Biſcay, in Guipuſcoa, and in the greateſt part of Alava. This language is very ancient; it differs entirely from the Spaniſh, either ancient or modern; it exiſted before the arrival of the Romans, and was then unlike what was ſpoken in the other parts of Spain; it is mentioned by Strabo, Seneca, and Pomponius Mela. It has been preſerved to our days almoſt without alteration or corruption, particularly in the more mountainous parts. It is very difficult to ſtrangers, and appears to thoſe who do not underſtand it a coarſe and barbarous tongue, deſtitute of elegance and expreſſion; but ſuch as are verſed in it account it very ſweet and expreſſive.

The Spaniards, abhorring the Moors, diſdained to apply themſelves to the arts which they exerciſed; and hence proceeded a general contempt for artiſans, which has been perpetuated to the preſent time, and has greatly retarded their progreſs in Spain. The arts which are employed in manufactures are much advanced in Spain. The 16th century was the moſt brilliant period of the arts in Spain, as well as of the ſciences, of literature, and of the power and grandeur of the monarchy. Many able architects appeared at once under Charles V. and Philip II., who erected numerous edifices, that will immortalize the reigns of thoſe princes and the names of the artiſts, ſuch as John de Herrera, Cepedes, Pedro de Uria, and John Baptiſt Monegro of Toledo, the latter of whom aſſiſted in the building of the Eſcurial, and of the church of St. Peter at Rome. The ſtructures of this age are the fineſt in Spain. Architecture, however, very much declined in the 17th century; but about half a century ago it began again to be cultivated with ſucceſs. Spain juſtly boaſts of a number of ſculptors of diſtinguiſhed merit, among whom we might mention Paul Cepedes of Cordova, and Alonzo Cano of Granada. Of all the liberal arts, painting is that which has been moſt cultivated in Spain; and though the Spaniſh ſchool is little known, it deſerves notice, as occupying a middle place between the Italian and Flemiſh ſchools, being more natural than the firſt, more noble than the ſecond, and participating the beauties of both. It has particularly excelled in ſacred ſubjects. Moſt of the painters of Spain are of the 17th or the end of the 16th century. In the 18th century painting was almoſt totally annihilated in Spain; but the Spaniſh ſchool was recovered about the middle of the ſame century by Antonio Raphael Mengs. Spain now poſſeſſes an academy of painting at Seville, and two academies of the fine arts, one at Madrid, and the other at Valencia; and public, gratuitous ſchools for drawing have not long ago been eſtabliſhed in various places. The Spaniards have a taſte for muſic, and have cultivated it with ſucceſs. They prefer the Italian to the French muſic, the latter being in their opinion too languid and monotonous. The Moors were the firſt in Spain who cultivated muſic ſcientifically, and who eſtabliſhed ſchools for teaching it: and the Spaniards have been led to imitate them. The Mooriſh muſic conſiſted chiefly of ſoft and tender airs, ſung by one or more voices, and accompanied by the lute: and the modern Spaniards have alſo their national muſic, reſembling that of the Moors, and confined to detached airs, which are ſung by one or more voices, and accompanied by the guitar. Spain has alſo adopted the muſical inſtruments generally uſed among other nations, and it has ſome that are peculiarly its own. Different provinces have their appropriate inſtruments. For the hiſtory of Spaniſh muſic, ſee the ſequel.

We have already mentioned dancing as one of the amuſements to which the Spaniards are much addicted. Beſides thoſe dances which are provincial, they have three which are national; *viz.* the fandango, the bolero, and the ſequidilla. The fandango is very ancient; it is probably referred to by Martial, and it is defined by Baretti to be a regular and harmonious convulſion of all parts of the body. The bolero, which is quite modern, is an imitation of the former, but ſhortened and modified, and ſtripped of all thoſe acceſſaries, which give to the fandango ſo very free a character. The ſequidilla is an imitation of the ſteps of the two others formed into a ballet. Theſe dances are uſually performed to the ſound of the guitar, accompanied by the voice of the player. The women very correctly mark the time with the heel, a motion which adds a new grace.

Climate, Soil, and Agriculture.—The climate of Spain is equal, if not ſuperior, to that of any country in Europe; it is in general very dry, and irrigation is rendered difficult by the chains of mountains that interſect it. The climate is various in different provinces, and in thoſe that lie to the ſouth the heat is inſalubrious, and ſometimes occaſions epidemic diſeaſes that are very fatal. Theſe are partly owing to ſtagnant and undrained marſhes, and to the neglect of proper culture. The chains of mountains that interſect the country at various diſtances from E. to W. ſerve to temper the climate, and ſupply cooling breezes. In the ſouth the ſea-breeze, commencing about nine in the morning, and continuing till five in the afternoon, moderates the heat of ſummer: and the ſeverity of winter in the northern provinces is allayed by the gales of the ocean, at no great diſtance. It has been obſerved, that the temperature of Spain is influenced by its peculiar configuration, and by the ſingular height of this country above the level of the ſea, inſomuch, that although from the N.E. it gradually becomes lower, yet the high plain, or table land of the Caſtiles, has an elevation of upwards of 300 fathoms. According to the obſervations of Humboldt, the interior of Spain is an elevated plain, and the higheſt of any of the ſame kind in Europe, which occupies a large extent of country. The mean height of the barometer at Madrid, obſerved by Don Felipe Bauza, ſhews that capital to be elevated at 309⅗ fathoms above the level of the ocean, allowing the barometer on the coaſts to be at 338 and 24 lines. Hence it appears that the elevation of Madrid is 15 times greater than that of Paris, three times greater than that of mount Valerian, and alſo three times greater than that of Geneva, which is 188 fathoms above the level of the ſea. This height of the plain of the Caſtiles has an obvious effect upon its temperature. The mean temperature of Madrid appears to be 59° of Fahrenheit, while that of Peterſburgh is 39° 52′ 30″; that of Berlin, 46° 57′ 30″; that of Paris, 53° 56′ 15″; that of Marſeilles, 58° 33′; that of Toulon, 61° 15′; that of Naples, 63° 30′; and that of the countries ſituated under the equator and on the level of the ocean, from 79° to 81°. Genoa is four degrees more to the north than Madrid, and yet the temperature of Genoa raiſes the glaſs almoſt two degrees higher than that of the capital of Spain. Such is the influence of local cauſes, of the elevation of ſcite, the proximity to the ſea, a chain of mountains which keeps off the cold northerly winds, and a great number of little circumſtances, the combination of which moderates the temperature of places.

If the mean temperature of the elevated plains of Spain is 59° of Fahrenheit, that of the coaſts from the 41ſt degree of latitude to the 36th, is between 63½° and 68° Fahrenheit. Thus we ſee banana-trees, heliconias, and ſugar-canes, growing upon theſe coaſts in ſituations that are ſheltered from the cold winds.

Upon the whole, the face of the country is in moſt ſeaſons delightful, abounding with excellent and fruitful paſturage, vineyards, and groves of orange-trees; and the hills ſtocked with wild thyme and other odoriferous plants. The rivers and ſtreams are numerous; and the chains of mountains afford a great variety to the proſpect. The moſt northern of theſe chains is regarded as a continuation of the Pyrenees, paſſing on the S. of Biſcay and the Aſturias into Galicia; and it is variouſly denominated, as the mountains of Biſcay, the Sierra of Aſturias, and the mountains of Mondonedo in Galicia. It is alſo known by the names of the mountains of Santiliana, of Vindo, and of the mountains of Oea. We here obſerve that the term "Sierra," peculiar to Spain, denotes a chain of mountains, the ſucceſſive peaks of which preſent the reſemblance of a *ſaw*. The gypſeous and argillaceous mountains of this country rarely exhibiting any ſupreme elevation, like thoſe in the granitic chains, naturally ſuggeſted this appellation. The ſecond chain of Spaniſh mountains extends from near Soria on the N.E., and purſues a S.W. direction towards Portugal. This chain is called that of Urbia, or Guadarama, and alſo the Montes Carpentanos. The third is that of Toledo, or Guadalupe, running nearly parallel with the laſt. Theſe two central chains ſeem to contain great quantities of granite. Next towards the S. is the Sierra Morena, or brown mountains, which are followed by the moſt ſouthern ridge, that of the Sierra Nevada. On the E. there is a conſiderable chain, which connects the two central ridges, and advances towards the Mediterranean in the N. of Valencia. There are alſo conſiderable ranges of hills in this part of the kingdom, generally running from N. to S. Near Barcelona is a remarkable ſolitary mountain, at a diſtance appearing like a ſugar-loaf, and on a nearer approach jagged like a ſaw, with pyramidal rocks; compoſed of ſarcilite or pudding-ſtone, formed of limeſtone gravel united by calcareous cement; and ſo high, that from its ſummit may be ſeen the iſlands of Majorca and Minorca, at the diſtance of 50 leagues. The circumjacent region conſiſts of argillaceous ſchiſtus, with clay and ſand. Not far from this mountain, called Montſerrat, near the village of Cardona, is a hill three miles in circumference, which is a maſs of rock-ſalt, uſed in the dry climate of Spain for vaſes, ſnuff-boxes, and trinkets, like our Derbyſhire ſpar.

According to the deſcription of the ingenious obſerver, Mr. Townſend, the northern ſide of the Pyrenees (which ſee) is chiefly calcareous, ſurmounted with argillaceous ſchiſtus; but the ſouthern is granite, and of courſe barren. The hills to the S. of Gerona are alſo granitic. The higheſt ridge in Spain, near Daroca, from which originate the Tajo and the Ebro, ſeems to be compoſed of argillaceous ſchiſtus, and free-ſtone, probably reſting on granite. Near Anchuala the mountains are limeſtone with ſhells, and in ſome places contain beds of red gypſum, with cryſtals of the ſame colour. In general, gypſum is as abundant in Spain as chalk is in England; and the gypſum produces cryſtals of ſea-ſalt and Epſom ſalt, and abundance of nitre. The mountains on the N. of Madrid, forming part of the central chain, are granite. Thoſe to the N. of Leon are chiefly marble or limeſtone, on a baſis of argillaceous ſchiſtus, riſing in bold and rugged rocks, which afforded a barrier to the remains of Spaniſh liberty. In returning towards the S. the ſoil of La Mancha is ſandy, the rock gypſum. The higher regions of the Sierra Morena are granite: the lower, argillaceous ſchiſtus with gypſum and limeſtone. The granite is of two kinds, the red and the white. Near Cordova the higheſt hills are

are covered with rounded maſſes of granite, grit, and limeſtone. Near Malaga are branches of the Sierra Nevada, or ſnowy chain, an appellation which might be extended to the central range between Old and New Caſtile, which, according to Mr. Townſend, may at ſome times be viſible at the diſtance of 100 miles: theſe branches preſent limeſtone and marble, ſurmounted by argillaceous ſchiſtus. Near Alhama, S.E. of the city of Granada, are found rocks, which, on a baſis of ſhingle or round gravel, preſent ſand-ſtone with ſhells, ſurmounted with ſarcilite; but in general the rocks are gypſeous, with ſtrata of the ſame ſubſtance cryſtallized. Mr. Townſend ſuppoſes that the power of the ſun contributes to impregnate chalk with vitriolic acid, thus forming gypſum. The S.E. part of Spain ſeems to be equally calcareous, and the cathedral of Murcia is built with piſolite, a ſort of free-ſtone, reſembling the roe of fiſh. The aventurine is found in the mountain of Gata, towards the frontiers of Portugal; the Cape de Gata preſents alſo ſome ſingularities, and appears to ſome travellers to have been volcanic.

The foreſts, or rather chaces of Spain, are numerous. They are little cultivated, and are partly reſerved for the pleaſures of hunting; ſuch is that of the Pardo, which is barren of trees, and extends about 30 miles. Some of the foreſts are haunted by ſmugglers and banditti, who rob travellers, and often commit murders.

Spain, including the whole country S. of the Pyrenees, in relation to botany, and its vegetable productions, has been divided into the ſea-ſhore, the high mountains, the lower ones, the arable lands, the grazing tracts and marſhes along the rivers, and the vicinity of Liſbon and Oporto. The ſea-ſhore, with reſpect to its vegetables, reſembles for the moſt part the northern coaſts of the Mediterranean; the flat ſandy tracts being occupied by the ſea-daffodil, the ſhrubby glaſs-wort, and the ſalſola ſoda and ſativa; and of the latter there are extenſive plantations in the vicinity of Alicant and Barcelona, the aſhes of which yield the barilla, of which ſome thouſand tons are annually manufactured: the rocks on the coaſt are chiefly calcareous, and abound with ſeveral vegetables, and particularly with the ſtipa tenaciſſima, or eſparto graſs, uſed in making ropes, mats, chair-bottoms, &c. The high mountains of Spain are covered with ſnow only for a few weeks in the year, and in theſe elevated regions are found the fineſt timber trees, and other vegetable productions of the ſame kind with thoſe that are met with in the north of Europe. The long ranges of hills that occupy the greateſt part of Spain, conſiſt either of extenſive arid tracts of ſand, arenaceous ſand-ſtone, and ferruginous rubble forming the heaths, of dry calcareous diſtricts forming the ſheep-walks, or of moiſt rough granitic and marble ridges, with a ſhallow ſoil, forming the woodlands. The Spaniſh heaths are gayer and richer with plants than thoſe of any other European country. The ſheep-walks are for the moſt part open downs, with little ſhelter, excepting occaſionally groves of cheſnut-trees or evergreen oaks. In the wood-lands the trees are neither ſo large nor ſo ample in their foliage as thoſe of the German and Engliſh foreſts. The maritime provinces of Spain abound with wood; but in the interior provinces trees are rare, and plantations are not ſufficiently encouraged. Portugal and Spain are deficient in reſpect of water; the rivers flow through rocky channels, and therefore the marſhes and bogs are infrequent. The vicinity of Liſbon and Oporto, and of a few other towns on the coaſt, afford a number of Indian, African, and American plants.

In zoology, Spain is celebrated for its horſes and mules, the latter however being more regarded than the former, which are ſaid to degenerate, and particularly for its ſheep, which are ſuperior to thoſe of other countries with reſpect to the delicacy of the mutton and the beauty of the fleece.

In mineralogy, Spain was formerly more diſtinguiſhed than it has been in later times. Pliny, Strabo, and Polybius, ſpeak in high terms of commendation of its precious metals; ſo that Britain and other maritime regions received their gold and ſilver from Gaul and Spain, in return for cattle, hides, and other products. At preſent the ſilver-mines are almoſt wholly confined to Guadalcanal in the Sierra Morena, though rich veins of the ſame metal, in a fuliginous ſtate, exiſt in many places. The quickſilver mines of Almadan in La Mancha furniſh America with mercury for refining its more precious metals. Calamine, cobalt, antimony, copper, tin, and lead, are found in Spain; its iron is valuable; and coals are obtained in the diſtrict of Villa Franca, in Catalonia, where alſo occur gold, ſilver, copper, and lead. Amber and jet are found in the territory of Betonica, in the Aſturias. The other minerals it is needleſs to enumerate. Murcia produces a fine red earth, called "almagra," which is mingled with the Spaniſh ſnuff. The aventurine of Spain is a felſpar ſprinkled with golden mica.

Few of the mineral waters of Spain are much celebrated. The hot ſprings near Oviedo reſemble thoſe of Bath; and thoſe near Alicant are warm ſprings of a chalybeate nature, riſing like the fumes among calcareous hills.

We ſhall now advert to the *agriculture* of Spain. The ſoil in Spain is generally light, and repoſes on beds of gypſum; nor is any country in Europe upon the whole ſo fertile as this, or poſſeſſing equal advantages at all ſeaſons of the year. It was, indeed, in this region that the ancients fixed the ſcite of the Elyſian fields, and the gardens of the Heſperides. When the Romans firſt entered Iberia, they were aſtoniſhed at the productive and flouriſhing ſtate in which many parts of it were found; and they encouraged the exiſting induſtry, ſo that Spain became the granary of their empire, and the nurſery of their armies. The northern nations, when they took poſſeſſion of the country, parcelled out the lands, and turned their attention to the improvement of agriculture. They conſtructed ſubterraneous buildings, or granaries, in uſe before their time, for the preſervation of corn, and encouraged the formation of canals and ſluices, for the irrigation of the land. Under the Moors agriculture was in a ſtill more flouriſhing ſtate; and the era of their expulſion deſignates the epoch of the decline of agriculture. The Spaniards, deprived of their aſſiſtance, poſſeſſed neither talents, activity, nor perſevering induſtry, for the cultivation of their lands; and though they had an excellent ſoil, and numerous rivers to counteract its aridity, and nothing but induſtry and labour were wanting, ſcarcely two-thirds of the country were under cultivation: ſo that they have been under a neceſſity of importing a large quantity of corn from foreign countries. Many attempts were made by ſucceſſive Spaniſh monarchs to rouſe the ſpirit and invigorate the ſyſtem of agriculture; but they proved, from various impeding cauſes, in a great degree ineffectual. A variety of circumſtances contributes to diminiſh the number of perſons that are inclined to labour, as well as to contract the portion of time that may be employed for this purpoſe. Although Spain has a population of 10,143,965 perſons, yet of theſe, the women, children, and old and infirm men, conſtitute five-eighths of the whole, and reduce the population to about 3,803,981 men. From this number muſt be ſubtracted the ſecular and regular clergy, military and navy, nobility, ſtudents, counſellors, ſcriveners, domeſtics, and tax-gatherers, amounting to 1,221,799 perſons; ſo that the number of thoſe who might be actively employed in agriculture, ſubject to a ſtill further reduction, amounts to conſiderably leſs than 2,582,592. The number of working days is much leſſened by the multiplicity of feaſts and holidays. The want of good roads and of convenient markets, the high price of labour, and the "meſta" (which ſee), very much impede agricultural improvement. Under all theſe diſadvantages, ſo fertile is the ſoil and ſo favourable the climate, Spain produces a very conſiderable quantity of various ſorts of grain; but different provinces are more or leſs diſtinguiſhed in this reſpect. Flax, hemp, ſugar-canes, madder, ſoda, ſaffron, broom, honey, palms and dates, cork-trees, kermes or gall-inſects, and different kinds of fruit, almonds, nuts, figs, carob-beans, olives, vines and dried raiſins, may be reckoned amongſt its productions. The common courſe of huſbandry about Barcelona, as Mr. Townſend informs us, begins with wheat; which being ripe in June is immediately ſucceeded by Indian corn, hemp, millet, cabbage, kidney-beans, or lettuce. In the ſecond year theſe crops ſucceed one another as before. In the next year they ſow barley, beans, or vetches, which being taken off the ground before Midſummer, are followed, as in the former year, by other crops, changing them according to the ſeaſon, ſo as to have on the ſame ſpot the greateſt variety. Wheat produces a ten-fold crop, and in rainy ſeaſons fifteen for one. Near Carthagena, the courſe is wheat, barley, and fallow. For wheat they plough thrice, and ſow from the middle of November to the beginning of December; in July they reap from 10 to 100 for one, as the ſeaſon happens to be humid. The Huerta, or rich vale of Alicant, yields a perpetual ſucceſſion of crops. Barley is ſown in September, reaped in April; ſucceeded by maize, reaped in September, and by a mixed crop of eſculents which follow. Wheat is ſown in November, and reaped in June; flax in September, pulled in May. In the vale of Valencia wheat yields from 20 to 40; barley, from 18 to 24; oats, from 20 to 30; maize, 100; rice, 40. In the more ſouthern provinces, the land is almoſt equally fertile: and the ſugar-cane is ſucceſsfully cultivated near Granada. The Spaniſh plough is generally light, and is drawn by oxen with the yoke over the horns. All the provinces of Spain produce wine. The eaſtern and ſouthern provinces contain a vaſt number of vines; but the northern and weſtern not ſo many. But the wines vary in reſpect of quality in the different provinces, and in the ſeveral diſtricts even of the ſame province. The ordinary wines of the country are red wines; but many diſtricts of Spain produce excellent ſweet wines. The old ſherry wine, "Xerez ſeco," is the ſherry ſack of Shakſpeare. The dried grapes or raiſins form in the kingdom of Valencia, where they annually produce 88,461½ cwt. and uſually export 36,538 cwt., and particularly in that of Granada, the environs of Malaga furniſhing annually 288,461½ cwt. and exporting 240,577 cwt., a very conſiderable article of commerce. In the latter province, they are ſimply dried in the ſun, without any other preparation; in the former the grapes are ſteeped in boiling water, ſharpened with a ley made of vine-ſtems, and then expoſed to the air and ſuſpended in the ſun, till they are ſufficiently dry. Thoſe of Malaga are of a ſuperior quality, in greater eſtimation, and obtain a higher price than any other. They are naturally larger, and of a more delicate flavour than any others. The cultivation of ſugar-canes prevails on an extenſive ſcale on the ſide of Granada, where enough is grown to ſupply a conſiderable manufacture of ſugar. Formerly they had no fewer than twelve ſugar-mills between Malaga and Gibraltar, the four principal of which were at Madrid, near which place the beſt canes were produced. But the cultivation of cotton has been ſubſtituted there in the place of ſugar. Olive-trees thrive in almoſt every part of the country. The olives grown in the diſtricts of Alcala and Guadayra, in the kingdom of Seville, are larger and finer than any in Europe, and the beſt adapted for pickling. The greateſt quantity of oil is produced in the kingdom of Valencia; *viz.* 88,000 quintals, or 84,615 cwt. annually. Wood is ſcarce in the two Caſtiles, Eſtremadura and Leon. The cables of the Spaniſh veſſels are often made of eſparto from Murcia.

In Spain ſeveral economical ſocieties have been lately eſtabliſhed, particularly at Valencia and Saragoſſa, with a view to the encouragement of agriculture; and in connection with the ſociety of the latter place is a charitable bank in favour of diſtreſſed farmers. Money is advanced ſufficient to defray the expences of harveſt, and two years are allowed for returning, by inſtalments, the ſums thus advanced. This eſtabliſhment commenced its operations in June 1805, and it then diſtributed 458*l.* 2*s.* ſterling to 110 huſbandmen; and in the month of Auguſt following it had furniſhed ſixty-two horſes to an equal number of other indigent farmers. The principal economical inſtitution for the promotion of agriculture is that at Madrid.

Manufactures and Commerce.—Spain, celebrated in remote periods for the fertility of its ſoil, and the variety of its productions, was equally ſignalized by the induſtry of its inhabitants. The Greeks and Romans found this country farther advanced in all kinds of uſeful arts than they could poſſibly have imagined. It was in the city of Zoela, in the diſtrict of Tarragon, that the firſt linen ſtuffs were manufactured; and the cloths of Xativa, or San Felippo, the ancient Sœtabis, were famous through Greece and Italy. At Carthagena very fine ſtuffs were fabricated from the bark of trees; and the manufacture of woollen cloth had arrived at a high degree of perfection, and the Spaniards poſſeſſed the art of dyeing cloth of a very beautiful purple colour, which they learned of the Phœnicians, ſo that they ſupplied all Italy with this article. The Celtiberians knew the method of tempering ſteel, and nothing could reſiſt the force of their ſwords. The manufactures of Spain, however, were injured by the invaſion of the northern nations; and were again revived by the Moors, who exhibited to the Spaniards an example of genius, activity, and induſtry. The two nations, *viz.* the Moors and the Spaniards, divided between them the manufactures of Spain: thoſe of leather, linen, ſilk, &c. were almoſt wholly in the hands of the Arabs; and thoſe of arms, and articles fabricated of wool, were in the hands of the Spaniards. When the Moors were expelled in 1614, the manufactures which had flouriſhed under their direction ſunk into decay and ruin. The hiſtory of Spaniſh manufactures may be divided into three periods. The firſt commences with the re-union of all parts of the monarchy, under the reign of Ferdinand and Iſabella, in the year 1475; and extends down to the death of Philip II. in the year 1598. The ſecond compriſes the reigns of Philip III. Philip IV. and Charles II., that is to ſay, during the whole of the 17th century. The third includes the 18th century; but ſtrictly ſpeaking, it did not begin till the year 1720.

The firſt was a brilliant period for Spain; manufactures of every kind were much increaſed, and for a time they became very famous. The ſecond period witneſſed their decline and decay, and their fall was as rapid as their elevation. Spain then no longer employed foreign merchandize. The third period furniſhes an intereſting index of the efforts which were uſed for a ſeries of time to reinvigorate the national manufactures. During the firſt, Spain was in a flouriſhing ſtate; but it had not then arrived at that high degree of improvement deſcribed by the greater part of modern writers; who have affected to believe that the country then had attained the acmè of its wealth and ſplendour.

During the whole period that elapſed, from the commencement of the 14th to the cloſe of the 16th century, Spain was perfectly independent of foreign nations; manufacturing the greateſt part of its ſilk and wool, and exporting more manufactured than raw articles. But during the progreſs of the 17th century, the manufactures of cotton, linen, and hempen cloths, gloves, and ſwords, entirely vaniſhed, and by the cloſe of this century, ſcarcely the ſmalleſt veſtiges remained, ſo that Spain was abſolutely deſtitute of trade. When Philip V. aſcended the throne, the inteſtine wars during the firſt fourteen years of that monarch's reign, and the low ſtate of the national finances, prevented the government from paying any attention to the ſtate of the country in this reſpect. Some meaſures were adopted for the revival of the manufactures, when tranquillity was reſtored. Ferdinand VI. did more for this purpoſe than any of his predeceſſors, and his ſucceſſor Charles III. followed his example. The manufactures of Catalonia were the firſt that revived ſubſequent to the war waged reſpecting the right of ſucceſſion. In a ſhort period manufactures were eſtabliſhed, and by a ſpirit of rivalry quickly multiplied. By degrees new branches of manufacture were adopted in various places, and the different ramifications are numerous at the preſent day. Theſe are ſo numerous in the different provinces and towns of the country, that our limits will not allow an enumeration of them in this place. Some account of them occurs under the names of the reſpective provinces and towns, in the courſe of this work. The ſtate of Spaniſh manufactures in the 15th and 16th centuries, will lead us to conclude that commerce was then in a flouriſhing condition; and its ramifications extended to all parts of Europe. Almeria, Valencia, and Barcelona, no leſs important, in a mercantile view, than the Hanſeatic towns, puſhed their commercial concerns into Syria, Egypt, Barbary, and the Archipelago. The trade of the country, however, was at this time very much, if not wholly, in the hands of the Jews; while the Spaniards were either engaged in war, or indulging themſelves in a ſtate of peace. The Moors conducted their agricultural and manufacturing concerns, and the Jews became their merchants and bankers. The expulſion of the Jews, in the year 1492, deprived Spain of its moſt active merchants; this was followed by the expulſion of the Moors, in 1614; ſo that commerce was deprived of its active and intelligent agents, and ceaſing to be nouriſhed by the produce of the ſoil, manufactures inſtantaneouſly diſappeared. The Barbary pirates likewiſe infeſted the Mediterranean ſea, and ſeized all the Spaniſh ſhips which ſailed from the ſouthern parts; and Spain being unable to defend commerce on the coaſt, the whole trade was carried on in foreign bottoms. The government alſo had adopted a ſyſtem peculiarly calculated to paralyze commerce: it had reſtricted the colonial trade to entering by one port only on the continent, Seville firſt, and Cadiz afterwards. Moreover, during the war about the ſucceſſion, Philip V. prohibited the exportation of all the produce of the country to the nations with which he was at war. The country at different times made fruitleſs attempts for reviving its commerce. Philip was ſcarcely in quiet poſſeſſion of the throne, before he turned his attention to the revival of commerce; he encouraged manufactures, and conferred honorary rewards on trade; he granted premiums to merchants, and inſtituted commercial boards. Charles III. permitted a general trade, and moderated the duties impoſed upon imported merchandize. In 1764 he eſtabliſhed packets, which ſailed regularly every month to the Havanna and Porto Rico, and others every two months for Rio de la Plata; and allowed every packet-boat to take out half a cargo of Spaniſh produce, and return half freighted with the productions of America. The Spaniards themſelves diſplayed a ſpirit of activity and enterpriſe, of which they were thought to be altogether incapable. About the year 1728, the Caraccas company of Guipuſcoa was eſtabliſhed, and this company produced prompt and extenſive advantages. This company was ſuppreſſed about the year 1781 or 1782. In the year 1784, a new company was formed, under the firm of "the Philippines;" and the ſhips belonging to this concern ſailed from Cadiz; but though its commencement was promiſing, many unfavourable circumſtances occurred, and it ſuſtained very heavy loſſes; nevertheleſs, at the cloſe of the year 1796 it derived a profit of nearly 229,166*l.* 13*s.* 4*d.* ſterling. The internal trade of Spain is very inconſiderable, for want of ſufficient means of communication; but it carries on a foreign trade with every country in Europe. The principal tranſactions, however, are with England, Holland, Italy, France, and its American colonies. The principal articles of foreign commerce are wine, brandy, oil, ſoda, barilla, fine wool, tobacco, dried raiſins and figs, nuts, dates, ſumac, anchovies, rice, kermes, ſalt, madder, bar-iron, and anchors. Although Spain exports immenſe quantities of its agricultural productions, it ſends abroad none of its manufactured articles, but all thoſe it receives from foreign countries. The following articles are imported into Spain, *viz.* from Holland, tapes, linen-drapery, common lace, cutlery goods, and paper;—from Sileſia, linen-drapery;—from Germany, particularly Hamburgh, quantities of haberdaſhery;—from England, calicoes, iron and ſteel goods, fine cloth, cod-fiſh, and ling; —from France, calicoes, linen-drapery, ſilk-ſtockings, ſilks, camblets, and other kinds of worſted ſtuffs, fine cloths, gilded articles, jewellery, iron goods, ſteel goods, haberdaſhery, and perfumery: and Spain carries on a conſiderable trade with her American colonies. Biſcay is the only province of Spain that is interdicted a free trade with the colonies. The colonies ſupply Spain with coffee, ſugar, ſome cotton, tobacco, cocoa, leather, and particularly gold and ſilver, both in ingots and coined into money.

The manufactures and commerce of Spain are conſiderably checked by the royal monopolies, which comprehend the following articles; *viz.* broad-cloth, at Guadalajara and Brihuega; china, at the palace of the Buen Retiro; cards, at Madrid and Malaga; glaſs, at St. Ildefonſo; paper, in Segovia; pottery, at Talavera; ſaltpetre, at Madrid and various other places; ſtockings, at Valdemoro; ſwords, at Toledo; tapeſtry, at Madrid; and tiſſue, at Talavera. The king has alſo the monopoly of brandy, gunpowder, lead, quickſilver, ſealing-wax, ſalt, ſulphur, and tobacco. Moſt of the royal manufactures may be regarded as monopolies, as no private capital can vie with the treaſury.

Government, Military, and Revenue.—Spain was never governed by a king who was not of foreign origin. Monarchs either of a Gothic or Mooriſh race, French or Auſtrian, or of the royal houſe of France, have occupied the Spaniſh throne from the year 411 till the preſent day. The Goths reigned in Spain from the year 411 till 711; the Moors from 711 till 716 in part of the Aſturias, till 820 in Catalonia, till 750 in Sobrarba, till 923 in Leon, till 1073 in different parts of the two Caſtiles, till 1118 in Aragon, till 1236 in Cordova and Jaen, till 1248 in Seville, till 1264 in Valencia, till 1265 in Murcia, and even ſo late as 1492 in Granada. During the wars againſt the Moors, the Goths reigned

reigned in the Aſturias, Galicia, and finally in the kingdom of Leon till 1038.

The houſe of Navarre deſcended from the French houſe of Bigorre, which had previouſly reigned in Caſtile for ten years, united with it the crown of Leon till the year 1126. This was ſucceeded by the family of Bourbon, deſcended from the royal family of France, which reigned over theſe countries till 1555. The houſe of Charlemagne, a French family deſcended from that prince, ruled over Catalonia from the year 802 till 1132. The French family of Bigorre firſt reigned in Sobrarba, and afterwards in Aragon, from the year 750 to 1162; at that period the French family of Barcelona ſucceeded to the government, and united to the crown of Aragon that of Catalonia, and afterwards the kingdom of Valencia, over which it reigned till the year 1430. Theſe parts of Spain then came into the poſſeſſion of the princes of the French branch of Navarre, which reigned in Caſtile, and continued in their deſcendants to 1515; at which time the different ſtates of the Spaniſh monarchy were under the government of Joanna the Fooliſh, who reigned over them till her death, which happened in 1555. The Auſtrian family then poſſeſſed the throne of Spain till 1700, ſince which time it was occupied by a branch of the houſe of Bourbon, till the late revolution, which placed the crown upon the head of Joſeph I., brother of Napoleon Buonaparte, emperor of the French; but this revolution has terminated in the reſtoration of Ferdinand VII., who ſucceeded on the abdication of his father in 1808.

The Spaniſh government, which was of a limited nature, during the dynaſties of the kings of Caſtile and Aragon, afterwards became an abſolute monarchy.

Philip V. ſuppreſſed the ſtates-general, their laſt meeting having been held at Saragoſſa in the year 1720; and ſince that period no further power is left to the Cortes of Caſtile and Aragon, but the privilege of ſending deputies to the ſtates-general, whenever they are ſummoned by the monarch. The whole authority centres at preſent in the king and his miniſters; and the national affairs are conducted by the different councils appointed by the crown, which deliberate and form their plans in the capital: ſome of them poſſeſs both legiſlative and executive power, and exerciſe the double function of adviſing the king and adminiſtering the juſtice. The council of Caſtile, in this diſtribution of power, is paramount; its decrees being deciſive in the courts, but its judgments are under the controul of the king. The chief councils in Spain are, 1. That of diſpatches, called alſo the Junto, or cabinet council, being compoſed of the king and his miniſters of ſtate. 2. The council of ſtate, in which the king preſides, and of which the archbiſhop of Toledo is always a member. 3. The royal council of finances, called the Hazienda. 4. The ſupreme council of war. 5. The ſupreme council of Caſtile. 6. The ſupreme council of Aragon. 7. The ſupreme council of the inquiſition. 8. The royal council of the orders of knighthood. 9. The royal council of the Indies. 10. That of the cruſade, compoſed of a commiſſary-general, a member of the council of Caſtile, and another of that of Aragon, who manage the ſale of little papal bulls, granting certain indulgences to the purchaſers. In Spain there are five miniſters of ſtate; correſponding to our foreign ſecretary, ſecretary for the home department, ſecretary at war, firſt lord of the admiralty, and chancellor of the exchequer, or prime miniſter.

The laws of Spain are contained in ſeveral ancient codes; and recourſe is alſo had to the civil and canon law. The "Eſcrivanos," or attorneys, are numerous, but inſtead of explaining the codes, they often impede the adminiſtration of juſtice. Miſtaken mercy frequently retains criminals in long durance, ſo that when they are executed their offence is forgotten, and the example of puniſhment has no effect.

With reſpect to the military of Spain we may obſerve, that when Philip V. aſcended the throne, there were not 15,000 troops in the kingdom, and it had not a ſingle ſhip of war fit for the ſea. This prince directed his attention to military arrangement and diſcipline; and his ſucceſſors, by following the ſame courſe, have obtained a reſpectable army; and by the increaſe and ſtrength of its naval inſtitutions, Spain has alſo become a maritime power. In the year 1807 the army ſtaff included 5 captains-general, 5 inſpectors, 87 lieutenant-generals, 128 field-marſhals, and 213 brigadier-generals, beſides military intendants, military commiſſioners, treaſurers of the army, military judges, &c. The military eſtabliſhment of the royal houſehold conſiſts of four companies of life-guards, a company of halbardiers or ſpearmen, a regiment of infantry called the Walloon guards, and a regiment of cavalry called the royal carabiniers. The life-guards are divided into four companies, the Spaniſh, the American, the Italian, and the Walloon; and each conſiſts of natives of theſe reſpective countries. The militia is diſtinguiſhed by the appellations of milices provinciales, or provincial militia, divided into 42 battalions, and diſtributed through the different provinces, and the milices urbanas, or civic militia, which neither receive pay nor are liable to be called away from their homes. The Spaniſh troops all wear a red cockade, except the Walloon and Swiſs guards; that of the former being red and black, and that of the latter red and yellow. The whole military force of Spain, in time of peace, is computed at about 60,000. The naval forces of Spain conſiſt of a marine ſtaff, a corps of marine officers, a corps of naval cadet-guards, and three corps of engineers, artillery, and infantry, appropriated entirely to the ſervice of the navy. The ſhips of the line can ſcarcely now be computed at more than 50.

The revenues of the king of Spain, on the continent, conſiſt in monies ariſing from his own landed eſtates, cuſtoms, all kinds of taxation, &c.; which revenues amount at preſent, for the whole of Spain, to 8,097,813*l.* 6*s.* 4*d.* ſterling, without including various conſiderable ſums from different ſources, which cannot be aſcertained, for want of accurate information. The king of Spain alſo derives conſiderable revenues from the two Indies; but the expence of collecting, &c. is ſo great as to abſorb nearly two-thirds. The total revenues of the Spaniſh colonies amount to 27,000,000 piaſtres fortes; and deducting expences, ſcarcely more than 9,000,000 piaſtres arrive at the royal treaſury. The revenue of Spain has been ſtated by ſome writers at 5,500,000*l.* ſterling, ſo that each perſon pays 10*s.* to government for protection. For the nature of the taxes we may refer to Laborde and Townſend's tables. The gabel is one of the moſt productive; and the clergy pay about 15,000,000 of rials. The expenditure now equals, or exceeds the income; and the national debt gradually enlarges. The colonies, as ſome of the beſt judges have eſtimated them, do not yield above 1,000,000*l.* ſterling, excluſive of the duties. Bourgoing computes the revenues of Spain at 616,295,657 rials, and its money in circulation he ſtates at 80,000,000 of dollars; eſtimating the rial at 5 ſous of France, and the dollar at 20 rials.

Religion and eccleſiaſtical Government.—The religion of Spain is the Roman Catholic, profeſſed with a degree of fanaticiſm which exceeds that of any Italian ſtate, or even the Papal territory. The inquiſition, eſtabliſhed in 1480, by Ferdinand and Iſabella, and lately reſtored with the return of the preſent ſovereign, after its abolition, has produced the moſt injurious effects; and the number of monks, under the obligation of celibacy, but under the influence of exiſting paſſions, has been very detrimental and even deſtructive to morals. The number of the Spaniſh clergy has been variouſly ſtated by different writers. Mr. Townſend ſtates it at 188,625; others compute the clergy at 400,000. Laborde, in a table drawn up from the enumeration of them in 1788, reckons the ſecular clergy at 60,238, the miniſters of churches at 15,834, the monks of 1925 convents at 49,238, and the nuns of 1081 convents at 22,347; and reckoning the population at 11,000,000, the clergy of Spain form one-ſixty-ninth of the whole. Spain is divided into eccleſiaſtical provinces, over which preſides an archbiſhop, with the rank of metropolitan: theſe provinces are again ſubdivided into dioceſes, each of which is governed by a biſhop. The archbiſhoprics are eight in number, and the ſuffragan biſhoprics are forty-four. The archiepiſcopal ſeat of Toledo is the firſt in rank, and the wealthieſt in Spain: it confers on its poſſeſſor the title of primate, and a revenue of about 125,000*l.* ſterling. The Moſarabic ritual, adopted in Spain, on the expulſion of the Arabs, declined after the introduction of the French princes, and was finally ſuperſeded by that of the Romiſh church. It ſtill ſubſiſts, however, at Salamanca and Toledo, where are two chapels ſerved by a numerous body of clergy, in which public worſhip is performed according to this ancient form.

The Spaniſh nation recognizes no authority or juriſdiction of the pope in the temporal concerns of eccleſiaſtical benefices. No briefs nor bulls are received, publiſhed, or executed in Spain, unleſs they have been examined by the chamber of Caſtile, and have received its *exequatur*, or licence.

In conſequence of the ſame concordat, and of various briefs and royal edicts founded upon it, the king at preſent nominates not only to thoſe benefices, the patronage of which belongs to the crown, but alſo to all the benefices in the patronage of the church, which become vacant during any of the eight months formerly reſerved by the pope, as well as to all thoſe that become vacant, in conſequence of the former incumbents having been promoted by the king: the crown alſo iſſues licences, to enable thoſe who are nominated to take poſſeſſion of their preferments. The revenues of conſiſtorial benefices, during their vacancy, go to the crown, on condition of their being applied to charitable uſes. The annates, demi-annates, and quindennes, belong to the king, who alſo has the right of granting penſions on the archbiſhoprics and biſhoprics, to the amount of one-third of their entire revenue.

The pope, however, ſtill preſerves in Spain two very important privileges, namely, the ſupreme adminiſtration of the *contentious juriſdiction* over all caſes that are brought before the eccleſiaſtical tribunals, and the free and independent nomination to fifty-two of the beſt benefices. The impoſts of various kinds and denominations, payable by the clergy of Spain, amount annually to about 437,840*l.* 18*s.* 2*d.* ſterling, excluſively of ſome other charges. Burgoing. Townſend. Fiſcher. Laborde. Pinkerton.

Hiſtory of the Muſic of Spain.—It ſeems as if a late muſical hiſtorian had placed the Spaniards lower among European muſicians, in the 15th and 16th centuries, than in equity they ought to have been, by imagining Morales the firſt practical muſician of eminence in that country, and Salinas the only theoriſt that was produced there during the 16th century. (See MORALES.) Indeed we know but little of the ſtate of muſic in the interior parts of that kingdom, during this period; but, if we may judge by the muſicians it furniſhed to the Papal chapel, both compoſers and ſingers, we may conclude, that the richeſt and moſt powerful nation in Europe, as Spain then was, would not breed muſicians as the Africans do ſlaves, or the Circaſſians women, merely to tranſport them for the uſe or pleaſure of others; they could doubtleſs then have afforded to keep a few for their own amuſement.

The Spaniards, ſo far from neglecting muſic, ſeem to have taken it very early into the circle of the ſciences, in their univerſities; for Salinas tells us, that the muſical profeſſorſhip, which was conferred upon him at Salamanca, had been founded and endowed by Alphonſo, king of Caſtile, ſurnamed the Wiſe. And Bartolomeo Ramis, the opponent of Franchinus, in 1482, was public profeſſor of muſic at Toledo, and afterwards at Bologna. Of Guillerm de Podio, a prieſt, we have likewiſe a work, entitled "Ars Muſicorum, ſive Commentarium Muſicæ Facultatis," publiſhed 1495; and another written in the Spaniſh language, by Franceſco Trovar, "Libro di Muſica Pratica," Barcelona, 1519; "Arte di Canto Llano," del Alfonſo de Caſtillo, Salamanca, 1504; "El Maeſtro o Muſica de Viguela de Mano," by Don Ludovicus Milan, a nobleman of Valentia, 1534; "Silva di Sirenas," or a treatiſe on the vitruela, or viol, by Henrico de Valderrabano, Valladolid, 1547; "Arte de la Muſica," by Melchior de Torres, alcala de Herrares, in New Caſtile, 1554. At the ſame place likewiſe was publiſhed, in 1557, "Tratado de Cifra nueva para Tecla, Harpa y Vieguela Canto Llano, de Organo y Contrapunto," by Lud. Venegas de Hineſtroia. There was likewiſe publiſhed at Alcala, by Cyprian de la Huerga, a Ciſtertian monk, who died 1560, a treatiſe "De Ratione Muſicæ et Inſtrumentorum Uſu apud veteres Hebræos;" and at Granada, 1555, "Libro de la Declaration de Inſtrumentos," by Joan Bermudo.

All theſe writers on the ſubject of muſic, and many more, appeared in Spain before Salinas; of whom an account is given under his biographical article.

Many more names of Spaniſh theoriſts and practical muſicians might be enumerated here; but as we have neither ſeen nor heard any of their productions, we are unable to eſtimate their worth. In 1613, however, a work was publiſhed in Spaniſh, by Cerone, in folio, which contains more information concerning every part of the art and ſcience then known, than any other elementary book which we have ſeen in any language. The title of this treatiſe is the following: "El Melopeo y Maeſtro. Tractado di Muſica teorica y pratica," Napoli, 1613. See CERONE.

Andres Lorente was author of a treatiſe, now become very ſcarce, entitled "El Porque del la Muſica," 4to. 1672. For a farther account of this book, ſee LORENTE, and *Dr.* WORGAN.

Pablo de Zaragoça Naſſarre was author alſo of a treatiſe on muſic, in Spaniſh, entitled "Fragmentos Muſicos," in four parts, a diſtinct treatiſe, 4to. Madrid, 1700. For a further account of this work, ſee NASSARRE.

About the middle of the laſt century was publiſhed at Madrid, in Spaniſh, "An Eſſay on Church Muſic," by Feyjoo. We have never ſeen the book in the original, but an anonymous tranſlation into Engliſh appeared in 1778. The author begins with a heavy complaint againſt the corruption and degeneracy of muſic, ancient and modern; joining with Plutarch in aſſerting, that muſic was at firſt only uſed in the temples of Greece; but paſſing to the theatre, a new and lighter ſtyle was invented, which being adopted in the temple, rendered it unfit for the ſerious ſervice of religion. It was not till the latter end of the 17th century, that ſecular muſic, by additional refinements in ſinging, and improvements in inſtrumental muſic at the opera, was thought worthy of being introduced, on great feſtivals, into the church, in Roman Catholic countries: on other days, canto fermo, and maſſes ſet alla Paleſtrina, were continued, and are ſtill continued in the cathedrals of Italy; though, even in the 16th century, maſſes *concertati*, or accompanied with a band of inſtruments, according to Montaigne, (Journal d'un Voyage,) were common throughout Italy and Germany.

We know not what the ſtate of eccleſiaſtical muſic may be in Spain at preſent; but we have always underſtood that the muſic, *à capella*, in Spain, was more ſolemn and learned than elſewhere. The poet Yriarte, whoſe judgment and taſte are correct and elegant, and who has no prejudices, except in favour of good muſic of every kind and country, ſpeaks highly of the muſic of the church in Spain.

But Feyjoo's Eſſay is conſtant complaint and cenſure. Yet from the time of Charles V., an excellent muſician himſelf, the Spaniſh monarchs have patronized muſic in a more diſtinguiſhed manner, both in the church and the theatre, than any other ſovereigns in Europe, till the late Charles VI., an *amouſos*, who ſucceeded Ferdinand IV., and who turned Farinelli out of the kingdom, whoſe good conduct merited equal praiſe with his talents. See FARINELLI.

The author before us aſks, whether all the muſic of the church ſhould not be grave? We anſwer, no; not invariably. Are there not days and pſalms of jubilation and thankſgiving, as well as of penitence, ſorrow, and ſupplication! As the Calviniſts confine all muſic to ſyllabic pſalmody, this pious Spaniard would have no other muſic tolerated in the church than canto fermo.

We own the impropriety, and have cenſured it, in the admiſſion of ſecular muſic in our cathedrals during the reign of Charles II. and his ſucceſſors; when, in the compoſitions of Weldon and Dr. Greene, the diviſions and ritornels wanted due gravity and dignity, and were manifeſtly introduced to diſplay an active throat and a lively finger, for want of judgment and decorum in the compoſer, who forgot the place and occaſion of the performance.

The Spaniſh writer very juſtly cenſures the admitting into the church the productions of inſipid pretenders to compoſition, without genius or ſcience; and finds, as is found every where elſe, that the number of bad compoſers and bad performers ſo far exceeds the good, that men of true genius and due cultivation are phenomena that rarely appear. Don Feyjoo has celebrated a Spaniſh compoſer, Don Antonio de Literes, whoſe name has never penetrated into other parts of Europe, in the higheſt terms of panegyric.

The Eſſay on Church Muſic was written about the middle of the laſt century, when the general ſtyle of Italy was frivolous, and that of Germany rude, pedantic, and inelegant; but ſo many great compoſers have appeared ſince in both countries, that Don Feyjoo's ſtrictures have loſt their force. There have been bad compoſers in all ages, but perhaps never more good ones at any period of time, than within the laſt 30 years.

Duron, the author, we ſuppoſed, meant Durante, was not only one of the greateſt maſters of harmony himſelf, but formed diſciples of the greateſt abilities that have ever iſſued from the Neapolitan ſchool; but we find in Yriarte, that there had been among the maſters of former times a Spaniſh compoſer of the name of Duron.

The reſt of this Eſſay is exaggeration of invective, either to mortify Farinelli, and the great Italian compoſers and ſingers whom he engaged for the court of Spain, or to flatter the ſucceſſor of Ferdinand, who hated muſic, and expelled all the Italian muſicians from his court.

The ſame anonymous gentleman has given us a tranſlation of a letter of the learned Benedictine on the ſubject of muſic, entitled "The wonderful Effects of Muſic, and a Parallel between ancient and modern Muſic."

Here the author relates all the old ſtories of the miraculous powers of ancient muſic. He, however, doubts of the facts; and relates, *per contra*, what we have been told of the power of modern muſic over diſeaſe and the paſſions.

No new materials appear in this letter, or ingenious conjectures to determine the diſpute, whether the ancients or the moderns had cultivated muſic moſt ſucceſsfully; and the author leaves the ſubject juſt as he found it, without clearing up his own doubts, or thoſe of his readers. He is always, however, inclined to give the preference to ancient muſic, without any thing to guide him but his prejudice, his determination to allow nothing that is new in muſic to be right, and the aſſertions by writers in favour of ancient counterpoint, that have been long ſince clearly confuted.

The laſt writer on muſic in Spain, that has come to our hands, is the ingenious and agreeable poet, Yriarte, of whoſe charming poem, "La Muſica," we but lately procured the beautiful third edition, printed at the royal preſs in Madrid, in 1789, with elegant deſigns well engraved.

As this is a work but little known in our country, and does honour to the author, and to the art of practical muſic in all its branches, we ſhall be ſomewhat diffuſe in our account of it.

D. Tomas de Yriarte writes like a man of the world, with an enlarged taſte, and extenſive knowledge of the ſubject. He has illuſtrated his doctrines from the moſt eminent moderns. Canto I. gives an outline of the general hiſtory of the muſical art; calls on muſic itſelf to inſpire and aſſiſt him, without applying to Apollo and his nine attendants, or even repeating old fabulous accounts of the miracles performed by Orpheus, Amphion, Linus, Terpander, or Olympus.

He deſcribes the importance of *tone* and *time*. The firſt includes the formation of the ſcale, and its diviſions into intervals; the ſecond, the time-table, or muſical characters for meaſuring the duration of ſounds.

II. Muſical expreſſion; its uſe in the church, the theatre, the chamber, and to man alone; its powers over the paſſions.

III. The dignity and uſe of muſic, particularly in the temple, the theatre, in ſociety, and in ſolitude; enumeration of celebrated ancient Spaniſh compoſers.

IV. Uſe of muſic in the theatre reſumed; Jomelli; dancing, architecture, painting, poetry, decorations; modern compoſers for the lyric theatre celebrated.

V. Uſe of muſic in private ſociety; eulogium on ſilence at concerts, and invective againſt thoſe who attend not with due reſpect for the art and for talents; of opera ſcenes in concerts; of inſtrumental muſic proper for a concert-room; ſonata, concerto, duo, trio, quartetto, ſymphony; neceſſity of variety and foreign muſic to keep off languor, and excite attention; praiſe of the German compoſers of inſtrumental muſic, particularly Haydn for invention; of the utility and delight which muſic affords in ſolitude, as well to thoſe that are ignorant, as thoſe that are learned in the art; of the ſtudy neceſſary for a good compoſer in examining the ſcores of celebrated authors, to detect errors and plagiariſm, as well as to diſcover how good effects are produced; cenſures the pedantry of dry fugues and canons, that have no other merit than the difficulty of compoſing them; extraneous modulation; confuſion of multiplied parts in different ſtyles and movements, which deſtroy the effect of each other; recommends the avoiding of all exceſſes of all kinds, as harmony, literally and figuratively, implies *juſt proportion;* celebrates the good taſte which is manifeſt in the Royal Academy at Madrid, in the public diſtribution of premiums to artiſts in painting, ſculpture, architecture, and engraving; to which have been added poetry and eloquence. It is propoſed, in addition to all theſe arts, to eſtabliſh an academy, or ſcientific body of muſic.

In the courſe of this laſt canto there is an animated eloge on Haydn.

> " Sólo á ta múmen, Háyden prodigioſo," &c.
>
> " To thee alone the muſes have conſign'd
> A genius ever fertile and refin'd;
> So new thy ſtrains, ſo copiouſly inſpir'd,
> That curioſity is never tir'd;
> Thy works a thouſand times repeated, ſtill
> With rapture new experienc'd ears can fill.
>
> To ſooth, to calm, or noble deeds inſpire,
> Thy fancy ſtill is fed with heaven's own fire.
> In every trait a judge profound can find
> Some grace or beauty of a higher kind;
> Expreſſion touching, modulation new,
> In themes which none but gifted men purſue.
>
> Surrounded by thy countrymen renown'd,
> In thee alone the liſtening world has found
> A power to intereſt, and render dear
> Each ſweet vibration of th' enraptur'd ear.
> To diſtant climes the happy means convey,
> As light and heat ſent forth from ſolar ray.
> And while theſe inſpirations wide expand,
> Conferring honours on thy native land."

SPAITLA, a town of Africa, in the kingdom of Tunis, anciently called " Sufetela," repreſented by Dr. Shaw as one of the moſt remarkable places in Barbary for the extent and magnificence of its ruins. Here are found a triumphal arch of the Corinthian order; a pavement of large black ſtone, with a breaſt-high parapet on each ſide, which leads from the arch to the city; a beautiful portico at the end of the pavement, opening into a ſpacious court; the ruins of three contiguous temples, of which the columns, pediments, and entablatures are entire, &c. &c. Spaitla is pleaſantly ſituated upon an eminence, ſhaded all over with juniper-trees; 110 miles S.W. of Tunis. N. lat. 35° 10′. E. long. 9° 10′.

SPALATRO, a ſea-port of Dalmatia, ſituated on a peninſula, with a good harbour; the ſee of an archbiſhop. The harbour is large and deep, and well frequented by foreign veſſels, which come for merchandize from Boſnia, ſuch as iron, hides, wrought copper, wool, blankets, bees-wax, orpiment, ſilk, cotton. Spalatro is built on the ruins of Diocleſian's palace, for an account of which ſee SALONA. Without the walls is a ſulphureous ſpring, of conſiderable ſervice in chronical diſeaſes. N. lat. 43° 22′. E. long. 16° 45′.

SPALDING, an ancient and reſpectable market-town in the wapentake of Elloe, parts of Holland, and county of Lincoln, England, is ſituated 8 miles W. from Holbeach, 41 miles S.E. from Lincoln, and 101 N. from London. Being in the midſt of a fenny diſtrict, and almoſt encompaſſed by the river Welland, and an ancient drain called the Weſtlode, and having numerous other drains in its vicinity, Spalding has been, with ſome degree of propriety, compared to a Dutch town. Though thus ſituated, and not apparently congenial to healthfulneſs, its claim to antiquity is teſtified by many remains diſcovered in and about the town. That it certainly exiſted before the foundation of Croyland abbey, is evinced by king Ethelbald's charter to that monaſtery, deſcribing its bounds as extending " uſque ad ædificia Spaldeling." Prior to the Conqueſt the manor was the property of Algar, earl of Mercia; but was granted by the conqueror, with the whole of the diviſion of Holland, to his nephew, Ivo Tailbois, who erected a caſtle here, of which the moat was to be diſtinguiſhed in 1746, in that part of the Caſtle-fields called Coney Garth. In the year 1051, Thorold de Bukenhale founded and endowed a priory here, and made it a cell to Croyland; but the inhabitants were forced to abandon it after the Conqueſt, through the oppreſſion of Tailbois, who about 1074 gave the church and manor to the abbey of St. Nicholas at Angiers, whence ſome Bendictine monks were ſent over, and it became an alien priory. It was in ſucceeding times a monaſtery of great conſequence. From this place Egelric, abbot of Croyland, made a firm cauſeway, named Elrick-road, through the marſh called Arundel foreſt, to Deeping, being an extent of twelve miles. It was formed by driving in piles of wood, which were covered with gravel. This road is now diſtinguiſhed by the name of " The Gravel." The conventual church not being ſufficiently large, the prior pulled it down in 1284, and built the preſent pariſh church, which is a light ſtructure, with a handſome ſpire, having crockets at the angles: the porch appears to have been added about the end of the 15th century. A free grammar-ſchool was erected in the reign of Elizabeth, by the will of John Blanch. Another, called the Petty ſchool, was founded in 1682, by Thomas Welleſley; here is alſo a blue-coat charity-ſchool. An alms-houſe for twenty-two perſons was founded in 1590; and another for eight widows in 1709.

For many centuries Spalding has been the principal ſeat of juriſdiction for the diviſion of Holland. In the Saxon times the courts of law were held here by the earls; and ſubſequent to the Norman Conqueſt, the priors were inveſted with the judicial authority: even capital offences were cognizable in the conventual court. But at the diſſolution of religious houſes, the power of deciding on life and death was removed from all ſuch inferior courts. Since that time a court of ſeſſions has been held here; for which purpoſe a town-hall, or court-houſe, was erected, at the expence of Mr. John Holſtan, at the north-weſt end of the market-place; the upper rooms are uſed for the quarter-ſeſſions, the courts-leet and baron, and the courts of requeſt and ſewers; the lower part of the building is let out for ſhops, and the rents appropriated to the uſe of the poor, conformably to the will of the donor. Spalding, ſince the river Welland has been made navigable to the town, has had a good carrying and coaſting trade. Barges of about 40 tons burthen come up to the centre of the town, where are quays and ſpacious ſtore-houſes: but veſſels requiring a larger draught come only to Boſton Scalp, nine miles diſtant. Attempts have been made to introduce manufactures into Spalding, but without ſucceſs: the town derives its chief ſupport from agriculture, and the extenſive grazing carried on in its neighbourhood. Wool conſequently forms a very prominent article in its trade; and ſome of the manufacturing towns of Yorkſhire and Norfolk are ſupplied from hence. A market is held on Tueſdays, and five fairs annually, beſides two ſtatutes for hiring ſervants. In the population return of the year 1811, the number of houſes was ſtated to be 951; the inhabitants 4330.

A literary ſociety was eſtabliſhed at Spalding in the beginning of the laſt century, under the auſpices of Mr. Maurice

Johnſon, an eminent native of this town, on the principle of that of the antiquaries of London; to which tranſcripts of the minutes and records were regularly ſent for upwards of forty years, till the death of Mr. Johnſon, which happened in 1755.

In the vicinity of Spalding is Ayſcough Fee-Hall, the reſidence of Maurice Johnſon, D.D., a deſcendant of Mr. Johnſon above-mentioned. The manſion was built about 1420, but having been altered at different times, exhibits ſcarcely any thing of its original architecture. The preſent poſſeſſor has, however, endeavoured to reſtore it to its ancient character.

At Pinchbeck, about three miles north of Spalding, are ſome conſiderable remains of an ancient manſion, formerly called Pinchbeck-Hall, from a family of that name. Being afterwards poſſeſſed by the Otway family, it acquired the appellation of Otway-Hall. It appears to have been an extenſive ſtructure, and to have been built about the time of Henry VIII. It was moated round, and ſome of the windows have pointed lights with ſquare heads. The chimnies are ſingularly lofty, and the gable ends have at the ſides and centres, ſpire-ſhaped ornaments, crowned with ornamental balls. Beauties of England and Wales, vol. ix. Lincolnſhire, by J. Britton, F.S.A.

SPALES, Cross-spales, in *Ship-Building*, are deals or fir-planks, nailed in a temporary manner to the frames of the ſhip, at a certain height, and by which the frames are kept to their proper breadths, until ſome of the deck-knees are faſtened. The main and top-timber-breadths are the heights frequently taken for ſpaling the frames, but that of the gun-deck ports is much better; yet this may be thought too high, if the ſhip is long in building.

SPALETHRA, or Spalathra, in *Ancient Geography*, a town of Greece, in Theſſaly. Steph. Byz. Scylax ſtates it to be a maritime town of Magneſia.

SPALMADORI, in *Geography*, a ſmall iſland in the Grecian Archipelago, between the iſland of Scio and the continent of Aſia. N. lat. 38° 36′. E. long. 26° 7′.

SPALT, a town of Bavaria, in the biſhopric of Aichſtat; 16 miles E.S.E. of Anſpach. N. lat. 49° 7′. E. long. 10° 52′.

SPAN, a meaſure taken from the ſpace between the thumb's end and the tip of the little finger, when both are ſtretched out.

The ſpan is eſtimated at three hands' breadths, or nine inches.

Span, in *Rigging*, a ſhort rope, having a block, thimble, or eye, ſpliced into each end: the middle is hitched round a maſt, yard, gaff, cap, or ſtay, from whence the ends branch out. Spans are ſometimes faſtened at both ends, and a block, &c. in the bight. They are uſed to lead ropes through, which paſs through blocks or thimbles, to increaſe power, or to prevent their ſwinging about. *Spanning of booms*, is confining them by ſeveral turns of rope. *Spanning of runners*, is taking ſeveral turns with ſmall rope round both runners, abaft the maſt, and frapping the turns.

Span-*Shackle*, a bolt having a large ring in the head of it.

SPANANTHE, in *Botany*, a genus of umbelliferous plants, received by Jacquin from the Caraccas, and ſo named by him, from σπανος, *rare*, and ανθος, *a flower*, becauſe of the ſcarcity of this tribe in tropical countries.—Jacq. Coll. v. 3. 248. Sprengel Umbellif. Prodr. 34.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Umbelliferæ*.

Gen. Ch. *Cal.* Umbel ſimple, of ſeveral rays; involucrum of ſeveral lanceolate leaves; perianth of five ovate, acute, permanent leaves. *Cor. Univerſal* uniform; all the flowers perfect and fertile; *partial* of five lanceolate, inflexed petals, channelled at the back. *Stam.* Filaments five, awl-ſhaped, erect, about as long as the petals; anthers roundiſh, of two lobes. *Piſt.* Germen inferior, ovate, rather compreſſed, with two lateral furrows, prominent, blunt and divided at the ſummit; ſtyles two, awl-ſhaped, divaricated, ſhorter than the ſtamens; ſtigmas ſimple. *Peric.* none; fruit ovate, ſolid, tranſverſely diviſible into two parts. *Seeds* two, five-ribbed, contracted at their conjunction, convex at their ſides.

Eſſ. Ch. Umbel ſimple. Involucrum of many leaves. Perianth of five permanent leaves. Petals undivided. Fruit oblong-ovate, ſolid. Seeds five-ribbed; contracted at their conjunction; convex at the ſides.

1. S. *paniculata*. Panicled Spananthe. Jacq. Coll. v. 3. 247. Ic. Rar. t. 350. (Hydrocotyle Spananthe; Willd Sp. Pl. v. 1. 1363. Ait. Hort. Kew. v. 2. 118.)—Native of the Caraccas, according to Jacquin. It was alſo found in moiſt places near Lima, by Dombey, one of whoſe ſpecimens, under the name of *Phellandrium ciliatum*, was given to the younger Linnæus. We received a living one from the ſtove at Kew, in October 1790, an earlier period by five years, than is marked for the introduction of this curious plant by Mr. Aiton. The *root* is biennial, conſiſting of many fibres. *Stem* from one to three feet high, erect, branched, leafy, round, ſtriated, ſmooth, hollow; ſometimes partly zigzag. *Leaves* alternate, on long ſtalks, ſimple, triangular, or ſomewhat heart-ſhaped, from one to three inches broad, pointed, copiouſly ſerrated; entire at the baſe; reticulated with numerous veins, which, on the upper ſide eſpecially, bear a greater or leſs number of briſtly hairs; the under ſide is paler and nearly ſmooth. The inſertion of the *footſtalk* is marked with a tuft of briſtly hairs. *Stipulas* oblong, membranous, fringed, united to the baſe of the footſtalk. *Umbels* ſimple, ſmall, on long ſtalks, variouſly collected into branched panicles, or ſometimes irregular compound umbels, accompanied by ovate, or lanceolate, ſerrated *bracteas*. *Petals* white, inflexed, and partly heart-ſhaped; by no means ſo flat and ſpreading as in Jacquin's figure, from whence his deſcription ſeems to be taken. We have not ſeen the ripe *fruit*, and have therefore been obliged to form our deſcription thereof from Jacquin and Sprengel. The latter, in the *Prodromus* of his new arrangement of the *Umbelliferæ*, of which we hope to ſpeak hereafter, in its proper place, has widely ſeparated this plant from *Hydrocotyle;* and we have already, ſee Hydrocotyle, n. 13, hinted a doubt on this ſubject, which was ſuggeſted by the very different habit of *Spananthe*. But ſurely the learned author laſt named has widely erred, in claſſing *Hydrocotyle* among the genera with compreſſed flat fruit, like *Tordylium*, *Heracleum*, &c. Its fruit indeed is compreſſed, but tranſverſely, not laterally, ſo as not to differ in that reſpect from the preſent genus; which, however, appears to us ſufficiently marked by its large and permanent *perianthium*, to ſay nothing of the more oblong, and not ſemi-orbicular, ſhape of its *ſeeds*. If we were furniſhed with theſe in a perfect ſtate, we ſhould probably find other diſtinctive characters.

SPANCEL, in *Rural Economy*, a term ſignifying a rope to tie a cow's hinder legs while milking, &c.

SPANDAU, in *Biography*, a very pleaſing and extraordinary performer on the French horn, in the ſervice of the ſtadtholder at the Hague in 1772, who in 1773 came to England, where he was heard with the greateſt pleaſure. He contrived in his performance ſo to correct the natural imperfections of the horn, as to make it a chamber inſtrument. He played in all keys, with an equality of tone, and as much accuracy of intonation in the chromatic notes, as could be done on a violin ; by which means, and his delicacy, taſte, and expreſſion, he rendered an inſtrument which, from its force and coarſeneſs, could formerly be only ſupported in the open air, in theatres, or ſpacious buildings, equally ſoft and pleaſing with the ſweeteſt human voice. In 1783 ſome exquiſite pieces for the horn of his compoſition were circulated in MS. from the German and Dutch muſic-ſhops ; but we believe they were never printed.

SPANDAU, in *Geography*, a town of Brandenburg, in the Middle Mark, ſituated on the Havel, at its union with the Spree. This town, though not large, is both flouriſhing and populous, with a conſiderable foundery of arms ; 11 miles N.E. of Potſdam. N. lat. 52° 33′. E. long. 13° 11′.

SPANDEN, a town of Pruſſia, in Oberland ; 14 miles E. of Holland.

SPANDONCEA, in *Botany*, a genus ſo called by profeſſor Deſfontaines, in honour of M. van Spaendonck, botanical draughtſman at the Royal Garden of Paris. This genus had previouſly been named in Italy *Panciatica*, and originally by Forſkall *Cadia ;* which laſt appellation, though of Arabian origin, has been retained. See CADIA.

SPANDRIL, in *Architecture*, the open ſpace between the outward moulding of an arch, from its impoſt to the horizontal member or line which ſurmounts it.

SPANGENBERG, in *Geography*, a town of the principality of Heſſe Caſſel ; 17 miles S.E. of Caſſel. N. lat. 51° 8′. E. long. 9° 36′.

SPANGLES *for Paper-hangings*. See PAPER-*hangings*.

SPANHEIM, FREDERIC, in *Biography*, an eminent theological profeſſor, was born in 1600, at Amberg, in the Upper Palatinate, where his father held an office in the electoral court. He ſtudied at Heidelberg and Geneva, and in 1621 engaged himſelf as preceptor in the family of the governor of Ambrun, in Dauphiné, where he remained three years. From thence he paſſed to Paris, and afterwards paid a viſit to England, and returning to Geneva, he obtained a chair of philoſophy in the college in 1626. Soon after this he was admitted a miniſter, and in 1631 he ſucceeded M. B. Turretin in the profeſſorſhip of theology at Geneva. The reputation which he acquired in the exerciſe of this office procured him various invitations, and having accepted one from the univerſity of Leyden, he removed thither in 1642. In this ſituation he augmented his former reputation, as well by his lectures and ſermons, as by the works which he compoſed. He paſſed a very laborious life, and died in the 50th year of his age. He was ſuppoſed to have ſhortened his days by the greatneſs of his labours, which are thus deſcribed. " He gave public lectures in theology four times a week, and private lectures of different kinds to his pupils ; he examined candidates, and preached in two languages, *viz.* the German and the French : he was accuſtomed frequently to viſit the ſick, wrote a vaſt number of letters, and would compoſe, at the ſame time, two or three books on different ſubjects : he aſſiſted every Wedneſday at the prince of Orange's council at the Hague, and was rector of the univerſity. Amidſt all theſe various occupations, he found leiſure to keep the accounts of his houſe, which was always well filled with boarders." Spanheim was a man of great learning and capacity, and he is thus characterized by Saumaiſe, who felt no love for him. " He had a ſtrong head, well filled with erudition : he was fitted for buſineſs, firm, ardent, and induſtrious. He was a rigid opponent of all that he regarded as innovation in doctrine ; and readily entered into controverſy, not only with the enemies, but with the friends of the church, when he ſuſpected that they deviated from orthodoxy." He never, it is ſaid, ſuffered philoſophy to intrude into the myſteries of theology, but exerted all efforts to keep the latter uncontaminated. His works were very numerous, and on divers ſubjects : ſome were political, as " Le Soldat Suedois," compoſed at the requeſt of the Swediſh ambaſſador ; " Mercure Suiſſe ;" " Commentaire hiſtorique de la Vie et de la Mort de Chriſtople, Vicomte de Dhona ;" " Memoires ſur la Princeſſe Louiſe Juliane, Electrice Palatine." Theſe were all publiſhed without his name : of his theological works, the principal is one on " Univerſal Grace ;" " Dubia Evangelica ;" " Epiſtola ad Buchananum de controverſiis Eccleſiæ Anglicanæ ;" " De Autore Epiſtolæ ad Hebræos."

SPANHEIM, FREDERIC, ſecond ſon of the preceding, was born at Geneva in 1632, was likewiſe a profeſſor of theology of high reputation. He ſtudied under his father at Leyden, and began his career as a preacher in 1652, and by his overbearing eloquence, excited the jealouſy of Alexander More, then famous in the United Provinces. Receiving an invitation from the elector-palatine to occupy the chair of theology at Heidelberg, he took the degree of D.D. at Leyden in 1655, and then took poſſeſſion of his poſt. He acquired the eſteem and confidence of the elector ; and it is to the honour of both, that he did not forfeit them when he was the only perſon who ſtrongly and firmly oppoſed that prince's deſign of divorcing his wife, and remarrying. He received invitations from ſeveral other univerſities, and accepted that from Leyden in 1670, when he was made profeſſor of theology and ſacred hiſtory, in performing the duties of which he acquired a very high reputation. His life was diſquieted by ſome controverſies in which he engaged, and into which none ſhould enter who have not ſtrong nerves, that will bear to be aſſailed by the weapons of an enemy. For ſeveral years before his death he was allowed to omit his duties as lecturer, in order that he might devote his whole time to learned writings. Theſe were ſo numerous, that when collected, they filled three volumes in folio, which were printed at Leyden in 1701-3 ; in the former of theſe years the learned profeſſor died. Among his works the moſt eſteemed is a ſummary of eccleſiaſtical hiſtory of the 16th century.

SPANHEIM, EZEKIEL, an eminent ſcholar and ſtateſman, eldeſt ſon of Frederic, was born at Geneva in 1629. He accompanied his father to Leyden in 1642, when he was already far advanced in the knowledge of the learned languages, and he ſoon acquired the eſteem both of Saumaiſe and Helvetius, who at this period were reſidents in that univerſity. In 1651 he was nominated profeſſor of the belles lettres at Geneva, and in the following year was admitted into the great council. His high reputation cauſed him ſoon after to be invited by the emperor to ſuperintend the education of his only ſon, and in this ſituation he applied himſelf to gain a thorough knowledge of the public law of Germany. Having obtained leave to travel into Italy, he was charged by his maſter to watch over the political intrigues of the Catholic electors at Rome ; and at the ſame time he made himſelf acquainted with the ſcience of medals and claſſical antiquity. While out on this tour he was introduced to the celebrated CHRISTINA (ſee her article), then reſiding at Rome, who favoured him with a gracious reception, and alſo to the ſtill more illuſtrious lady Sophia, electreſs of Hanover, who brought him back with her to Heidelberg in 1665. The elector-palatine, then engaged in various other projects, permitted Spanheim to enter into the ſervice of the elector of Brandenburg, for whom he reſided nine years in the quality of envoy-extraordinary. On his return to Berlin he was made one of the miniſters of the ſtate, and at the peace of Ryſwick, he was deputed again to France. The elector, being now acknowledged king of Pruſſia, conferred upon M. Spanheim the title of baron, and ſent him in the character of extraordinary miniſter to queen Anne of England. He was received at her court with all the reſpect and honour due to his merit, and was, on account of his talents, elected fellow of the Royal Society. He died in this country, at the age of 81. It is ſaid of this author, that he filled his diplomatic character as if he were entirely detached from letters, and his literary character as if he had no concern with politics. His erudition was ſolid and extenſive, of which he gave various proofs in his writings. The earlieſt of theſe were either theological or juridical; but he is beſt known as an antiquarian and critic. "His work," ſays his biographer, "entitled 'De Uſu et Preſtantia Numiſmatum Antiquorum,' in two volumes folio, is accounted one of the beſt treatiſes that ever appeared on the medallic ſcience." His tranſlation into French of the "Cæſars," of the emperor Julian, with illuſtrations; his edition of the ſame work, with a preface and notes; and his obſervations on Callimachus and other authors, with ſome diſſertations on ſubjects of antiquity in the collection of Grævius, are reckoned extremely valuable contributions to critical literature. The wife of this learned profeſſor, who died the year before him, was worthy to be his partner, from her extraordinary acquiſitions, being miſtreſs of various languages, and well acquainted with the philoſophy of the ancients.

SPANIARD's Bay, in *Geography*, a bay on the E. coaſt of the iſland of Cape Breton.—Alſo, a bay on the N. coaſt of the ſame iſland. N. lat. 46° 15′. W. long. 60° 20′.

SPANIEL, Hispaniolus, or *Canis Avicularius* of Linnæus, a variety of the *Canis familiaris*, a ſpecies of dog uſed in fowling. See Dog.

From the name, it may be ſuppoſed that we were indebted to Spain for this breed. There are two varieties of this kind; the firſt formerly uſed in hawking to ſpring the game, the ſame with our ſtarters; the others uſed only for the net, and formerly called *index*, or *ſetter*. This kingdom has been remarkable for producing dogs of this ſort, particular care having been taken to preſerve the breed in the utmoſt purity. They are diſtinguiſhed by the name of Engliſh ſpaniels; ſo that, notwithſtanding the derivation of the name, it is more than probable they are natives of Great-Britain.

The pointer, which is a dog of foreign extraction, was unknown to our anceſtors.

The aquaticus, or finder, in Dr. Caius's ſyſtematic arrangement (ſee Dog), was the ſame with our water ſpaniel, and uſed to find or recover the game that was loſt.

The ſpaniel is of great uſe, but ſubject to many diſtempers; among theſe the mange is a very frequent one, and is the moſt pernicious of all others to his quiet and his beauty; and is very apt, when one dog has it, to ſpread to others that come in its way. As a remedy for this diſeaſe, ſome have recommended a decoction of a large quantity of brimſtone, with ſome common ſalt and wood-aſhes, in water and urine, of each equal quantities: this is to be uſed three or four times a day, waſhing the creature well with it before the fire, or in the warm ſun. If this is not ſtrong enough, the ſame ingredients, with the addition of a conſiderable quantity of wood-ſoot, are to be boiled in ſtrong vinegar, and the liquor uſed in the ſame manner; but this muſt never be uſed in cold weather, as it would then endanger the creature's life.

When this diſeaſe is not in a violent degree, it may be cured by the herb agrimony internally taken. The method is to pound the roots, leaves, and ſeeds of this plant in a mortar, and mix them with a large quantity of wheaten-bran; they are to be then made into dough in the common way, and baked in an oven; the dog is to have no other bread but this for ſome time, but he is to eat of this as often and as much as he will: this, without any further care, has cured many. See *Diſeaſes of Dogs*, under Dog.

Another very troubleſome diſorder in this creature, is what is called the *formica:* this infeſts only the ears, and is cauſed by flies, and by the dog's ſcratching for them. The beſt medicine for the cure of theſe is this: take a quantity of pure and clean gum tragacanth, infuſe it in white-wine vinegar; let as much vinegar be uſed as will ſerve to ſoften it, and when it has lain a week in it, let it be taken out and ground on a marble, as the painters grind their colours, adding to it rock-alum and galls, reduced to powder, of each two ounces; all this is to be well mixed together, and the matter, if it grows too ſtiff in the grinding, is to be moiſtened with ſome of the vinegar in which the gum was ſoaked: when all is thoroughly mixed, and ground fine, it is to be put in a gallypot, and a ſmall quantity of it applied to the creature's ear every night, till the complaint is removed.

The ſwelling of the throat is another diſeaſe very common to ſpaniels, but the cure of this is eaſy; there needs only to bathe it well with oil of chamomile, and afterwards waſh it with a mixture of vinegar and ſalt; this done night and morning, will, in a few days, wholly remove the complaint. Spaniels will ſometimes, when they have much reſt and good food, loſe their ſenſe of ſmelling, but this is recovered by a briſk purge and repeated airings; a very common doſe, on this occaſion, is a drachm of jalap, and two drachms of ſal gem, mixed up into a bolus with oxymel of ſquills: this is to be rubbed over with ſome butter, and will be got down in that manner pretty eaſily, and will work briſkly.

Spaniel, *Gentle*. See Lap-dog.

SPANISH *Academy*, *Bible*, *Black*, *Brown*, *Coinage*, *Coins*, *Epocha*, *Inquiſition*, *Language*, *Meaſures*, *Order*, *Plough*, *Silk*, *Soap*, *Wax*, and *White*. See each article, and Spain.

Spanish, or *Liſbon*, *Bean*, in *Agriculture*, the common name of a particular ſort of bean, which is ſmaller than the long pod kind, but which ripens about the ſame time, and is very productive. See Bean.

Spanish *Broom*, in *Botany*. See Spartium.

Spanish *Cheſnut*, in *Planting*, a tree of the deciduous timber kind. See Chesnut-*Tree*.

This is a moſt valuable ſort of tree, as it affords, in a quick, ſpeedy, and abundant manner, the beſt ſort of hop-pole that has yet been met with, and which far ſurpaſſes that of the aſh, being conſiderably more durable.

Spanish *Elm*, in *Botany*. See Cordia.

Spanish *Flies*. See Cantharides.

Spanish *Juice*. See Liquorice.

Spanish *Potatoes*, in *Gardening*, the common name of a plant producing white, tuberous, eatable roots, ſomewhat like large kidney potatoes of the ſame colour, and of a ſweetiſh taſte. They are uſually brought here from Spain. See Convolvulus.

Spanish *Sheep*, in *Agriculture*, a breed of very fine ſhort-woolled ſheep, originally imported into this country from Spain. See Sheep.

Spanish *Windlaſs*. See Windlass.

Spanish *Wool*. See Sheep and Wool.

Spanish *Cove*, in *Geography*, a creek at the weſtern extremity of the county of Cork, Ireland, between Crookhaven and Mizen Point.

SPANISH *Creek*, a river of Florida, which runs into the river St. Mary.

SPANISH *Main*, that part of the Atlantic ocean which waſhes the N. part of South America, from the Leeward iſlands to the iſthmus of Darien. The term is alſo applied to the coaſt.

SPANISH *Point*, a cape on the N.E. coaſt of the iſland of St. Vincent. N. lat. 13° 24′. W. long. 61° 12′.

SPANISH *River*, a river and ſettlement on the iſland of Cape Breton.

SPANISH *Town*, or *St. Jago de la Vega*, a ſea-port town of Middleſex county, and capital of the iſland of Jamaica, ſituated on the banks of the river Cobre, about ſix miles from the ſea, and containing between 500 and 600 houſes, and about 5000 inhabitants, including free people of colour. It is the reſidence of the governor, or commander-in-chief, who is accommodated with a ſuperb palace; and here the legiſlature is convened, and the court of chancery and the ſupreme court of judicature are held. N. lat. 18° 1′. W. long. 76° 44′. See JAMAICA.

SPANISH *Town*, or *Virgin Gorda*, one of the Virgin iſlands in the Weſt Indies, called alſo Penniſton, belonging to the Engliſh, and having two good harbours. N. lat. 18° 20′. W. long. 63° 48′. See VIRGIN *Iſlands*.

SPANN, in *Commerce*, a corn-meaſure of Sweden; two ſpanns being equal to a *Tunna*; which ſee.

SPANNBERG, in *Geography*, a town of Auſtria; 5 miles S. of Ziſterzdorff.

SPANNER, in *Rural Economy*, the name of a wrench or nut ſcrew-driver, which is often very uſeful for the farmer.

SPAR, in *Mineralogy*, a name given by working miners in England to all cryſtallized minerals which have a ſhining luſtre: it is ſynonimous with *ſpath*, from the German.

The obſervation that ſpar is continually formed at this time in caves and grottoes under ground, has given birth to many different conjectures as to the origin of that ſubſtance. We have accounts from Switzerland, and other places, that the ſnow, by long lying on the earth, and being ſubject to repeated freezing, is at length hardened into ſpar: this is much of the nature of that opinion of the ancients concerning cryſtal, that it was water frozen by ſevere colds to a ſort of ice, much harder than the common kind: both are equally erroneous and abſurd. But more rational conjectures, as to its original, are, that it is produced either by effluvia alone, or by the joint force of effluvia iſſuing up from the depths of the earth, and mixing with water oozing out of rocks into their cracks and cavities, or by the ſame water or effluvia paſſing through beds of this ſparry matter contained in clay. In the firſt place, we are to obſerve, that ſpar is capable of being diſſolved either by water or vapour, and ſuſpended imperceptibly in either; and that though it remains ſuſpended a long time, yet there are occaſions of its ſeparating itſelf from either of theſe vehicles; ſuch are long ſtanding ſtill, and evaporation. What is called the growth and formation of ſpar, therefore, is properly perhaps only the change of place in this ſubſtance; and all that theſe agents, waters and vapours do, is only to waſh it out of the ſtrata of earth or ſtone, in which it lay in ſcattered particles, and bring it together into the cracks and crevices of ſtones, where it may again ſeparate itſelf, and become more pure and perfect.

The operation of nature, in this caſe, is very like that of art in extracting of ſalts from the various bodies they are mixed with; and ſpar, in its two ſtates, when blended in the ſtrata of ſtone, &c. and when pure, and in form of cryſtals in the cracks, may be compared to alum, for inſtance, in its bed, and when purified. The alum, in the common ſtones from which it is made, is not perceptible to the eye, but lies in ſcattered particles; water being added to this, takes up the ſalt, and when it has been managed by evaporation and reſt, yields it again purified and alone, and it forms ſuch cryſtals on the ſides of the veſſel as the other does on the ſides of the fiſſures of ſtone, which are the veſſels where the water, out of which it was formed, was ſet to evaporate, and to reſt a proper time.

That ſome ſpars grow from vapours alone is evident, from the ſtalactitæ, or ſtony icicles, hanging down from the roofs of our caverns, which, though they grow downwards, yet have many times little plants of the ſame ſubſtance growing out at their ſides, and ſtanding upwards, contrary to the growth of the other, and evidently formed of the matter ſeparated from the vapours in their aſcent, as the ſtalactitæ themſelves are from ſuch as have aſcended to the roof, and there been condenſed into water, and ſent down again in drops. Nor is the ſparry matter alone thus raiſed in vapour, for even the metals, and other bodies as little likely as thoſe to be thus raiſed, yet are found to form ſtalactitæ.

The mundics, in general, though they never form regular ſtalactitæ, yet often are found adhering to the ſides of them, and the metals, particularly iron and lead, form regular ſtalactitæ; the iron ones very common and very perfect; the lead leſs perfect and more rare; and Dr. Brown gives us abundant inſtances of ſpars growing entirely from vapours in the baths of Buda in Hungary.

Mr. Beaumont is of opinion, that earth by degrees will ripen into ſpar; but this is an error. He founds his opinion on certain ſtalactitæ, and ſtalagmitæ, found in caverns, partly earth, and partly ſpar, and ſuppoſes that the whole would in time become ſpar; but there is nothing in nature to warrant this conjecture. Phil. Tranſ. N° 129.

M. de Juſſieu has given us, in the Memoirs of the Paris Academy, a very remarkable account of the recryſtallization, or reproduction, of the parts of ſpar, after ſolution. Mem. Acad. Paris, 1719.

The denomination of ſpars, ſays the editor of the Chemical Dictionary, is given to many ſtones of different properties and appearances, which do not poſſeſs conſtantly any one common character or mark, by which they may be certainly diſtinguiſhed from other ſtones. In general, we may obſerve, that they are moſt frequently found in mines, and that they generally conſiſt of ſmooth and ſhining plates or laminæ; that ſome are tranſparent, and others opaque; that ſome are colourleſs and others coloured; that they are cryſtallized in various determinate figures, or poſſeſs no determinate ſhape; and, laſtly, that they differ ſo much in hardneſs, denſity, degree of fuſibility, and in their moſt eſſential chemical properties, that they cannot be conſidered as forming a diſtinct claſs of foſſile ſubſtances.

The ſeveral ſtones to which the name of ſpar has been given are, the calcareous, the gypſeous, the fluors, and feltſpar. Calcareous ſpars are ſoft heavy ſtones, which have the common chemical properties of calcareous earth. The texture is laminated, ſome of them have no determinate figure, and others from their form are called rhomboidal. Some ſpars, called dog's-tooth ſpars, have a pyramidal figure; but when theſe are broken, their fragments ſhew that they alſo conſiſt of rhomboidal particles. Some rhomboidal ſpars are tranſparent, others are opaque; ſome are colourleſs, and others are coloured; and ſome of them have a property of doubly refracting the rays of light: this ſpar has been called refracting ſpar, or iſland cryſtal. Its figure is that of an oblique parallelepiped, contained within ſix parallelogrammic ſides, and eight ſolid angles. Each of the obtuſe angles of the parallelograms is 101° 52′; and each of the acute angles is 78° 8′. Theſe calcareous ſpars may be diſtinguiſhed from others by effervescing with acids.

The gypſeous, or ſelenitic ſpars, are gypſeous earth, diſtinctly cryſtallized. The form of the cryſtals is rhomboidal. They are alſo called ſelenites and glacies Mariæ. Theſe ſpars ſometimes aſſume other forms, and are very heavy.

Mr. Margraaf has ſhewn, that under this claſs are to be comprehended thoſe white opaque ſpars, which by calcination with inflammable matters are capable of receiving a phoſphoric quality, ſimilar to that of the Bolognian ſtone, which he alſo ſhews is a gypſeous ſpar. For the ſpars called fluors, ſee Fluor.

The feltſpar, or *ſpatum ſcintillans*, differs from all the preceding, in being ſo hard as to be capable of ſtriking ignited ſparks from ſteel. For which reaſon it is referred by Cronſtedt to the ſiliceous claſs of earths, and by him called rhombic quartz, becauſe the particles of which it conſiſt ſeem to be parallelepipeds, each of which is contained within ſix rhomboidal ſides. Its colours are various, white, grey, and red.

Several other foſſile ſubſtances conſiſt of large plates, and are, therefore, ſaid to have a ſparry texture. Such are ſome kinds of talcs, of hornblende, of quartz, of amianthus, and ſome calciform ores of metals.

Spars, in *Medicine*, have from the earlieſt times been recommended in nephritic complaints. Some have uſed one kind, ſome another, as the lapis judaicus, the ſparry incruſtations of caverns, petrified oyſter-ſhells, and water in which large quantities of ſpar are ſuſtained. After all, the nephritic virtues of ſpar want ſufficient proof; ſome even ſuſpect its uſe to be more hurtful than beneficial. See Crystal.

SPARADRAP, Sparadrápum, in *Pharmacy*, &c. an ancient name for a kind of ſear-cloth; or a linen-cloth ſmeared on both ſides with ſome kind of plaſter, or unguent.

The ſparadrap is ſometimes alſo called *tela Gualteriana*, or *tela Gualteri*; ſometimes *tela emplaſtica*.

It is prepared by melting a ſufficient quantity of ſome plaſter or unguent, and dipping a linen-cloth therein, till ſuch time as it hath imbibed its fill. It is then taken out, cooled, and poliſhed on a marble.

SPARAGUS, or Asparagus, *Sperage*, in *Botany*. See Asparagus.

SPARAXIS, ſo named by Mr. Gawler, now Ker Bellenden, from σπαραξις, *a tearing*, or *plucking*, in alluſion to the torn appearance of the ſheath, which makes a principal part of the generic character.—Ker in Sims and Kon. Ann. of Bot. v. 1. 225. Ait. Hort. Kew. v. 1. 85.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Enſatæ*, Linn. *Irides*, Juſſ.

Gen. Ch. *Cal.* Sheath inferior, of two membranous, dry, unequal, claſping valves, torn and ſhrivelled at the extremity. *Cor.* of one petal, ſuperior; tube funnel-ſhaped, ſlender at the baſe; limb dilated, in ſix ſegments, either regular or irregular, ſpreading or partly erect. *Stam.* Filaments three, inſerted into the upper part of the tube, thread-ſhaped, ſtraight, a little inclining, rarely aſcending, much ſhorter than the limb; anthers oblong, incumbent. *Piſt.* Germen triangular; ſtyle thread-ſhaped; ſtigmas three, ſpreading, recurved, oblong, downy. *Peric.* Capſule roundiſh-oblong, full of unequal ſwellings, thin, of three cells and three valves. *Seeds* numerous, globoſe.

Eſſ. Ch. Sheath of two valves, membranous, dry, jagged. Corolla tubular. Stigmas three, oblong, recurved. Capſule roundiſh-oblong, tumid.

Obſ. The character of this genus chiefly depends on its *ſheath*, which is large, and exhibits its diſtinctive marks, as above deſcribed, ſufficiently clearly. The limb of the *corolla* is either regular and ſpreading, or converging downwards, or two-lipped, with an erect hood; in which laſt caſe the *ſtamens* and *ſtyle* are upright, otherwiſe ſpreading, or inclining. The *bulb* is ſolid, ovate, pointed, clothed with reticulated ſcales. The *ſtem* moſt frequently bears axillary bulbous buds. *Leaves* from ſix to ten, ſword-ſhaped, with fine parallel ribs. *Flowers* rather large, and ſomewhat diſtant from each other; never crowded or numerous. *Ker.*

1. S. *anemoniflora.* Large White Sparaxis. Ker n. 1. (Ixia amemoniflora; Willd. Sp. Pl. v. 1. 200. Jacq. Ic. Rar. t. 273.)—Stem ſingle-flowered, as tall as the leaves. Corolla regular; its ſegments obovate, four times as long as the tube.—Native of the Cape of Good Hope. Cultivated by Jacquin. The *ſtem* is about a foot high, ſimple, oblique, with five or ſix *leaves* at the bottom only, which are linear and glaucous, the longeſt of them nearly equal to the ſtem. *Flower* two inches in diameter, pure white, with yellow anthers; its tube equal to the *ſheath*, which meaſures about a quarter of an inch.

2. S. *fragrans.* Sweet Yellow Sparaxis. Ker n. 2. (Ixia fragrans; Willd. Sp. Pl. v. 1. 197. Jacq. Ic. Rar. t. 274.)—Stem uſually two-flowered, ſhorter than the recurved leaves. Corolla regular; its ſegments elliptic-lanceolate, thrice as long as the tube.—Native of the Cape. Cultivated by Jacquin. *Stem* a ſpan high, leafy. *Leaves* linear, narrow, green, about twice the length of the ſtem, all more or leſs recurved. *Flowers* about half the ſize of the foregoing, yellow, with white many-cleft *ſheaths*.

3. S. *tricolor.* Three-coloured Sparaxis. Ker n. 3. Ait. n. 1. (Ixia tricolor; Curt. Mag. t. 381. Schneevogt. Ic. t. 39. Redout. Liliac. t. 129.)—Stem two or three-flowered, taller than the erect lanceolate leaves. Corolla regular; its ſegments obovate, twice the length of the tube. Sheath corrugated, ſpotted.—Native of the Cape, from whence it was introduced into the Dutch gardens, and thence into ours. It flowers, like the reſt of its family, in the frame or greenhouſe, about May. The *foliage* is green. *Flowers* peculiarly ſplendid, as large as the firſt ſpecies; their tube and baſe of the limb yellow; middle of the limb marked with an angular, or arrow-ſhaped, dark purple, or chocolate-coloured, ſpot; all beyond it of an orange ſcarlet. The *ſheaths* are wrinkled, furrowed, brown, copiouſly dotted with a darker tint.

4. S. *galeata.* Hooded Fleſh-coloured Sparaxis. Ker n. 4. (Gladiolus galeatus; Jacq. Coll. v. 4. 167. Ic. Rar. t. 258. Willd. Sp. Pl. v. 1. 212, excluding moſt of the ſynonyms.)—Corolla irregular; its upper ſegment ſpreading. Leaves elliptic-oblong.—Native of the Cape: cultivated by Jacquin. The *ſtem* is leafy, a ſpan high. *Leaves* equitant, vertical, broad, many-ribbed, and obtuſe. *Flowers* about three, fleſh-coloured or pale purpliſh; the lower lip yellow: the upper ſegment, or hood, is remarkably divaricated. Perhaps the irregularity of the *corolla* would rather authorize the referring this and the following, as moſt authors have done, to *Gladiolus*, near our fourth ſpecies of that genus. See Gladiolus.

5. S. *bicolor.* Purple and Yellow Sparaxis. Ker n. 5. Ait. n. 2. (Ixia bicolor; Ker in Curt. Mag. t. 348. Gladiolus bicolor; Thunb. Diſſ. n. 16. t. 2. f. 1. Willd. Sp. Pl. v. 1. 216. Jacq. Ic. Rar. t. 240.)—Corolla irregular; its ſegments converging. Leaves lanceolate.—From the ſame

country. Introduced at Kew in 1786, by Mr. Maſſon. The *leaves* are narrower, and more acute, than in the laſt. *Flowers* three or four, with ſpotted *ſheaths*; their tube, and two lateral ſegments, pale yellow, or whitiſh; hood purple; lip deep yellow.

6. S. *grandiflora*. Large-flowered Sparaxis. Ker n. 6. Ait. n. 2. (Ixia grandiflora; De la Roche Diſſ. 23. Curt. Mag. t. 541. Redout. Liliac. t. 139. I. ariſtata; Thunb. Diſſ. n. 15. Ait. ed. 1. v. 1. 57. Willd. Sp. Pl. v. 1. 203. Andr. Repoſ. t. 87. I. foliis gladiolatis, &c.; Mill. Ic. t. 237. f. 3. I. uniflora; Jacq. Ic. Rar. t. 283. I. holoſericea; Jacq. Hort. Schoenbr. v. 1. 9. t. 17.)

β. Curt. Mag. t. 779.

Corolla regular; its ſegments obovate-oblong, four times the length of the tube. Stamens and ſtyle inclining. Sheath with many awl-ſhaped ſegments. Leaves erect, lanceolate. —Native of the Cape. Long ſince cultivated in the gardens of Europe. The *ſtem* is about a foot high, bearing uſually three or four handſome *flowers*; ſometimes but one. *Leaves* equitant, ſcarcely glaucous, uſually much ſhorter than the ſtem. *Sheaths* ſtriated, ending in many lax taper ſegments, of their own length. *Corolla* full two inches wide; uſually of a rich deep ſatin-like purple, edged with white, and paler beneath; but in the variety β, it is whitiſh, or ſulphur-coloured, with ſome central ſpots, on the upper ſide; violet beneath. It muſt be allowed that authors have multiplied figures of this ſpecies in a moſt blameable manner.

7. S. *bulbifera*. Bulb-bearing Sparaxis. Ker n. 7. Ait. n. 4. (Ixia bulbifera; Linn. Sp. Pl. 51. Willd. Sp. Pl. v. 1. 204. Andr. Repoſ. t. 48. Curt. Mag. t. 545. Redout. Liliac. t. 128. Ixia foliis linearibus glabris, caule folioſo bulbifero; Mill. Ic. t. 236. f. 2.)—Corolla regular; its ſegments elliptical, acute, four times the length of the tube. Stamens inclining. Sheath deeply torn. Leaves erect, lanceolate. Stem bulbiferous, ſomewhat branched.—From the ſame country as the laſt, and known as long in our gardens. It is taller than that ſpecies, with paler *leaves*. The *ſtem* is generally branched and leafy, bearing a few bulbs at each joint, by which the plant may be increaſed. Each branch uſually bears two diſtant *flowers*, rather ſmaller than the foregoing, but with the ſame ſilky aſpect, though their colour is an uniform pale yellow, or white; and their ſegments are more acute.

8. S. *fimbriata*. Fringed Sparaxis. Ker n. 8. (Ixia fimbriata; Lamarck Dict. v. 3. 339. I. foliis gladiolatis nervoſis, &c.; Mill. Ic. t. 237. f. 1, 2.)—Corolla regular; its ſegments elliptical, obtuſe, four times as long as the tube. Stamens erect? Sheath deeply torn. Leaves erect, bluntiſh, about as tall as the ſimple, zigzag, three-flowered ſtem.—Native of the Cape of Good Hope. Cultivated by Miller. We adopt this ſpecies, (though omitted by Mr. Dryander in Ait. Hort. Kew.) on the authority of the authors quoted, for we have had no opportunity of inveſtigating it. Its humble growth, and the abruptneſs of the *leaves*, ſeem to indicate a ſpecific difference from the two laſt. The *ſtem* bears no bulbs, and is quite ſimple; leafy at the baſe only. *Flowers* large; white or yellowiſh above; tinged with violet beneath. Miller repreſents both *ſtyle* and *ſtamens* erect, but we dare not implicitly rely on this. The *ſheaths* are ſplit into numerous very long and ſlender ſegments.

Mr. Ker merely mentions an eighth ſpecies, under the name of *S. lacera*, ſeen by him in ſir Joſeph Banks's herbarium, with which we are unacquainted.

SPARENBERG, in *Geography*, a town and citadel of Weſtphalia, in the county of Ravenſberg; 2 miles S.E. of Bielefeld.

SPARGANIUM, in *Botany*, σπαργανιον of the Greeks, a very expreſſive ancient name, derived from σπαργανον, *a fillet*, or *bandage*, and alluding to the long flat linear form, and pliant texture, of the ribband-like foliage—Linn. Gen. 480. Schreb. 621. Willd. Sp. Pl. v. 4. 199. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 961. Ait. Hort. Kew. v. 5. 235. Brown Prodr. Nov. Holl. v. 1. 338. Purſh v. 1. 33. Juſſ. 26. Tourn. t. 302. Lamarck Illuſtr. t. 748. Leers Herborn. t. 13. f. 11. Gærtn. t. 19.—Claſs and order, *Monoecia Triandria*. Nat. Ord. *Calamariæ*, or rather *Piperitæ*, Linn. *Typhæ*, Juſſ.

Gen. Ch. Male flowers numerous, collected into a head. *Cal.* Perianth of three linear, coloured, erect, deciduous leaves. *Cor.* none. *Stam.* Filaments three, capillary, longer than the calyx; anthers oblong.

Female, *Cal.* as in the male. *Cor.* none. *Piſt.* Germen ovate, tapering into a ſhort awl-ſhaped ſtyle; ſtigma oblique, undivided, downy, channelled along the upper ſide, permanent, uſually ſimple, rarely double. *Peric.* Drupa dry, turbinate, pointed; angular at the baſe. *Seed.* Nut hard, oblong-ovate, angular, uſually ſolitary; occaſionally there are two.

Eſſ. Ch. Male, Calyx of three leaves. Corolla none. Female, Calyx of three leaves. Corolla none. Drupa dry, with a ſolitary nut.

1. S. *ramoſum*. Branched Bur-reed. Hudſ. 401. Fl. Brit. n. 1. Willd. n. 1. Purſh n. 1. Curt. Lond. faſc. 5. t. 66. Engl. Bot. t. 744. Bauh. Theatr. 228. Ger. Em. 45. (S. erectum; Linn. Sp. Pl. 1378.)—Leaves triangular at the baſe; concave at the ſides. Common flower-ſtalk branched. Stigma linear.—Common in ditches, and about the banks of ponds and rivers, throughout Europe; more rare, according to Mr. Purſh, in North America. It appears to be the σπαργανιον of Dioſcorides, being the only ſpecies Dr. Sibthorp obſerved in Greece. It is perennial, flowering in July and Auguſt. *Root* creeping. *Stem* erect, about a yard high, round, leafy, ſmooth, alternately branched at the top in a panicled manner. *Radical leaves* triangular at the baſe, with concave ſides; their upper part erect, ſword-ſhaped, ſmooth, much taller than the ſtem; *ſtem-leaves* gradually ſhorter, flat, claſping at their baſe. *Partial flower-ſtalks* racemoſe, many-flowered; zigzag in the lower part. *Heads* alternate, ſeſſile, globoſe; the lower ones female, brown; upper male, cloſer and more numerous, with yellow *anthers*. *Calyx-leaves* ſpatulate, brown. *Germen* of two cells. *Stigma* elongated, linear, uſually ſolitary; when there are two ſtigmas, there ſeem to be two ſeeds alſo. The *Sparganium* of Moriſon, ſect. 8. t. 13. f. 2, ſeems an *Aliſma* or *Sagittaria*.

2. S. *ſimplex*. Unbranched Upright Bur-reed. Hudſ. 401. Fl. Brit. n. 2. Willd. n. 2. Purſh n. 2. Curt. Lond. faſc. 5. t. 67. Engl. Bot. t. 745. (S. erectum β; Linn. Sp. Pl. 1378. S. n. 345.* Linn. Fl. Lapp. ed. 1. 271. ed. 2. 280. S. non ramoſum; Bauh. Theatr. 231. S. latifolium; Ger. Em. 45. S. alterum; Bauh. Hiſt. v. 2. 541. Lob. Ic. 80.)—Leaves triangular at the baſe; flat at the ſides. Common flower-ſtalk ſimple. Stigma linear.—Native of ponds throughout Europe, eſpecially on a gravelly ſoil, flowering in July and Auguſt. More frequent in North America, according to Mr. Purſh, than the *ramoſum*, from which Hudſon and Curtis firſt well diſtinguiſhed this ſpecies. It is a ſmaller plant, and never branched or panicled. The lowermoſt head of *flowers* is generally ſtalked; the reſt being ſeſſile. *Calyx* green, or whitiſh, not brown. *Stigma* elongated, moſtly ſimple.

3. S. *natans*. Floating Bur-reed. Linn. Sp. Pl. 1378. Willd. n. 3. Fl. Brit. n. 3. Purſh n. 3. Engl. Bot. t. 273. Fl. Dan. t. 260.—Leaves drooping, flat. Com-

mon flower-ſtalk ſimple. Stigma ovate, very ſhort. Head of male flowers nearly ſolitary.—Native of rivers, pools, and lakes, in Europe and North America, chiefly on a muddy or clay ſoil, flowering in July. The *root* is long, perennial, creeping widely. *Herb* floating, with long flat *leaves*, half the ſize of the laſt; the upper ones ſheathing. *Cluſter* of few heads of *flowers*, of which the top one only, with ſometimes a portion of the next, is male; the lowermoſt is ſtalked. The ſhort, broad, ovate, always ſolitary, *ſtigma* beſt diſtinguiſhes this from *S. ſimplex*. Willdenow perſiſts in citing the *Fl. Lapp.* for this, though he refers to it properly under the preceding, except that in both caſes he omits the aſteriſk.

4. S. *anguſtifolium*. Narrow-leaved Bur-reed. Br. n. 1. (S. anguſtifolium; Michaux Boreal-Amer. v. 2. 189? S. natans β; Purſh n. 3?)—“Leaves flat, lax, longer than the ſtem. Heads of male flowers numerous. Stigma oval. Drupa obovate, even; depreſſed at the ſummit.”—Found by Mr. Brown near Port Jackſon, New South Wales. If the ſynonyms be right, it is alſo a native of rivulets in Canada.

SPARGANOPHORUS, from σπαργανον, *a fillet*, and φερω, *to bear*, becauſe the ſeed is crowned with a membranous band, or border.—Vaill. Act. Pariſ. ann. 1719. Gærtn. v. 2. 395. t. 165. Michaux Boreal-Amer. v. 2. 95. Purſh v. 2. 518.—We have already ſpoken of the plant of Vaillant and Gærtner under ETHULIA, (ſee that article,) of which, in our opinion, it conſtitutes a genuine ſpecies. Perhaps that of Michaux and Purſh may belong to the ſame genus, but we dare not, without examination, aſſert this. The word *Sparganophorus*, though not exactly compounded of *Sparganium*, may be thought rather too near to that name, and we, on many accounts, prefer *Ethulia*.

SPARGANOSIS, from σπαργαω, *to ſwell*, in *Surgery*, an abſceſs of the breaſt; a milk-abſceſs.

SPARGUS, in *Ichthyology*, a name given by Gaza to the common ſparus, which he calls alſo *fluta*.

Artedi calls it the plain yellow ſparus, with an annular ſpot near the tail. See SPARUS.

SPARHAWK POINT, in *Geography*, a cape on the north coaſt of the mouth of the river Piſcataqua.

SPARKS's ISLAND, a ſmall iſland in the bay of Honduras, at the mouth of the river Roman. N. lat. 15° 54′. W. long. 86° 5′.

SPARLING, in *Ichthyology*. See SMELT.

SPARLING-*Fowl*, in *Ornithology*, a name given in ſome places, by the country people, to the female merganſer, called more uſually the *dundiver*.

SPARNECK, in *Geography*, a town of Germany, in the principality of Culmbach; 3 miles S.S.E. of Munchberg.

SPARRE, ERIC, in *Biography*, chancellor of Sweden, was born in 1550; but from this time we have no account of him till 1578, when he was appointed ſupreme judge of Weſtmanland and Dalecarlia; and in 1582 he became a ſenator, governor of theſe provinces, and vice-chancellor of the kingdom. In 1583 he was knighted by king James VI. of Scotland; and in 1587 he went as envoy to Poland, reſpecting the elevation of Sigiſmund to the Poliſh throne. Within about two years from this time he fell in diſgrace, was deprived of his employments, and thrown into priſon. He was likewiſe accuſed of high crimes againſt the ſovereign, John III. On this occaſion his letter of knighthood was taken from him by the king, and torn to pieces before his face. He was, however, pardoned, on the interceſſion of king Sigiſmund; but was again arraigned, in 1592, before a court at which the king himſelf preſided, on a charge of having promiſed the ceſſion of Eſthonia, in direct contradiction to the inſtructions which he had received, when envoy of Poland. He defended himſelf with great boldneſs againſt all his accuſers; which ſo incenſed the ſovereign, that he drew his ſword, exclaiming, that it was given him by God to puniſh traitors and breakers of their oath. Duke Charles brought forth other accuſations againſt him; but the court broke up, after coming to this concluſion, that Sparre, and the other ſenators who had been accuſed with him, were neither condemned nor acquitted. Sparre fell again under the duke's diſpleaſure, on account of a celebrated book which he wrote, entitled “Pro Lege, Rege, et Grege;” which ſeemed to be directed againſt the authority exerciſed by that prince. Having, however, taken an oath of fidelity to the duke, and made a ſolemn promiſe of obedience in writing, he was reſtored to his employments; and, as chancellor of the kingdom, ſubſcribed, in 1593, the reconciliation between him and Sigiſmund. Notwithſtanding this, he was afterwards delivered up to the duke, and ſuffered under the hands of the executioner, during the bloody ſcenes that took place at Linkoeping, in 1600; but he maintained his innocence to the laſt, and read a proteſt againſt thoſe who had doomed him to puniſhment. He was author of many books, beſides the one already referred to, “Pro Lege,” &c. among which are the following: “Account of the Coronation of king Sigiſmund at Upſal, February 19, 1594;” “Sententia Ordinum Regni Sueciæ in quoſdam de Collegio Senatorum,” &c.; “Adverſus Inſimulationes et Proteſtationes à Regis Sigiſmundi legato Polono, Oratione prolata, Defenſio.” Gen. Biog.

SPARRING, among *Cock-fighters*, is the fighting a cock with another to breathe him. In ſparring, they put hotts on their ſpurs, that they may not hurt one another.

To ſpar the cock, imports in general to breathe him, in order to embolden him to fight. See HOTTS.

SPARRMANNIA, in *Botany*, ſo named by the younger Linnæus, in honour of his diſtinguiſhed countryman, Andrew Sparrmann, or rather Sparrman, the friend and pupil of his father, and the companion of the voyage of the Forſters, round the world. This gentleman is well known in England by the account of his travels in ſouthern Africa, which diſplay great candour and love of truth, as well as the true ſpirit of Linnæan philoſophy and accuracy. He is, we believe, ſtill living in Sweden.—Linn. Suppl. 41. Schreb. 355. Willd. Sp. Pl. v. 2. 1160. Thunb. Nov. Gen. 88. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 298. Juſſ. 290. Lamarck Illuſtr. t. 468.—Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Columniferæ*, Linn. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of four lanceolate, undivided, ſpreading, nearly equal, deciduous leaves. *Cor.* Petals four, equal, wedge-ſhaped, flat, undivided, twice the length of the calyx. Nectary? of ſeveral thread-ſhaped, tumid, corrugated, or toothed, bodies, more properly to be eſteemed imperfect filaments, or ſtamens, partly changed to petals. *Stam.* Filaments numerous, thread-ſhaped, inſerted into the receptacle, about half the length of the petals; anthers ovate, incumbent. *Piſt.* Germen ſuperior, roundiſh, hiſpid, with five angles; ſtyle thread-ſhaped, longer than the ſtamens; ſtigma in many minute ſegments. *Peric.* Capſule five-ſided, with five cells; its angles armed with long, ſtraight, rigid, ſpreading thorns, each tipped with a ſharp tranſparent point. *Seeds* two in each cell, oblong, ſmooth, keeled at one ſide.

Eſſ. Ch. Calyx of four leaves, deciduous. Petals four. Barren filaments numerous, toothed. Capſule of five cells, angular, armed with ſtraight pungent ſpines. Seeds two in each cell.

Obſ. Ventenat has juſtly remarked that the ſuppoſed nectaries are, as well as the perfect ſtamens, inſerted into the receptacle, and not, as Schreber after Thunberg aſſerts, into the germen, and that they are properly to be conſidered as imperfect ſtamens.

1. S. *africana*. African Sparrmannia. Linn. Suppl. 265. Willd. n. 1. Ait. n. 1. Retz. Obſ. faſc. 5. 25. t. 3, (but the ſynonym, habitat, and all that follows, belong to the preceding *Lagerſtromia*.) Curt. Mag. t. 516. Venten. Malmaiſ. t. 78.—Native of woods and thickets, on the ſides of hills, at the Cape of Good Hope, flowering from October to January. It was introduced at Kew, in 1790, by Mr. Maſſon, and makes a moſt elegant and ſplendid appearance in the collection of greenhouſe ſhrubs, in the ſpring, and early part of the ſummer. The whole plant is clothed with fine, ſilky, ſpreading hairs. *Stem* ſhrubby, erect, two to ſix feet high, with round, alternate, leafy *branches*. *Leaves* alternate, ſtalked, dependent, large, heart-ſhaped, pointed, crenate, ſlightly lobed, veiny, reſembling thoſe of ſome Mallow, *Sida*, or *Hibiſcus*. *Stipulas* awl-ſhaped, lateral, in pairs near the baſe of each *footſtalk*. *Flowers* in large, terminal, hairy umbels, like thoſe of a Cape Geranium, with awl-ſhaped *bracteas*. *Calyx* downy, pale brown, not quite an inch long. *Petals* white, wrinkled, often emarginate. *Filaments* yellow, partly crimſon. *Anthers* brown. This ſhrub is propagated, without much difficulty, either by cuttings or ſeeds; but we know not whether the latter are often perfected in Europe.

SPARROW, Passer, in *Ornithology*, the name of a large order of birds. See Passeres.

Sparrow, *Common*, or *Houſe*, the *Fringilla domeſtica* of Linnæus, is a well-known bird, and needs no deſcription. Sparrows are proverbially ſalacious: they breed early in the ſpring, often in the neſts of the martin, after expelling the owner; the martin, however, in revenge, is ſaid to aſſemble its companions, and to aſſiſt in plaſtering up the entrance with dirt, and thus leaves the invader to periſh. See Fringilla.

Sparrow, *Hedge*, *Curruca*, or *Motacilla modularis* of Linnæus, a bird of the ſize of the red-breaſt, or of the titlark. Its beak is longiſh, ſlender, and black; its head is of a deep brown, mixed with aſh-colour; the cheeks are marked with oblong ſpots of dirty white; the back and coverts of the wings are duſky, edged with reddiſh-brown; the quill-feathers and tail duſky; the rump brown, tinged with green; the throat and breaſt are of a dull aſh-colour; the belly of a dirty white; the ſides, thighs, and vent-feathers are of a pale tawny brown; and the legs of a dull fleſh-colour. This bird frequents low hedges, particularly thoſe of gardens; making its neſt in ſome ſmall buſh, where it lays four or five eggs of a fine pale blue colour; and during the breeding-ſeaſon it has a remarkable flirt with its wings. The male has a ſhort but very ſweet plaintive note, which it begins with the firſt froſty mornings, and continues till a little time in the ſpring.

The bird which Linnæus ſuppoſes to be our hedge-ſparrow, which he deſcribes under the title of *motacilla curruca*, and to which he applies the denomination of *cannavarola*, differs in colour of plumage as well as eggs. Pennant.

It is in the neſt of this bird that the cuckoo hatches her eggs for the moſt part, though not always, the neſts of turtle and wood-pigeons being ſometimes uſed by her for that purpoſe. Hence it was that the ancients made the cuckoo an emblem of ſuch men as made bold with the marriage-bed of others, who, on that account, were called *curruca*. See Motacilla.

Sparrow, *Reed*, *Paſſer arundinaceus*, the *Emberiza ſchoeniclus* of Linnæus, a bird that lives moſt commonly among reeds in marſhy places, and known among authors by the name of *junco*.

Its neſt is curiouſly contrived, being faſtened to four reeds, and ſuſpended by them like a hammock, about three feet above the water. It lays four or five eggs of a blueiſh-white, marked with irregular purpliſh veins. This bird is much admired for its ſong, and like the nightingale it ſings in the night. In the male, the head, chin, and throat, are black; the tongue livid; at each corner of the mouth commences a white ring, which encircles the head; at approach of winter the head changes to hoary, but on return of ſpring reſumes its jet colour; the whole under ſide of the body is white; the back, coverts of the wings, and the ſcapular feathers, are black, deeply bordered with red; the two middle feathers of the tail are of the ſame colours, the three next black; the exterior web, and part of the interior of the outmoſt feather, are white: the head of the female is ruſt-coloured, ſpotted with black; it wants the white ring round the neck, but in moſt other reſpects reſembles the male. Pennant. See Emberiza.

Sparrow, *Leſſer Reed*, *Willow Lark*, or *Sedge-bird*, *Paſſer arundinaceus minor*, the *Motacilla ſalicaria* of Linnæus, is a ſpecies of a ſlender elegant form; the head brown, marked with duſky ſtreaks; over each eye a line of pure white, over that another of black; cheeks brown; throat, breaſt, and belly white, the two laſt tinged with yellow; hind-part of the neck and back of a reddiſh-brown; the back ſpotted with black; coverts of the tail tawny; coverts of the wings duſky, edged with pale brown; quill-feathers duſky; tail brown, and in the form of a wedge, and making a circle when ſpread, and legs duſky. This bird is common in low wet grounds, ſits on the top of ſome ſpray with its wings diſhevelled; its ſong conſiſts of but two notes, which are loud, querulous, and harſh. Pennant.

Ray obſerves, that the leſſer reed ſparrow ſings ſweetly, and ſome have called it *cannavarola*. See Motacilla.

Sparrow, *Solitary*. See Passer *Solitarius*.

Sparrow, *Tree*, *Paſſer montanus*, the *Fringilla montana* of Linnæus, is inferior in ſize to the common ſparrow; the bill is thick and black; the crown of the head, hind part of the neck, and leſſer coverts of the wings, are of a bright bay, the two firſt plain, the laſt ſpotted with black; the chin black; the cheeks and ſides of the head white, marked with a great black ſpot beneath each ear; the breaſt and belly of a dirty white; juſt above the greater coverts is a row of feathers, black edged with white; the greater coverts are black, edged with a ruſt-colour; the quill-feathers duſky, edged with pale red; lower part of the back of an olive-brown; the tail brown, and legs of a ſtraw-colour.

Theſe birds are common in Lincolnſhire, among trees, and collect, like the common kind, in great flocks. Pennant. See Fringilla.

Sparrow, *Water*, *Paſſer aquaticus*, a bird deſcribed by Nieremberg, which, he ſays, the Indians call *acototlequichitl*. It ſings all day long without ceaſing, but with no very pleaſing note. It is, however, a well-taſted bird. It lives among ſedge and buſhes, and is of the ſize and ſhape of a ſwallow, but has a black bill and yellow legs; its breaſt and belly are white, and its back is of a browniſh-yellow, variegated with ſpots of black and white. This bird much reſembles our reed ſparrow. Ray.

Sparrow, in *Agriculture*, a miſchievous deſtructive bird in corn-fields, and which ſhould moſtly be deſtroyed. It is obſerved, that were all the farmers in a neighbourhood to agree to their deſtruction, by offering rewards for their heads, their numbers might be leſſened; and that were the practice general, ſurely the whole race might be extirpated. It is ſuppoſed, that ſixpence a dozen the firſt year, nine-pence the ſecond, and a ſhilling the third year, would nearly reach their complete extirpation. To enforce which, it ſhould be conſidered how ſoon twelve ſparrows deſtroy twelve penny-worth of wheat.

In Kent, they uſe a ſpecies of trap, which is very effectual in taking them. It, according to Mr. Marſhall, conſiſts of a ſmall wicker baſket, reſembling the fruit-ſieve of the London markets, with a cover of the ſame material fitted to it, and formed on the principle of the fiſh-pot, and the vermin trap, into which the entrance is eaſy, but the return difficult. Theſe traps, which are an ordinary article of ſale in the markets of the diſtrict, are conſtituted of brown unpeeled oſiers. The diameter about two feet; the depth nine inches; the cover is ſomewhat diſhing, with a tunnel, or inverted cone, in the centre, reaching to within an inch of the bottom of the baſket; the aperture or entrance, formed by the points of the twigs, of which the tunnel is conſtructed, being about an inch and a half in diameter. And the uſual bait is wheat ſcattered in the baſket. The number caught at once, is frequently more than theory would ſuggeſt; the contentions of a few that have entered, ſeldom failing to bring others to the combat.

Theſe miſchievous birds, however, ſoon grow too cunning to be taken in any ſort of trap to any extent, which has a chance of extirpating and deſtroying the race; conſequently ſome more effectual and certain plan, ſuch as that ſuggeſted above, or ſome other, which is better and more fully adapted to the purpoſe, muſt be had recourſe to in order to completely exterminate them, and prevent the injury they do annually to the farmer, in the deſtruction of his wheat and other crops. Though theſe are only ſmall birds, they deſtroy vaſt quantities of grain, much more than has indeed been commonly ſuppoſed. It is ſtated to have been calculated to have amounted to a hundred ſacks of wheat, beſides the oats and barley, in the courſe of only one ſeaſon, in a townſhip of no very great extent in the north-weſtern part of the kingdom. Where rewards or ſums of money are paid for the taking or deſtroying them, no advantages are gained, except where there are ſufficiently ample and proper regulations entered into and enforced, the whole diſtrict, pariſh, or townſhip becoming partakers in the buſineſs. No languid or half meaſures will do any thing uſeful, or to the purpoſe, in this ſort of undertaking.

It is not improbable, but that theſe deſtructive birds might be greatly extirpated and thinned down in their numbers, by the uſe of ſome taſteleſs infuſion of a ſtrongly poiſonous nature, either to the ears of the grain at the time of harveſt, or to the naked grain in the winter ſeaſon, when they are extremely eager for food, as they are conſtantly found to remain hovering about houſes or other buildings, where the effects of ſuch trials might eaſily be aſcertained. If ſuch a method ſhould ſucceed, the whole race might readily, and with great facility and certainty, be exterminated.

SPARROW-*Graſs*, in *Botany*. See ASPARAGUS.

SPARROW-*Hawk*. See HAWK.

SPARROW-*Wort*, in *Botany*. See PASSERINA.

SPARRY, in *Mineralogy*, having a confuſed cryſtalline ſtructure, ſynonimous with ſpathoſe.

SPARRY *Iron Ore*, denominated alſo *brown ſpar* and *pearl ſpar*, is a mineral compoſed of the oxyd of iron combined with about thirty-five *per cent.* of carbonic acid, and a variable portion of manganeſe, lime, and magneſia. (See *Iron* ORES.) As pearl ſpar, this mineral may be claſſed among the earthy minerals. It has a white colour, paſſing by various gradations into brown, with a pearly luſtre; in the pure white ſpecimens the luſtre is brilliant. It occurs in ſmall curved rhomboidal cryſtals, which do not melt before the blow-pipe, but diſſolve with effervеſcence in muriatic acid. This mineral is generally found in veins, accompanying metallic ores, but is never worked as an ore of iron.

SPARS, in *Rural Economy*, a name often applied to thatching rods, or the ſpelks or rods by which thatch is bound on the roofs of buildings.

SPARS, in *Ship-Building*, ſmall fir-trees; called cant, which are from 33 to 35 feet long, and five hands circumference; barling, from 30 to 28 feet long, and four hands circumference; boom, from 24 to 20 feet long, and three hands circumference; middling, from 20 to 16 feet long; and ſmall, from 16 to 11 feet long.

SPARSE-LEAVES, *Sparſa folia*, among *Botaniſts*. See LEAF.

SPARTA, in *Ancient Geography*, a celebrated city of Greece, in the Peloponneſus, and the capital of Laconia. It was ſituated at the foot of mount Thornax, on the banks of the Eurotas, and to the W. of it.

According to Strabo, this city was founded by Patrocles; but the moſt common opinion attributes its origin to Leles, in the year 1516 B.C. Some maintain that it originated at Lacedæmon in the year 400 B.C. However this may be, it was known alſo by this name. However, the appellation of Spartans is applied to the inhabitants of Sparta and its territory, and that of Lacedæmonians to the inhabitants of the whole country of Laconia. (See LACONIA, and LACEDÆMONIANS.) This country was not equal in extent to Athens, containing only 48 ſtadia; but it was adorned in a very eminent degree. At firſt it had no walls, the Spartans confiding in their own valour for its defence. In proceſs of time, however, they conſtructed walls about it, when the ambition of Caſſander, and the violent aſſaults of ſome tyrants, had wearied out and almoſt exhauſted their fortitude. Pauſanias ſays, that it was fortified on occaſion of the wars of Demetrius and Pyrrhus, and he mentions in terms of high commendation ſome pieces of ſculpture, for which this city was diſtinguiſhed. Sparta was famous for a variety of public inſtitutions, among which were the ſenate of the aged, the ſenate of the conſervators of the laws, the ſenate of the ephori, and that of the magiſtrates, denominated Bidiæans. The firſt of theſe was the ſovereign tribunal of the Lacedæmonians, which regulated the affairs of the ſtate; the other ſenators were, properly ſpeaking, archons; the ephori were five, and the Bidiæans of the ſame number, whoſe province it was to direct and ſuperintend the exerciſes of the youth. The public edifices, temples, ſtatues, and monuments of Sparta, were ſo numerous and various, that we ſhould far exceed our limits in recounting them. It is not certain at what time this celebrated place was deſtroyed; but it was ſucceeded by the modern town of Miſitra, which is ſituated about four miles from ancient Sparta.

SPARTA was alſo the name of a town ſituated in the environs of the Euxine ſea. Steph. Byz.

SPARTA, in *Geography*, a poſt-town of America, in Sparta county, North Carolina; 541 miles from Waſhington.—Alſo, a poſt-town of New Jerſey, in Suſſex county; 117 miles from Philadelphia.—Alſo, a poſt-town of Hancock county, Georgia, with a court-houſe and gaol, ſituated in a fertile and populous country, and a place of conſiderable trade.

SPARTA, a poſt-townſhip of New York, in the S.W. corner of Ontario county, 25 miles S.W. of Conondaigua; bounded N. by Geneſeo and Livonia, E. by Livonia and Naples, S. by Steuben and Allegany counties, and W. by Geneſee county. It compriſes three townſhips. The alluvial lands are fine, and the territory is in general good and well ſettled, principally by emigrants from Pennſylvania. Hemp is raiſed in conſiderable quantities. In 1810 the whole population was 1397, with 65 ſenatorial electors; and the houſehold looms, of which there are 56, produced 17,772 yards of cloth. The whole number of families is 232.

SPARTACUS, in *Biography*, one of the ſcourges of Roman tyranny and cruelty, a native of Thrace, was born of very low parents, entered the army, then became a deſerter, and a robber. Being taken, he was confined as a gladiator in a receptacle at Capua for thoſe unfortunate men whoſe lives were devoted to the pleaſure of the Roman people. He eſcaped the horrid den, and placing himſelf at the head of a body of gladiators and fugitive ſlaves, he took a fortified place in the year B.C. 72, whence he made predatory excurſions throughout Campania. His force daily increaſed, and he defeated ſeveral commanders who were ſent againſt him. He marched into Ciſalpine Gaul, in order to give the ſlaves in his army, who mere moſtly Thracians and Gauls, an opportunity of returning home. Part of them, however, greedy of pillage, ſeparated themſelves from their commander, and were cut to pieces. The conſul Lentulus, upon this ſucceſs, which was extremely partial, purſued Spartacus, who turned about and gave him a total defeat; and then, in his turn, becoming the aggreſſor, he marched againſt the other conſul, Gellius, drove him from the field, and obliged him to take ſhelter in the walled towns. He retaliated the cruelty of the Romans towards the gladiators, by obliging a number of his captives to fight with each other round the funeral pyre of one of his commanders. He was now at the head of 120,000 men, and with theſe he ravaged moſt of the provinces of Italia, and ſtruck ſuch a terror at Rome, that Craſſus, at that time the man of the greateſt conſequence in the city, was ſent againſt him. He ſoon confined Spartacus in Lucania, and cut off ſome of his detachments, ſo that he would gladly have croſſed over to Sicily, but being prevented, he took poſt in a peninſula near Rhegium, where Craſſus encloſed him by a rampart drawn from ſea to ſea. Spartacus, however, found means to break through this barrier, and gain the open country, but he was here deſerted by a large body of his followers, who became the victims of Craſſus. Spartacus now retreated towards the mountains, and repulſed with loſs ſome of his purſuers. This ſucceſs was, however, his ruin; for his men inſiſted upon his return to give battle to Craſſus in the open field. Before the commencement of the engagement, Spartacus ſtabbed his horſe, exclaiming, "If I am victorious, I can eaſily get another; if vanquiſhed, I ſhall not want any." After a long conteſt, the Roman diſcipline prevailed. Spartacus, during extraordinary exertions of valour, was ſurrounded, and fell pierced with a multitude of wounds. He was unqueſtionably a brave man, and ſomething more than a courageous barbarian. He had, ſays Plutarch, not only ſtrength and elevation of mind, but a diſcernment and civility much ſuperior to his fortune. It is ſaid that his wife accompanied him into the field, pretended to the gift of prophecy, and probably inſpired him with a fanatical confidence in victory.

SPARTANBURG, in *Geography*, a diſtrict of South Carolina, containing 12,122 inhabitants, of whom 147 are ſlaves.

SPARTEL, CAPE, a cape of Morocco, W. of Tangier, being a headland, which divides the ſtraits from the Weſtern ocean. After doubling this cape, at the diſtance of 15 miles ſtands the little town of *Arzilla*; which ſee.

SPARTIANUS, ÆLIUS, in *Biography*, a Latin hiſtorian, flouriſhed in the time of Diocletian, to whom he dedicated the lives of Adrian, Ælius, Verus, Didius Julianus, Severus, and Peſcennius Niger, which, as well as his lives of Caracalla and Geta, are come down to our times. He is one of the writers of the "Hiſtoriæ Auguſtæ Scriptores," but his merits are not very great.

SPARTINA, in *Botany*, a name borrowed from *Spartum*, a kind of broom, or of hard graſs, both uſed in ancient as well as modern times, to make baſkets, cordage, &c.—Schreb. Gen. 43.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Glume ſingle-flowered, compreſſed, of two boat-like, compreſſed, keeled, converging valves; the innermoſt longeſt; the broader one ſtriated at the back, and pointed. *Cor.* ſhorter than the inner valve of the calyx, of two nearly equal, linear, compreſſed, bluntiſh valves, claſping each other, the inner one rather the longeſt. Nectary none. *Stam.* Filaments three, capillary, very ſhort; anthers linear, ſquare, ſharpiſh, cloven at the baſe. *Piſt.* Germen ſuperior, linear, acute; ſtyle thread-ſhaped, erect, longer than the ſtamens; ſtigmas two, villous. *Peric.* none, except the calyx, which enfolds the ſeed, and at length drops it. *Seed* oblong, compreſſed.

This is all the account we have found of the preſent genus, of which its author has left nothing concerning the ſpecies, whether one or more, nor its native country. Theſe points can only be aſcertained from his herbarium; and as yet *Spartina* has not been adopted by any writer that has fallen in our way, though it ſeems to have the ſanction of Schrader in his *Flora Germanica*, v. 1. 169. That author, ſo learned in graſſes, ſtrongly objects to Roth's having referred to *Spartina* by the name of *phleoides*, the *Crypſis ſchænoides* of Schrader, Lamarck, and others; as being, he ſays, widely different, both in habit and the ſtructure of its flowers. *Spartina* however does not find a place in his *Flora Germanica*, and is, therefore, perhaps not of European growth.

SPARTIUM, *σπαρτιον* of Dioſcorides, ſo called from *σπαρτη*, *a rope*, becauſe of the uſe of the long, ſlender, tough branches, or bark, in making cordage.—Linn. Gen. 368. Schreb. 487. Willd. Sp. Pl. v. 3. 926. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 254. Sm. Fl. Brit. 753. Prodr. Fl. Græc. Sibth. v. 2. 53. Gærtn. t. 153. (Geniſta; Juſſ. 353. Tourn. t. 411. Lamarck Illuſtr. t. 619. f. 1.)—Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, ſomewhat heart-ſhaped; its margin at the upper ſide very ſhort; at the lower furniſhed with five little teeth towards the extremity; coloured, ſmall. *Cor.* papilionaceous, of five petals; ſtandard inverſely heart-ſhaped, very large, entirely reflexed; wings ovate-oblong, ſhorter than the ſtandard, attached to the filaments; keel of two petals, lanceolate-oblong, longer than the wings, inſerted into the filaments, the lower edges of its petals connected by fine hairs. *Stam.* Filaments ten, combined all together at the baſe, adhering to the germen, unequal, gradually longer; the upper one very ſhort, the remaining nine in one ſet; anthers rather oblong. *Piſt.* Germen oblong, or roundiſh; ſtyle awl-ſhaped, aſcending; ſtigma united to the upper ſide of its ſummit, oblong, villous. *Peric.* Legume cylindrical, long, obtuſe, of one cell and two valves. *Seeds* ſeveral, kidney-ſhaped, ſomewhat globoſe.

Eſſ. Ch. Stigma longitudinal, villous above. Filaments monadelphous, adhering to the germen. Calyx extended downward.

The Linnæan genus of *Spartium* is, by Juſſieu, ſunk, partly in *Geniſta*, after Tournefort, and partly in *Cytiſus*. The ſpecies in the fourteenth edition of *Syſt. Veg.* are ſixteen; Willdenow has twenty-five; three of the Linnæan ones being referred to Thunberg's *Lebeckia*. They are all ſhrubby, with yellow, rarely white, ſtill more rarely purpliſh, *flowers*, and either ſimple or ternate *leaves*. One only is a native of Britain, though all the reſt are of European growth; ſixteen are enumerated amongſt our garden plants by Mr. Aiton; ſome of them bearing the open air, others requiring the ſhelter of a greenhouſe; but none of them very tender. As ſome of the others promiſe to be well worthy the notice of cultivators, and are eaſily propagated, we ſhall take a brief view of the whole, introducing one nondeſcript ſpecies, and offering a few corrections reſpecting ſome of the reſt.

Section 1. *Leaves ſimple.*

1. S. *junceum.* Spaniſh Broom. Linn. Sp. Pl. 995. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 85. Sm. Fl. Græc. Sibth. t. 671, unpubliſhed. (S. macrolobium; Renealm. Spec. 34. t. 35. Geniſta hiſpanica; Ger. Em. 1313. Geniſta; Matth. Valgr. v. 2. 574.)—Branches oppoſite, round, flowering at the extremity. Leaves lanceolate. Legume linear.—Native of the ſouth of Europe. Frequent, according to Dr. Sibthorp, on dry hills throughout Greece and the Archipelago, where it is known by the name of *σπάρτο*, being unqueſtionably the *σπαρτιον* of Dioſcorides. This ſhrub was one of the firſt exotics introduced into cultivation in England, where it is quite hardy, flowering moſt part of the ſummer, and much eſteemed for the beauty, and ſweet luſcious ſcent, of its large yellow bloſſoms. Its height is uſually ſix feet or more, and the copious, long, twiggy, tough *branches*, bearing a few elliptic-oblong *leaves*, make a ſingular appearance. The *flowers* are ſometimes double, but are not improved in beauty by that change.

2. S. *aphyllum.* Leafleſs Siberian Broom. Linn. Suppl. 320. Willd. n. 2. Pallas Voyage, v. 3. append. 742. t. V. f. 2.—Branches round, ſtraight, wand-like, ſmooth, ſubtended by very ſhort, linear-lanceolate, cloſe-preſſed, withering leaves. Petals all ſmooth. Legume ovate, with two ſeeds.—Found by Pallas in blowing ſand of the deſarts about the river Wolga, flowering in June. The *ſtems*, though ſhrubby and often ſix feet high, die down every year. They are ſlender and much branched, with a ſmall, inconſpicuous *leaf* under each branch. *Flowers* ſcattered along the ultimate branches, ſolitary, on ſhort ſtalks, ſmall, dull violet; yellowiſh at the baſe. *Legume* a quarter of an inch long, gibbous, compreſſed, ſilky, as well as the *calyx*, *flower-ſtalks*, and young *branches*.

3. S. *monoſpermum.* White ſingle-ſeeded Broom. Linn. Sp. Pl. 995. Willd. n. 3. Ait. n. 2. Curt. Mag. t. 683. (Pſeudo-ſpartum album aphyllum; Ger. Em. 1318.)—Branches round, furrowed. Cluſters lateral, of a few rather crowded flowers. Seeds ſolitary. Leaves lanceolate, ſilky, as well as the wings and keel.—Native of dry barren hills in Spain, Portugal, and Morocco. A hardy greenhouſe plant with us, flowering in June and July. The *ſtem* is five or ſix feet high, with numerous ſlender, pliant, glaucous, furrowed *branches*, bearing, while young only, a few ſimple, linear-lanceolate, obtuſe, ſilky *leaves*. *Flowers* in ſhort, lateral, denſe cluſters, white, with a dark-red ſmooth *calyx*. The *ſtandard* is ſtreaked minutely with crimſon, and ſilky at the back, about half an inch long. *Wings* and *keel* partly, but denſely, ſilky. *Seed* ſolitary.

4. S. *ſphærocarpum.* Yellow ſingle-ſeeded Broom. Linn. Mant. 571. Willd. n. 4. Ait. n. 3. (S. hypoſphærolobium; Renealm. Spec. 35. t. 33. Pſeudo-ſpartum hiſpanicum aphyllum; Ger. Em. 1318.)—Branches round, furrowed. Cluſters lateral, many-flowered, ſolitary or in pairs. Seeds ſolitary. Leaves lanceolate, downy beneath. Wings ſmooth. Keel ſomewhat ſilky.—Native of the ſouth of Europe. A greenhouſe plant, cultivated in Miller's time, flowering in June and July. Of more humble growth than the preceding, with more erect, ſtraighter *branches*, and yellow *flowers*, not half ſo large, though more numerous in each cluſter. Though the two plants are very diſtinct, their ſpecific definition is not eaſy. We agree with Mr. Curtis, as to the probability of Cluſius's wooden cuts, and conſequently thoſe of Gerarde above cited, (which are the ſame blocks as thoſe of Cluſius,) being tranſpoſed. Yet we cannot ſay they are ſo, for though the *infloreſcence* of Gerard's f. 1, applied to this yellow ſpecies, is more like the former, and *vice verſa*; the ſize of the *flowers* in f. 2 is too large for the preſent.

5. S. *triſpermum.* Yellow Three-ſeeded Broom.—Branches round, ſtriated, racemoſe. Leaves very ſhort, ſpinous-pointed. Wings ſmooth. Keel ſilky. Legume half-ovate, with three ſeeds.—Gathered on mount Ætna, by the baron Bivona, from whom we, laſt year, received ſpecimens. This is allied to the two laſt, though eſſentially diſtinct in its *fruit*, which more reſembles that of *S. aphyllum*, n. 3, but is nearly ſmooth, not ſilky, and contains three roundiſh *ſeeds*. The *flowers*, moreover, are diſpoſed as in that ſpecies, being looſely ſcattered along the young *branches*, not compoſing lateral cluſters: but they are thrice as large, yellow, and fragrant, with more oblong *petals*, and the *keel* is ſilky, in which laſt character this ſpecies agrees with *ſphærocarpum*. We have not ſeen the young *leaves*, but thoſe under the flowering branches are ſmall, thick, ſhort, furrowed, with a ſtrong ſharp point.—The figure of *Spartium*, Matth. Valgr. v. 2. 573, anſwers well to our plant, except that the *flowers* are repreſented much too ſhort, and the *legumes* too hairy, in which latter circumſtance it anſwers better to *S. purgans*, though, in other reſpects, not like that ſpecies; ſtill leſs does it reſemble the following.

6. S. *cinereum.* Grey-branched Broom. "Villars Proſpect. 40." Willd. n. 5. (Geniſta ſcoparia; Villars Dauph. v. 3. 420. Bellardi Append. ad Fl. Pedem. 34.)—Branches round, with ten furrows. Leaves lanceolate; ſilky beneath. Flowers axillary, ſolitary; their ſtalks not longer than the calyx. Keel ſilky. Legume hairy.—Native of ſunny hills in the ſouth of France and in Piedmont. The *branches* are much more leafy than in any of the foregoing. *Leaves* nearly ſeſſile, about three quarters of an inch long; ſmooth above. *Flowers* yellow, much longer than the leaves, on ſhort ſilky ſtalks. The *calyx* alſo is ſilky, deeply divided. *Keel* ſilky, eſpecially toward the lower edge. *Legume* hairy, with from three to five *ſeeds*. Gerard, from whom, as well as from Bellardi, we have ſpecimens, miſtook this plant, as many others have done, for *S. purgans*; but Willdenow well remarks, that the more erect and ſtraight *branches*, and eſpecially the ſhortneſs of the *flower-ſtalks*, diſtinguiſh it from that ſpecies. Villars thinks it may have been confounded with *S. ſcoparium*, which ſeems hardly poſſible. He conceives the figure of Matthiolus, Valgriſian edition, v. 2. 573, badly copied in Bauhin's Matthiolus, 852,

f. 1, may have been done for this plant; but it more reſembles our *triſpermum*.

7. S. *virgatum*. Long-twig'd Broom. Ait. n. 4. Willd. n. 6. (Cytiſus tener; Jacq. Coll. v. 1. 40. Ic. Rar. t. 147. Linn. Syſt. Veg. ed. 14. 667.)—Branches round, furrowed. Leaves obovate, rather ſilky. Flowers axillary, ſolitary, ſomewhat racemoſe. Petals all ſilky. Legume denſely hairy.—Found by Mr. Maſſon in Madeira, whence it came to Kew garden in 1777. It is a greenhouſe ſhrub, flowering in ſpring. The copious ſlender *branches* bear numerous alternate *leaves*, half an inch long. The *flowers* are yellow, very ſilky in every part, and form *cluſters* at the end of each branch, two or three of the lower ones only being axillary. *Legumes* lanceolate, pointed, clothed with ſhort denſe hairs, and containing three or four round *ſeeds*, which are ſeldom all perfected.

8. S. *ramoſiſſimum*. Branching African Broom. Desfont. Atlant. v. 2. 132. t. 178. Willd. n. 7.—Branches round, furrowed, ſtraight. Leaves obovato-lanceolate, villous. Flowers axillary, on ſhort ſtalks, ſomewhat whorled. Petals all ſilky.—Native of mount Atlas, near Tlemſen. A ſhrub, two or three feet high, leafleſs when old, flowering early in the ſpring. The *flowers* are yellow, erect. *Legume* not obſerved, but the *germen* is villous. *Desfont.*

9. S. *purgans*. Purging Broom. Willd. n. 8. Ait. n. 5. But not Linn. Syſt. Nat. ed. 12. v. 2. 474. (Geniſta purgans; Bulliard t. 115. G. ſive Spartium purgans; Bauh. Hiſt. v. 1. p. 2. 404.)—Branches round, furrowed. Leaves obovato-lanceolate; ſilky beneath. Flowers axillary, ſolitary; their ſtalks thrice the length of the calyx. Petals all ſmooth. Legume ſhaggy.—Native of the ſouth of France. We received it from the late Dr. Brouſſonet. The *ſtem* is woody, very much branched, and ſtrongly furrowed, not ſpinous. *Leaves* chiefly on the young branches, ſmall, ſtalked. *Flower-ſtalks* ſilky, as long as the leaves, or longer. *Calyx* partly ſilky. *Petals* yellow, ſhorter, and more rounded, than in *S. cinereum*, quite ſmooth, except the villous hairs, which knit thoſe of the keel together. *Legume* curved, denſely clothed with long ſhaggy hairs. Linnæus was really unacquainted with this ſpecies. His *Geniſta purgans*, Sp. Pl. 999, is a very ſpinous ſhrub, totally different from Bauhin's plant, and may be *S. ſcorpius*. His *S. purgans*, adopted from Gerard in the 12th edition of Syſt. Nat. is our *cinereum*, n. 6; yet we do not judge it right to interchange the ſynonyms, merely to countenance, ſtill leſs to conceal, a blunder of our great maſter, or of his learned correſpondent, Gerard. The two plants can never again be confounded.

10. S. *umbellatum*. Umbellate Broom. Desfont. Atlant. v. 2. 133. t. 180. Willd. n. 9. Ait. n. 6.—Branches round, ſtriated, leafy. Flowers capitate. Corolla ſilky, as well as the legume, and lanceolate leaves.—Native of the ſea-coaſt of Barbary. Sent to Kew by the late Dr. Brouſſonet. It is a greenhouſe ſhrub, flowering from April to June, very much branched, and readily known by its yellow, ſilky, capitate, rather than umbellate, *flowers*. *Legume* oblong, compreſſed, denſely villous, containing from three to five *ſeeds*. The *leaves* are often ternate, ſo that this ſpecies ought rather to ſtand in the next ſection, near *linifolium*.

11. S. *Scorpius*. Scorpion Broom. Linn. Sp. Pl. 995. Willd. n. 10. Ait. n. 7. Prodr. Fl. Græc. n. 1644. (Geniſta purgans; Linn. Sp. Pl. 999? G. ſpinoſa minor; Ger. Em. 1319. Aſpalathus alter tertius; Cluſ. Hiſt. v. 1. 106.)—Branches round, ſtriated, ſpreading, ſpinous. Flower-ſtalks axillary, aggregate. Leaves oblong, hairy, with a ſpinous point.—Native of Spain, the ſouth of France, Greece, and the Archipelago. Each of the *branches* ends in a ſharp thorn, and the young ones ſpread horizontally. The *leaves* are ſmall, oblong or obovate, looſely covered on both ſides with ſilky hairs. *Flowers* yellow, their ſtalks about as long as the leaves, and ſituated, like them, on the young branches only. We know nothing of the *legume*. Lamarck ſays it is ſmooth. The modern Greeks call this plant Αϛάνα.

12. S. *aſpalathoides*. Tubercular Thorny Broom. Deſfont. Atlant. v. 2. 136. Willd. n. 11. (Geniſta aſpalathoides; Lamarck Dict. v. 2. 620.)—Branches angular, tuberculated, ſpinous. Flower-ſtalks axillary, aggregate. Leaves linear-lanceolate, ſilky, unarmed.—Diſcovered by Poiret, on the coaſt of Barbary, near Tunis. The *ſtem* is much branched, two or three feet high; the *branches* beſet with ſcattered tubercles, and ending in ſharp thorns. *Leaves* in ſmall tufts upon the tubercles; alternate on the young ſhoots; ſmall, narrow, covered with ſhort, depreſſed, ſilky hairs. *Flowers* twice the ſize of the laſt, pale yellow, axillary, ſtalked, two or more together; their *ſtalks*, *calyx*, and *corolla* ſilky. *Germen* covered with white hairs.

Section 2. *Leaves moſtly ternate.*

13. S. *multiflorum*. Portugal White Broom. Ait. n. 8. Willd. n. 12. (S. album; Desfont. Atlant. v. 2. 132. S. diſpermum; Willd. in Rom. and Uſt. Mag. faſc. 11. 35. t. 2. Geniſta alba; Tabern. Kreuterb. 1509.)—Leaves ternate or ſimple, elliptic-lanceolate, ſilky. Branches ſtraight, ſtriated, covered with flowers. Legume ſilky, with two ſeeds.—Native of Portugal and Barbary. A hardy ſhrub in our gardens, flowering in May. The *ſtem* is from four to ſix feet high, with copious, erect, long, ſtraight, wand-like *branches*, covered from top to bottom with elegant, ſnow-white, ſtalked, axillary *flowers*. The *leaves* are but ſeldom ternate. The *legume* is ovate-oblong, compreſſed, dark brown, clothed with whitiſh hairs.

14. S. *angulatum*. Angular-branched Broom. Linn. Sp. Pl. 996. Willd. n. 13. Ait. n. 9. Sm. Fl. Græc. Sibth. t. 672, unpubliſhed. (S. parviflorum; Venten. Cels. t. 87.)—Leaves moſtly ternate, linear-oblong. Branches with ſix angles. Flowers terminal, racemoſe. Legume elliptical, acute at each end, with one or two ſeeds.—Native of the Levant. Hardy with us, flowering in May and June. Its aſpect is that of a Melilot, but the *ſtem* is ſhrubby, with numerous ſtraight upright *branches*, marked with three decurrent angles from the inſertion of each leaf. The *leaflets* are more or leſs obtuſe, nearly equal, ſlightly hoary, not an inch long. *Flowers* ſmall, yellow, numerous, compoſing long, ſolitary cluſters, at the end of each branch. *Legumes* pendulous, ſlightly hairy, compreſſed, thick-edged, three quarters of an inch long, having an annular appearance at each ſide from the projection of the uſually ſolitary *ſeed*.

15. S. *perſicum*. Perſian Broom. Willd. n. 14. (Cytiſus perſicus; Burm. Ind. 163. t. 51. f. 1.)—Leaves ternate, linear-lanceolate, ſtalked; the middle leaflet twice as large as the others. Branches divaricated, roundiſh. Flowers terminal, racemoſe.—Native of Perſia. A ſmall ſpecies, whoſe genus ſeems uncertain, and of which neither we nor Willdenow have ſeen any ſpecimen. There appears, however, ſome affinity between it and the laſt. The *flowers* evidently compoſe terminal cluſters. The *branches*, *ſtalks*, and *calyx* are downy.

16. S. *patens*. Woolly-podded Broom. Linn. Syſt. Veg. ed. 13. 535. Willd. n. 15. Ait. n. 10, excluding the ſynonym of Cavanilles. (Cytiſus patens; Linn. Syſt. Veg. ed. 13. 555. C. pendulinus; Linn. Suppl. 328. C. luſitanicus, medicæ folio, floribus in foliorum alis; Tourn.

Inſt. 648.)—Leaves ternate, ſtalked, obovate. Branches round, ſtriated. Flowers lateral, drooping. Calyx two-lipped, broad, ſilky. Germen very woolly.—Native of Portugal and Spain. Hardy in our gardens, flowering in June and July. The *branches* ſpread widely, and are clothed with numerous, ſtalked, ſilky *leaves*, uſually ſhorter than the large, tumid, pendulous, yellow *flowers*, which are moſtly ſolitary, ſometimes in pairs, by the ſide of each tuft of leaves, on ſimple ſilky ſtalks. The *calyx* is deeply divided, ſhallow, ſpreading widely, beſprinkled with ſilky hairs. *Petals* very large, ſmooth, rounded and obtuſe. *Germen* clothed with extremely long, woolly hairs, and ſheathed in the permanent *ſtamens*, but at length becoming an oblong, compreſſed, wavy, very hairy *legume*, containing ſeveral *ſeeds*. Whatever the plant of Cavanilles' Icones, t. 176, may be, its unequal *leaflets*, terminal corymboſe *infloreſcence*, long ſlender *calyx*, and ſmooth *germen*, are all ſo totally unlike the preſent ſpecies, that we wonder how even the moſt caſual peruſal of its name could cauſe it to be quoted by Willdenow for ſuch.

17. S. *nubigena*. Cluſter-flowered White Broom. Ait. ed. 1. v. 3. 13. ed. 2. n. 11. Willd. n. 16. (S. ſupranubium; Maſſon in Linn. Suppl. 319.)—Leaves ternate, ſtalked, lanceolate, hairy. Branches round, furrowed. Flowers lateral, aggregate. Upper lip of the calyx abrupt. Germen ſmooth.—Diſcovered by Mr. Maſſon, very high on the peak of Teneriffe, above the clouds, as he meant to expreſs in the ſpecific name. It is a greenhouſe plant at Kew, flowering moſt part of the ſummer. The buſhy *ſtem*, with its copious furrowed *branches*, much reſembles *S. junceum*, but the *leaves* are ternate, ſmall, and the *flowers* very much ſmaller than in that ſpecies, white and fragrant, ranged in lateral tufts along the branches, on ſilky ſtalks. The *calyx* is hairy or ſilky, cup-ſhaped; its lower lip elongated; upper ſhort and abrupt. *Legume* an inch and a half, or two inches long, curved, compreſſed, wavy, quite ſmooth.

18. S. *biflorum*. Two-flowered Terminal Broom. Desfont. Atlant. v. 2. 133. t. 179. Willd. n. 17.—Leaves ternate, linear-lanceolate, ſtalked, ſomewhat hairy. Flowers terminal, often in pairs. Calyx villous, its lips nearly equal. Legume ſmooth.—Native of mount Atlas, near Tlemſen. *Stem* buſhy, from one to two feet high, with ſlender, angular, leafy branches. *Leaves* ſmall, ſtalked, rather ſilky. *Flowers* yellow, erect, one, two, or three at the ſummit of each branch, rather ſmaller than thoſe of the common *S. ſcoparium*.

19. S. *linifolium*. Flax-leaved Broom. Desfont. Atlant. v. 2. 134. t. 181. Willd. n. 18. Ait. n. 12. (Geniſta linifolia; Linn. Sp. Pl. 997. Curt. Mag. t. 442. G. tinctoria hiſpanica; Cluſ. Hiſt. v. 1. 101. Geniſtella infectoria; Ger. Em. 1316.)—Leaves ſeſſile, ternate, linear-lanceolate, revolute; ſilky beneath. Cluſters terminal. Branches angular, furrowed.—Native of Barbary, Spain, and the ſouth of France. A hardy greenhouſe plant in England, flowering moſt plentifully in May and June. The *ſtem* is ſhrubby, much branched, and very leafy. *Leaves* about an inch long, rendered very beautiful by the ſilvery ſilkineſs of their under ſide, in which they agree with the *calyx* and young *branches*. *Flowers* of a beautiful golden yellow, in denſe tufted cluſters. *Legume* ſhort and broad, clothed with ſhaggy hairs. *S. umbellatum*, n. 10, having frequently many ternate *leaves*, and agreeing nearly with the preſent ſpecies in habit, *legume*, and *infloreſcence*, would perhaps have been better placed here.

26. S. *ſcoparium*. Common Broom. Linn. Sp. Pl. 996. Willd. n. 19. Fl. Brit. n. 1. Engl. Bot. t. 1339. Curt. Lond. faſc. 5. t. 52. Woodv. Med. Bot. t. 89. Fl. Dan. t. 313. Dreves Bilderb. t. 48. Ehrh. Arb. 56. (Geniſta; Ger. Em. 1311.)—Leaves chiefly ternate, ſtalked, obovate. Branches angular. Flowers lateral, ſolitary. Calyx two-lipped, broad, ſmooth. Legume fringed.—Common on ſandy or gravelly dry hills, principally in the north or middle of Europe. Abundant in Britain, flowering copiouſly in May and June, when it makes a highly ornamental appearance. The *ſtem* is very buſhy, from three to eight feet in height, with innumerable, aſcending, angular, ſmooth, evergreen twigs. *Leaves* deciduous, ſmooth or ſomewhat hairy; the upper ones generally ſimple. *Flowers* axillary, looſely pendulous, ſolitary, on long ſtalks, large, uſually of a golden yellow; ſometimes orange at the outſide; very rarely of a pale uniform lemon-colour: their *petals* ſpread widely in hot ſunny weather. *Calyx* bell-ſhaped, ſmooth, glaucous and purpliſh, with two widely-ſpreading lips, whoſe teeth are minute and downy. *Legume* compreſſed, two inches long, ſmooth, fringed at the margin with denſe deciduous hairs. *Seeds* numerous.

21. S. *arboreum*. Tree Broom. Desfont. Atlant. v. 2. 131. t. 177. Willd. n. 20. (Cytiſus foliis ſubrotundis glabris, floribus amplis glomeratis pendulis; Shaw Phyt. Afr. n. 191.)—Leaves ternate, ſtalked, obovate. Branches round, furrowed. Flowers lateral, aggregate, drooping. Calyx two-lipped, ſpreading. Legume ſilky, with cloſe-preſſed hairs.—Found by profeſſor Desfontaines on mount Atlas, and in vallies near Algiers. From eight to twelve feet high, with a *trunk* often as thick as the arm. It ſeems akin to the laſt, but more to *S. patens*, n. 16, of which Desfontaines ſuſpected it might be a variety. Their *foliage* indeed appears much the ſame, but the *flowers* of the preſent are more aggregate. The *legume* however ſeems to afford the moſt certain ſpecific difference, being twice as long as that of the *patens*, and covered with depreſſed ſilky hairs, not long and ſhaggy ones. Nothing is mentioned of the pubeſcence of the *calyx*, nor have we ſeen a ſpecimen: but its teeth are repreſented like thoſe of *patens*, much more conſpicuous than in *ſcoparium*.

22. S. *radiatum*. Starry Broom. Linn. Sp. Pl. 996. Willd. n. 21. Ait. n. 14. (S. ramis oppoſitis angulatis, foliis oppoſitis ſubulatis; Mill. Ic. v. 2. 173. t. 259. S. minimum montanum triphyllum; Column. Ecphr. 295. t. 294. f. 2. Geniſta radiata, ſive ſtellaris; Bauh. Hiſt. v. 1. p. 2. 399.)—Leaves ternate, oppoſite, linear; with ſhort, dilated, permanent footſtalks. Branches oppoſite or aggregate, angular. Cluſters capitate, terminal. Legume ovate, hairy.—Native of Italy and Carniola. Hardy with us, in mild winters at leaſt. Flowering in June and July. The great abundance of naked radiating *branches*, crowned with tufts of handſome yellow *flowers*, readily diſtinguiſh this ſpecies. The broad, ſhort, permanent, concave *footſtalks*, hardening into ſpinous-tipped ſcales, under the branches, are very remarkable. The linear ſilky *leaves*, being oppoſite and ternate, look as if whorled. The *calyx* is tubular, ſilky as well as the *keel*. *Legume* ſhort, broadly ovate, pointed, covered with long ſilky hairs, and containing ſeveral ſmall *ſeeds*.

23. S. *ferox*. Sharp-thorned Broom. Desfont. Atlant. v. 2. 136. t. 182. Willd. n. 22. Ait. n. 15. (Cytiſus foliis oblongis ſeſſilibus glabris, ſiliquis compreſſis incanis; Shaw Phyt. Afric. n. 194.)—Leaves partly ternate, elliptic-oblong, pointed. Branches ſtriated, with ſpinous points. Cluſters terminal. Legume linear, hoary.—Native of Barbary. The *ſtem* is three or four feet high, with numerous ſtraight leafy *branches*, which, after bearing each a terminal *ſpike*,

ſpike, or *cluſter*, of yellow *flowers*, become very ſharp thorns. The *leaves* are moſt of them ſimple, on ſhort ſtalks, nearly ſmooth; ſome of the lower ones ternate. *Corolla* ſmooth, oblong and ſlender, ſomewhat like *Geniſta tinctoria*. *Calyx* elongated. *Germen* ſilvery. *Legume* about an inch and a half long, linear, ſlightly curved, clothed with ſhort, cloſe-preſſed, hoary hairs. *Seeds* numerous.

24. S. *ſpinoſum*. Prickly Broom. Linn. Sp. Pl. 997. Willd. n. 23. Ait. n. 16. Desfont. Atlant. v. 2. 135. (Acacia altera Dioſcoridis; Lob. Ic. v. 2. 95. A. altera trifolia; Ger. Em. 1330. A. altera; Matth. Valgr. v. 1. 176.)—Leaves ternate, ſtalked, obovate. Flowers axillary. Calyx ſmooth. Branches ſtriated, with alternate, ſpreading, angular, furrowed thorns. Legume oblong, ſmooth.—Native of Italy, Spain, and Barbary. Gerarde appears to have cultivated it in 1596, and it is marked by Mr. Aiton, as a greenhouſe ſhrub, flowering in June and July; but we have ſeldom met with it in collections. The whole buſh is armed with very ſtrong, long and ſharp *thorns*, ſpreading in every direction. *Leaves* on long ſtalks, each of three equal, broadiſh-obovate, ſometimes emarginate, leaflets; rather hairy beneath. *Flowers* half the ſize of *S. ſcoparium*, ſolitary or aggregate, ſtalked. *Calyx* membranous, with obſolete teeth. *Legume* pendulous, compreſſed, thick-edged, ſlightly tumid, ſmooth, an inch and a half long, with from two to four *ſeeds*.

25. S. *villoſum*. Hairy-podded Thorny Broom. Vahl Symb. v. 2. 80. Willd. n. 24. Sm. Fl. Græc. Sibth. t. 673, unpubliſhed. (S. lanigerum; Desfont. Atlant. v. 2. 135. Cytiſus ſpinoſus creticus, ſiliquâ villis denſiſſimis longiſſimis et incanis obductâ; Tourn. Cor. 44.)—Leaves ternate, ſtalked, obovate. Flowers axillary. Calyx hairy. Branches furrowed, ſpinous, downy. Legume linear-oblong, very hairy.—Native of Gibraltar, Barbary, and Crete. Dr. Sibthorp found it every where in Greece and the iſles of the Archipelago, where it is known by the names of ασπᾶλαλος, or ασπάλαθεια, and he judged it to be the ασπαλαθος of Dioſcorides. This ſpecies flowers in its native country in April. We have never met with a garden ſpecimen. The habit of the whole plant is like the laſt, but the *ſpines* are all terminations of *branches*, which are finely downy, and neatly ſtriated. In the *flowers* we ſcarcely obſerve a difference, except the denſe hairineſs of the *calyx*; but the *germen* is exceſſively hairy, and the *legume* differs eſſentially in its narrower, more linear, form, and its denſe cloathing, of long ſhaggy hairs.

26. S. *horridum*. Many-thorned Broom. Vahl Symb. v. 1. 51. Willd. n. 25. Sm. Fl. Græc. Sibth. t. 674, unpubliſhed.—Leaves ternate, linear, folded, ſilky. Branches oppoſite, aggregate, furrowed, ſpinous. Flowers lateral. Legume ovate, hairy as well as the calyx.—Native of Spain, as well as of hills in Greece and the Archipelago. This is a very denſely branched *ſhrub*, like a furze buſh, beſet with innumerable, thorny, cluſtered, ſomewhat hairy, *branches*, bearing a very few and ſmall *leaves*. The *flowers* are yellow, but half the ſize of the laſt, placed two or three on each young branch, near its point. *Calyx* pale, two-lipped, hairy, as well as the *keel*, and little, tawny, ovate or rhomboid, pointed *legume*, which ſcarcely contains more than one ſeed.

The *S. complicatum*, Linn. Sp. Pl. 996, is now *Cytiſus divaricatus*, Willd. Sp. Pl. v. 3. 1119. Ait. Hort. Kew. v. 4. 319. Curt. Mag. t. 1387. Sm. Fl. Græc. Sibth. t. 704, unpubliſhed.—*Cytiſus* differs from *Spartium* in having the *filaments* ſeparated to the very bottom, into two diſtinct ſets, and the *germen* ſtalked. There is a general reſemblance in habit between ſome of the ſpecies to each other. More difficulty exiſts in diſtinguiſhing *Spartium* and *Geniſta*; the latter being characterized chiefly by the depreſſion of its organs of impregnation along with the *keel*, while the *ſtandard* is ſtrongly divaricated. The involute *ſtigma*, and the *ſtamens* not being attached to the *germen*, are leſs obvious diſtinctions. See Genista.

Three Linnæan ſpecies of *Spartium*, as we have already hinted, named *contaminatum*, *ſepiarium*, and *cytiſoides*, with one from the firſt edition of Aiton, *ſericeum*, all natives of the Cape of Good Hope, are removed by Thunberg from hence, and eſtabliſhed, with four other ſhrubs from the ſame country, as a diſtinct genus, named Lebeckia, in Thunberg's *Prodromus*, and in Willd. Sp. Pl. v. 3. 946. Ait. Hort. Kew. v. 4. 261. This ranges next after *Geniſta*, and is defined as follows.

Eſſ. Ch. Calyx in five deep acute ſegments, with rounded ſinuſes. Filaments monadelphous. Legume cylindrical, with many ſeeds.

Section 1. *Leaves ſimple.*

1. L. *contaminata*. Narrow-leaved Lebeckia. Willd. n. 1. Ait. n. 1. (Spartium contaminatum; Linn. Mant. 268.)—Leaves ſimple, linear-thread-ſhaped, ſmooth, ſtained at the baſe. Flowers racemoſe.—Native of ſandy ground at the Cape. *Stem* ſhrubby, branched, ſmooth and round. *Leaves* alternate, an inch and a half or two inches long, acute, glaucous; flattiſh above; purple at the baſe. *Flowers* in a long, ſimple, terminal *cluſter*, orange-coloured, with a yellow *keel*. The *ſtamens* are deſcribed as all equally combined. We know not by what accident Thunberg calls the *flowers* umbellate, which Willdenow copies, in direct contradiction to the Linnæan deſcription ſubjoined.

2. L. *ſepiaria*. Capillary Lebeckia. Willd. n. 2. (Spartium ſepiarium; Linn. Sp. Pl. 995. Lathyroides, vel lathyris congener, linariæ foliis, æthiopicum; Pluk. Mant. 114. Amalth. t. 424. f. 1. Yellow Cape Broom, with fennel leaves; Petiv. Gazoph. t. 83. f. 3.)—Leaves ſimple, capillary, ſmooth. Flowers racemoſe.—Native of the Cape, like all the reſt of the ſpecies. This has more copious, longer, and much ſlenderer *leaves* than the foregoing, with larger *flowers*, whoſe tenth *ſtamen* is ſeparated, in its upper part at leaſt, from the reſt.

3. L. *pungens*. Spinous Downy Lebeckia. Thunb. Prodr. 122. Willd. n. 3.—"Leaves ſimple, obovate. Branches downy, all becoming ſpinous at the end. Flowers ſolitary."

Section 2. *Leaves ternate.*

4. L. *armata*. Thorny Grey Lebeckia. Thunb. Prodr. 122. Willd. n. 4.—"Leaves ternate. Branches hoary, round, becoming thorny. Flowers racemoſe."

5. L. *denſa*. Denſe-leaved Lebeckia. Thunb. Prodr. 122. Willd. n. 5.—"Leaves ternate, villous; leaflets convolute, oblong. Flowers racemoſe, diſtant."

6. L. *humilis*. Dwarf Lebeckia. Thunb. Prodr. 122. Willd. n. 6.—"Leaves ternate, villous; leaflets linear-oblong. Flowers racemoſe, reflexed. Branches incurved."

7. L. *ſericea*. Silky Lebeckia. Thunb. Prodr. 122. Willd. n. 7. Ait. n. 2. (Spartium ſericeum; Ait. ed. 1. v. 3. 12.)—"Leaves ternate, ſilky; leaflets linear. Flowers racemoſe. Branches angular."—Sent by Mr. Maſſon to Kew, in 1774. It flowers in the greenhouſe, in April.

8. L. *cytiſoides*. Cytiſus-leaved Lebeckia. Willd. n. 8. Ait. n. 3. (Spartium cytiſoides; Linn. Suppl. 320. Ebenus capenſis; Linn. Mant. 264. Trifolium africanum fruticans, folio anguſtiore, flore rubicante; Commel. Hort. v. 2. 213. t. 107.)—Leaves ternate, ſilky; leaflets linear-lanceolate. Flowers racemoſe. Branches round.—Communicated by Thunberg to Linnæus. Maſſon ſent it from the Cape to

Kew garden in 1774, where it flowers in the greenhouſe, in April. We preſume this to be nearly akin to the laſt. The *leaves* in the original ſpecimen are ſilky, not villous; each *leaflet* above an inch long. *Flowers* large, in terminal ſolitary *cluſters*. *Calyx* bell-ſhaped, ſmooth, coloured. *Petals* reddiſh. *Legume* long, with the rudiments of many *ſeeds*, only one of which is ſaid to come to perfection.

Spartium, in *Gardening*, contains plants of the deciduous and evergreen kinds, among which the ſpecies cultivated are the common broom (S. ſcoparium); the Spaniſh broom (S. junceum); the ſtarry broom (S. radiatum); the white-flowered ſingle-ſeeded broom (S. monoſpermum); the yellow-flowered ſingle-ſeeded broom (S. ſphærocarpum); the ſcorpion broom (S. ſcorpius); the angular-branched broom (S. angulatum); and the prickly broom (S. ſpinoſum).

In the firſt ſpecies there are ſeveral varieties, ſome of which merit a place among flowering ſhrubs; as that with a purple calyx, and the flowers ſtrongly tinged with orange, as well as that which is very hoary.

The ſecond ſpecies has alſo a variety with double flowers.

Method of Culture.—The three firſt ſorts are hardy, but the others more tender, eſpecially in their young growth. And they are all capable of being raiſed from ſeeds, and the double-bloſſomed ſorts alſo by layers and cuttings. The ſeeds ſhould be ſown in the early ſpring, as about April; the hardy ſorts in beds of common earth, either in drills, or by bedding in to the depth of an inch: but in the tender ſorts, in pots or beds hooped over to protect them in froſty weather. In the following ſpring they ſhould be removed into nurſery-rows or larger pots, according to the kinds, ſhortening their tap-roots, and ſetting them out in rows two feet apart, at the diſtance of one in the rows, to remain two or three years, when they may be planted out in the ſhrubbery, or other places where they may be wanted: the tender ſorts in pots, being removed to the greenhouſe or garden for protection in winter, and managed as the hardy ſorts of plants of this kind.

But the layers ſhould be laid down in the autumn or ſpring, and the cuttings may be planted out in the ſpring or ſummer, ſome in the open ground, and others in pots plunged in the hot-bed, to promote their ſtriking root. They may be managed afterwards as the other ſorts. This is the only certain mode of preſerving the varieties.

All the hardy ſorts are very ornamental in the borders, clumps, and other parts, and the tender kinds in greenhouſe collections, and among other more hardy potted plants.

It is conſtantly proper, as a precautionary practice, to have ſome of the tender ſorts of theſe plants always in pots, under the greenhouſe management, with the view of more certainly preſerving them, in caſe thoſe which are planted out in the ſhrubberies or other parts of the open grounds ſhould ſuffer much or be wholly deſtroyed by the too great ſeverity of very ſevere winter ſeaſons. And as the long roots of the plants which are naked or but thinly ſet with fibres, are not unfrequently diſpoſed to run downwards with a long tap-root, they ſhould be planted out when young as much as poſſible where they are to remain and grow, as they do not ſucceed well, where they are tranſplanted or removed into a new ſituation when of a large or old growth.

Spartium *Scoparium*, *Common Broom*, in the *Materia Medica*. The tops and ſeeds are directed for uſe: the tops and leaves have a nauſeous bitter taſte, imparted by infuſion both to water and ſpirit. They are commended for their purgative and diuretic qualities, and have therefore been ſucceſsfully employed in hydropic caſes. Dr. Cullen ordered half an ounce of freſh broom-tops to be boiled in a pound of water till one half of this is conſumed, and gave of this decoction two table-ſpoonfuls every hour, till it operated by ſtool, or till the whole was taken. It ſeldom failed, he ſays, to operate both by ſtool and urine; and by repeating this exhibition every day, or every ſecond day, ſome dropſies have been cured. It is affirmed, that a patient, by taking half a pint of a decoction of green broom-tops, with a ſpoonful of whole muſtard-ſeed, every morning and evening, was cured, after being tapped three times, and trying the uſual remedies given in dropſies. The aſhes of broom have alſo been much uſed in dropſies, and principally on the authority of Sydenham, whoſe account of their good effects has been confirmed by the teſtimony of Dr. Monro, who gave a drachm divided into three doſes every day, and by other writers; the efficacy of this medicine depending entirely upon the alkaline ſalt, and not at all upon the vegetable from which it is obtained. The ſeeds and flowers of broom are ſaid to be emetic and cathartic; but the evidence upon which this aſſertion reſts is not wholly to be relied upon, as the former, when roaſted, have been uſed as a ſubſtitute for coffee, and the latter employed as a pickle. Ray informs us, from the MS. of Dr. Hulſe, that the flor. geniſt. given in the form of electuary, with honey of roſes, were found very efficacious in ſcrophulous affections. Woodv. Med. Bot.

SPARTOPOLIAS Lapis, in *Natural Hiſtory*, a name given by ſome authors to a whitiſh agate, variegated with long and ſlender ſtreaks of grey, diſpoſed in a variouſly undulated order, and reſembling grey hairs.

SPARUS, in *Ichthyology*, a genus of fiſhes of the order Thoracici, of which the generic character is; teeth generally ſtrong; the grinders ſomewhat obtuſe and crowded; the lips are doubled; gill-membrane five-rayed; the cover ſcaly; the body compreſſed; the lateral line curved on the hind part; the pectoral fins are rounded.

The name *ſparus* is of Greek origin, being derived from the verb σπαιρειν, *to palpitate* or *tremble*; and was given to this fiſh from its remarkable quality of trembling or palpitating all over the body, as ſoon as taken out of the water.

There are, according to Gmelin, about forty ſpecies, ſeparated into diviſions, and claſſed according to their colours; but Dr. Shaw has enumerated nearly four times that number. The greater number of ſpecies being exotic, little is known of their hiſtory; they are evidently allied to the Labri. See Labrus.

Species.

§ A. *Marked with a black Spot.*

*Auratus; or Lunated Gilt-head. The ſpecific character of this is, that between the eyes there is a ſemilunar ſpot. The general length of this fiſh is about fifteen inches; but occaſionally it is found of a far larger ſize: the body is broad and thin; the back riſing into a carina. Dr. Shaw gives the ſpecific character as ſilvery-blueiſh, with gold-coloured brows, and a purple ſpot beyond each ſide the head; but ſometimes, he ſays, with the addition of ſeveral browniſh longitudinal ſtripes. It is a native of the Mediterranean, Atlantic, and Indian ſeas, and held in conſiderable eſtimation as food. It was much admired by the ancient Greeks and Romans; by the former it was conſecrated to Venus. It feeds on ſhell-fiſh, which it grinds with its ſtrong teeth before it ſwallows. It is ſometimes found of the weight of eight or even ten pounds.

Annularis. Yellowiſh, with a black ocellate ſpot near the tail. This is found chiefly in the Adriatic. The colour of this ſpecies reſembles that of the common perch: at a certain diſtance from the baſe of the tail a round black ſpot is ſituated at the bottom of the laſt duſky bar of the body; the pectoral fins and tail are red, the reſt blackiſh. Native of the Mediterranean, and not at all in eſteem for the table.

Sargus. The body of this is marked with black bands, and a black ocellate ſpot near the tail. It inhabits the ſouthern coaſts of Europe. The body is oval, broad; the teeth are equal, obtuſe; and the tail forked. It is nearly of the ſize of the auratus, and the ſhape very like that, but deeper in proportion. It is much eſteemed as food.

Melanurus. Body with longitudinal lines and a black ocellate ſpot near the tail. This ſpecies is found in the ſouthern European ſeas. It is deſcribed by Shaw as ſilvery, with a blue back; the ſides have a ſtripe, ſpotted longitudinally with brown, and a black ſpot at the baſe of the tail.

Smaris. A black ocellate ſpot on each ſide; pectoral fins and tail red. It inhabits the Mediterranean.

Mœna. Body variegated; a blackiſh ſpot on each ſide. This is alſo found in the Mediterranean.

Saxatilis. Body whitiſh; a black ocellate ſpot at the baſe of the tail. This is found on the coaſts of Surinam. The ſnout is depreſſed; and the tail rounded.

Orphus. A black ocellate ſpot at the tail; the head is reddiſh; the tail is entire.

Punctata. Mouth cuſpidate; the tail entire; in colour it is partly black. It inhabits the ſhores of Sardinia. In ſize and colour it is nearly allied to the S. ſargus.

Argentatus. This has a black ſpot behind the gills. It is found on the coaſts of Japan; is ſix inches long; the body is covered with ſilvery ſcales; before the eyes are two noſtrils.

Notatus. Dorſal fin divided; the gill-covers and tail ſpotted with black. It is found at Japan. The head is coated with ſilvery ſcales, nearly as long as the fingers.

§ B. *Body moſtly red.*

Erythrinus. The tail of this fiſh is nearly entire; the body red. It inhabits the European, American, and Japan ſeas. It is often eaten, but is not held in any great eſtimation; and it has ſometimes proved poiſonous: the iris is ſilvery.

Insidiator. Body red, yellowiſh at the ſides; tail a little forked. It inhabits the Indian ocean; is about ten inches long; catches aquatic inſects, like the Chætodon roſtratus, with its ſnout, which it can lengthen out into a tube; the body is rather broad, fat, coated with large ſcales of a metallic-green colour at the edge; when dead it becomes brown; the fleſh is eatable. It is deſcribed as having a compreſſed head, and ſcaly; the eyes are lateral; jaws divided, each with two large ſtraight conic teeth in the middle; gill-covers very entire; firſt lateral line nearer the back, beginning at the end of the dorſal fin, the other ſtraight; the vent is nearly in the middle; the fins are yellowiſh; the dorſal and anal fins are marked with green bands; the laſt ray but one of the anal is very long.

* Formosus. Red; longitudinal marks on the body and tip of the tail blue. This fiſh is figured in Dr. Shaw's Naturaliſt's Miſcellany, and he ſuſpected that it was a Britiſh fiſh; hence it is marked with an aſteriſk. The fore-part of the dorſal, and edge of the anal fins, are blue.

* Pagrus; the Red Gilt-head. This is reddiſh; the ſkin, at the end of the dorſal and anal fins, gathered up, and hiding the laſt rays. It is found in the European ſeas. In ſhape, teeth, and ſize, it reſembles S. auratus. The iris is ſilvery; inſides of the gill-covers, mouth, and tongue, are of a fine red; at the baſe of the pectoral fins is a ferruginous ſpot; the ſcales are large; and the tail is forked.

Spinifer. Dorſal ſpines recumbent; the five middle ones filiform and longer. This inhabits the muddy deeps of the Red ſea; is about a ſpan and a half long. The body is ſilvery, but with a reddiſh hue; the back is marked with darker lines; the ſcales are broad, very entire, obſcurely ſtreaked, and the fleſh is reckoned excellent.

Palpebratus. This is of a cheſnut-red; the eyes are of a pale yellow, covered with a looſe yellowiſh membrane. This is found on the coaſts of Amboina. It reſembles a perch; but the head is more obtuſe.

§ C. *Body marked with Lines.*

Boops. Longitudinal lines duſky; the four lower ones are gold and ſilvery. It inhabits the ſea round Japan.

Cantharus. The tail is without ſpots; the body is marked with longitudinal lines. It inhabits the coaſt of Tuſcany. The iris is ſilvery.

Chromis. The tail is bifid; the ſecond ray of the ventral fin is ſetaceous. It inhabits ſouthern Europe.

Salpa. Tail bifid; the body is marked with eleven tawny longitudinal lines. It is found in the Mediterranean.

Sarba. This is of an oblong oval ſhape, ſilvery, with numerous obſolete ſtripes; the ventral fins are yellow, with a golden line on each ſide near them. It inhabits the Mediterranean, and along the coaſts of Arabia. The body is broad, and covered with broad entire ſcales; there are ſeventeen longitudinal browniſh ſtripes on each ſide; the fleſh is reckoned pleaſant.

Synagris. The tail is bifid, red; the body is purpliſh, with ſeven gold lines on each ſide. It inhabits South America.

Rhomboides. The tail is entire; the back is caniculate; the body with yellow lines. It inhabits America, and is there called the ſalt-water bream. The teeth are obtuſe; between the roots of the pectoral and dorſal fins a black ſpot; the ventral, anal, and caudal fins are tawny.

Latus. Yellowiſh; the head is ſilvery; the ſcales longitudinally imbricate. It inhabits about the coaſts of Japan; is three inches long, and one and a half broad.

Virgatus. The tail is forked; the body is depreſſed, oblong, ſtriped with ſcales. This is found on the coaſt of Japan.

Haffara. Silvery, with fourteen obſolete yellowiſh-brown lines on each ſide; the tail is bifid. It inhabits the muddy ſhores of Arabia; is about a ſpan long; and the fleſh is reckoned good.

Berda. Whitiſh-aſh; lateral ſcales with each a tranſverſe brown band in the middle; the dorſal ſpines are recumbent. It is found in the Red ſea. The body is oval; the back is gibbous, with obſolete bands; beneath it is white; the ſcales are broad, round, and entire.

Chilensis. The tail is bifid; the body is marked with tranſverſe brown lines on each ſide. It inhabits, as its ſpecific name denotes, Chili, in South America. It grows to full ſix feet long; in ſhape it is oval, depreſſed, coated with large rhomboidal margaritaceous ſcales, ſpotted with white; the fleſh is good.

§ D. *Various.*

Chrysops. The tail is ſemi-lunar; the back is grooved;

the iris is golden. It inhabits Carolina. The body is blueiſh.

ARGYROPS. Tail ſemi-lunar; the back is grooved; iris is ſilvery. It inhabits Jamaica and Carolina. It reſembles the laſt. The three firſt rays of the dorſal fin end in a long briſtle.

DENTEX. The tail is bifid; the body is variegated; four of the teeth are larger. It inhabits many parts of Europe, and the Cape of Good Hope.

SPINUS. Tail bifid; dorſal ſpine recumbent. It inhabits South America and India. The body is apparently painted with blue recurved blotches.

RADIATUS; Pudding-fiſh. The tail is entire; lateral line compoſed of linear ſcales, divided into three bifid branches. This is found on the coaſt of Carolina. Above it is a green purple at the ſides; beneath rufous; head varied with blue, yellow, and green ſtreaks.

VIRGINICUS. The tail is bifid; the body with two black tranſverſe bands, and numerous longitudinal lines. It inhabits North America.

MORMYRUS. The tail of this ſpecies is bifid; body with numerous ſilvery and black bands. It inhabits Tuſcany.

CAPISTRATUS. The tail of this is entire; the body is reticulate with white. It inhabits America. Body oblong; ſcales looſely imbricate, with a white band bent into a right angle before the edge.

GALILÆUS. The tail entire; body above is greeniſh, beneath white. It inhabits the lake Genezareth, in Galilee.

FUSCESCENS. Browniſh; ſcales golden; near the pectoral fins a black ſpot. It inhabits Japan, and is about four inches long.

* NIGER; Toothed Gilt-head. The back is black; the ſides brighter; belly ſilvery. This is found on the coaſts of Yorkſhire. It is deſcribed in Pennant's Britiſh Zoology. The body is twenty-ſix inches long, and ten broad; eyes large; teeth in the lower jaw ſlender, ſharp, and on each ſide a ſlender canine tooth, in the upper jaw a ſingle row; the firſt ſeven rays of the dorſal fin high, the reſt low; this fin and the anal covered with imbricate ſcales.

SPARUS, among the Romans, a kind of ruſtic weapon, bent backwards like the foot. It was likewiſe uſed for a ſmall dart, or miſſive weapon.

SPASA, in *Geography*, a town of Ruſſia, in the government of Archangel; 40 miles S.W. of Mezen.

SPASK, a town of Ruſſia, in the government of Kazan, on the Volga; 40 miles S. of Kazan. N. lat. 55°. E. long. 49° 14′.—Alſo, a town of Ruſſia, in the government of Tambov; 92 miles N.N.E. of Tambov. N. lat. 54° 2′. E. long. 42° 58′.—Alſo, a town of Ruſſia, in the government of Riazan, on the Oka; 32 miles E.S.E. of Riazan. N. lat. 54° 32′. E. long. 39° 50′.

SPASKAIA, a town of Ruſſia, in the country of the Coſſacks, on the Don; 52 miles S.S.W. of Arkadinſkaia. —Alſo, a town of Ruſſia, in the government of Upha; 8 miles S. of Verchouralſk.

SPASKOI, a town of Ruſſia, in the government of Kolivan. N. lat. 55° 38′. E. long. 86° 14′.—Alſo, a town of Ruſſia, in the government of Tobolſk; 36 miles N. of Tomſk.—Alſo, a town of Ruſſia, in the government of Tobolſk; 20 miles W. of Narim.—Alſo, a town of Ruſſia, in the government of Olonetz; 60 miles N.E. of Pudoga.

SPASM, in *Medicine*, σπασμος, from σπαω, *I draw*, or *contract*, a *cramp*, in its modern ſenſe, ſignifies a continued and painful contraction of a muſcle, or any portion of muſcular fibres; in which ſignification it ſtands in oppoſition to *convulſion*. This, however, appears to have been an arbitrary determination of its acceptation, which does not ſtrictly accord with the original uſe of the word. For Celſus has diſtinctly defined *ſpaſm*, as meaning convulſive motion, and applies the word *tetanus* to the rigid and fixed contraction, as we have ſtated in another place. "Modo nervorum diſtentionem, modo rigorem; illud σπασμὸς, hoc τετανος, Græcè nominatur." (De Medicinâ, lib. ii. cap. 1.) See CONVULSIONS. Some writers, however, have applied the term, ſpaſm, to both theſe forms of diſeaſe; uſing the epithet of *tonic* to ſignify the ſtate of rigid contraction, and *clonic* to denote the violent contractions and relaxations of convulſion. Others again have applied the word to every irregular action of the muſcular or moving fibres, in any part of the body. (See Cullen, Firſt Lines, par. 1251.) This latitude has led the celebrated author, juſt quoted, to bring together diſeaſes, which have very little reſemblance in the morbid actions which conſtitute them; as, for inſtance, hyſteria, diabetes, colic, and hydrophobia, which are claſſed together as *ſpaſmodic* affections of the natural functions, in his ſyſtem of noſology.

The various functions of the animal body are performed by certain contractions of the moving or muſcular fibres, in which alone that power is inherent. Theſe contractions are excited either by the will, in thoſe muſcles which obey the faculty of volition; or by certain ſtimuli or cauſes of irritation, appointed by nature for that purpoſe, in thoſe which are not under the influence of the will. The blood, for inſtance, excites the motions of the heart; the paſſing aliments produce the periſtaltic contractions of the bowels; and ſo forth. In a ſtate of health, the contractions are regulated in force and velocity by the will, or by theſe natural irritations; and whether produced by the one or the other, they are always ſoon ſucceeded by a ſtate of relaxation, and are not repeated, until the will or theſe natural excitements operate again. But in a morbid ſtate, the contractions of the moving fibres, ordinarily depending on the will, are excited without the concurrence of the will, or contrary to what it intends; and in the other functions, they are excited by the action of unuſual and unnatural cauſes, or, from too great mobility, are rouſed to more violent and continued contractions by the ordinary cauſes. When the contractions are more violent in degree than is uſual in health, and are neither ſucceeded by a ſpontaneous relaxation, nor even yield readily to an extenſion, either from the action of antagoniſt muſcles, or from other extending powers applied, this ſtate is called a *tonic ſpaſm*, or ſimply a *ſpaſm*. For an account of the ſucceſſive violent contractions and relaxations under this morbid excitement, ſee CONVULSIONS.

The preſence of ſpaſm, in any muſcular part, is indicated by intenſe *pain*, (and it muſt be obvious, from what has juſt been ſtated, that thoſe pathologiſts, who ſpeak of ſpaſmodic affections of nerves, membranes, and ſuch uncontractible parts, uſe an erroneous language;) a ſymptom, however, which occurs alſo in inflammation of the ſame parts: and as the remedies for inflammation are injurious in ſpaſm, and *vice verſâ*, it is always important to aſcertain the real origin of ſuch pain. The pain ariſing from ſpaſm commonly attacks very ſuddenly, or even inſtantaneouſly; it generally comes and goes, or is intenſe for a while, and then ſubſides at intervals, as the ſpaſm recurs and relaxes; it very often ſhifts its ſeat, as different portions of the muſcular fibres of any part are ſucceſſively contracted; and, above all, it is not attended with general fever, and the pulſe is neither accelerated, nor increaſed in hardneſs. The pain connected with inflammation of any organ is commonly more ſlow and gradual in its attack; it is accompanied or preceded by ſhivering; it is fixed both in reſpect to the intenſity and to the ſeat of it; and it is attended by ſymptoms of fever, heat of ſkin, a quick and hard pulſe, thirſt, &c. The *kind* of pain, too, is deſcribed as different: that of ſpaſm being accompanied by a ſenſe of conſtriction; while that of inflammation is combined with a ſenſe of ſtabbing or cutting, and often of throbbing, burning, &c.

Of theſe painful ſpaſmodic diſeaſes, the *tetanus* is the moſt formidable and fatal, in which all the voluntary muſcles are rigidly contracted, and the body and limbs ſtiffly extended; in ſhort, an univerſal cramp exiſts, and the pain of ſuch a condition may be conceived, if we conſider the ſuffering produced by a partial cramp. Sometimes the antagoniſt muſcles of the back are moſt affected, when the body is rigidly bent backwards, like a bow, and reſts upon the back of the head and the heels, when it is called *opiſthotonos;* and ſometimes the anterior muſcles are moſt contracted, and the bend is forwards, which is called *emproſthotonos*. (See Tetanus.) The jaw is firmly locked in this complaint; and when the ſpaſm is confined to that part, it is called Trismus, or locked-jaw; which ſee. Leſs formidable, though very painful, ſpaſms occur in the muſcular coat of the inteſtines, conſtituting *colic;* or in that of the ſtomach, which is uſually called *cramp in the ſtomach*. In hyſterical women, various cramps of theſe parts, and of the voluntary muſcles, are liable to occur. The fit of ſpaſmodic *aſthma* is principally produced by a ſpaſmodic contraction of the muſcular fibres about the larynx, and of the muſcles ſubſervient to reſpiration.

In the pathological doctrines of Dr. Cullen relative to the nature of fever, *ſpaſm* holds a diſtinguiſhed place, and is conſidered, indeed, as the eſſence of fever. This hypothetical ſpaſm was ſuppoſed by him to take place in the extremities of the arteries, and eſpecially of thoſe on the ſurface of the body, and to be demonſtrated by the paleneſs and ſhrinking of the external parts, and the ſuppreſſion of the excretions, conſtituting the cold fit; and the hot fit, which enſues, was believed to be an effort of the conſtitution, a reaction of the powers of life, and of the heart and arteries in particular, to overcome and to relax this ſpaſmodic conſtriction of the extreme veſſels; and this reaction, or fever, therefore, is ſeen to continue until the relaxation of the ſpaſm is effected. (See Firſt Lines of Pract. of Phyſic, par. 40. et ſeq.) We have confuted this hypotheſis at conſiderable length, in another place, (ſee Fever, *Dr. Cullen's Theory*,) and ſhall not dwell upon it here. It is altogether gratuitous, and unſupported by facts; but it has had conſiderable influence in modern practice.

The *cauſes of ſpaſm* may be reduced to two heads: *debility*, and its concomitant irritability, in the whole ſyſtem, or in particular organs, which are, therefore, excited to inordinate actions by the ordinary ſtimuli; and *irritation*, that is, the actual operation of unuſual and extraordinary ſtimuli. If theſe two cauſes are combined, it is obvious that any excitement, very little greater than ordinary, may produce violent ſpaſm, or very inordinate actions: whence it happens, that in conſtitutions of particular irritability, very ſlight irritations will occaſionally produce the moſt ſevere ſpaſmodic diſorders. Thus the moſt violent of all, the tetanus, is often occaſioned by a ſcratch or ſlight wound of the ſkin; and the locked-jaw of new-born infants appears to originate in the irritation of the meconium retained in the bowels. If the irritation of worms, and even morbid ſecretions, in the inteſtines are ſufficient, in children, to produce actual convulſions, it need not be matter of ſurpriſe that colic and cramp of the ſtomach ſhould be occaſioned, in irritable adults, by undigeſted food, and hot ſtimulating drinks. Very ſlight irritations, both external and internal, excite ſpaſms in ſuch habits; even the puncture of a needle (Mem. of the Med. Society of Lond. vol. ii.); and the preſſure of a tumour on a nerve, irritation from diſtended veſſels, or bony excreſcences in the cranium, have all given riſe to ſpaſm.

The *chief remedies* for ſpaſm are thoſe which leſſen irritability, or which excite increaſed power of action, or produce a ſudden and conſiderable commotion, and thoſe which remove the irritating cauſe. The firſt mentioned are uſually called *antiſpaſmodic* medicines. The moſt effectual of theſe are anodyne or narcotic ſubſtances, eſpecially opium, hyoſcyamus, and conium, which tend to leſſen the ſenſibility of the whole frame, and, therefore, to render it leſs liable to be acted upon by irritants. The term *antiſpaſmodic*, however, has been much applied to medicines of a ſtimulant quality, and eſpecially to ſome ſtrong-ſmelling ſubſtances, which alone are much leſs efficacious in relieving ſpaſm than the narcotics. Of the latter claſs are muſk, caſtor, camphor, and aſſafœtida; and of the more ſtimulant claſs are alcohol, æther, ammonia, the eſſential oils, &c. Perhaps the moſt efficacious remedy is compoſed by uniting the latter with the anodynes; for we know of no relief to violent ſpaſmodic pain more effectual than that produced by a combination of laudanum with æther. Among the ſtimulants that are often remedial in caſes of ſpaſm, *heat* is not the leaſt important. Fomentations, hot water, a hot brick, a bag of heated bran, &c. applied externally near the ſeat of ſpaſm, will often afford ſpeedy relief; and a large draught of hot water, taken as warm as the ſtomach will bear it, has produced a ſimilar good effect.

It is probably chiefly from the ſtimulant effect of violent emotions that relief is obtained from them in ſpaſmodic pain; but ſudden terror, or ſurpriſe, or apprehenſion, have ſucceeded in removing it. The influence of mental emotions, indeed, both in producing and curing ſpaſm, and even convulſions of the moſt violent nature, is equally curious and inexplicable. See Imitation and Convulsions.

Where ſpaſm depends upon irritation, the cauſe muſt be inveſtigated, and, if poſſible, removed by appropriate remedies, if within their reach. Thus clearing the bowels, where there is an obvious irritation from worms, undigeſted aliment, morbid bile, &c. will ſometimes entirely remove the ſpaſms. In order to prevent a recurrence, by invigorating the ſyſtem, and thus leſſening its irritability, after the ſpaſms have been ſubdued, it is often neceſſary to reſort to the uſe of tonic remedies. Of theſe a great variety has been employed, at different periods, with various reputation. Cold bathing, the uſe of the ſhower-bath, or tepid bathing, as at Buxton, may be conſidered as one of the moſt effectual tonics; after which may be mentioned ſome of the metallic tonics, ſuch as the various preparations of iron, copper, zinc, and ſilver, all of which are often efficient remedies. The cinchona, columba, caſcarilla, gentian, and other vegetable aromatic bitters, with or without an addition of the mineral acids, have alſo their value as tonics, and contribute to reſtore vigour and leſſen irritability in debilitated habits.

SPASMODIC, ſomething belonging to a ſpaſm, or convulſion; as ſpaſmodic medicine, ſpaſmodic diſeaſe, &c.

Hunger, according to M. Hecquet, is a ſpaſmodic affection of the fibres of the ſtomach; unleſs it ariſe from the fibres being too much moiſtened by the liquors thereof, ſo as to incapacitate them for their office. See Hunger.

SPAT, a term uſed by the fiſhermen for the ſpawn of oyſters, which is caſt in the month of May.

SPATAGOIDES, in *Natural Hiſtory*, the name of a genus of the echini marini, the characters of which are, that it has the aperture for the anus on one ſide of the upper ſurface, and has a large furrow on the back, which makes it of a cordated form; but has no furrows on the vertex, but only four or five ſmooth rays, made of a number of ſlight tranſverſe ſtriæ.

SPATALLA, in *Botany*, a name of Mr. Saliſbury's.—Brown Tr. of Linn. Soc. v. 10. 143. Ait. Hort. Kew. v. 1. 203.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juſſ. Brown.

Eſſ. Ch. Corolla four-cleft. Stamens in the concave tips of the ſegments. Nectary four ſcales beneath the germen. Stigma oblique, dilated. Nut ſuperior. Involucrum of from two to four leaves, containing one, or a very few, flowers. Common receptacle naked.

An occaſional irregularity in the *corolla*, and the oblique *ſtigma*, are the only characters which diſtinguiſh this genus from *Sorocephalus;* for in habit they ſtrictly accord. We cannot but, therefore, adviſe their union, under the latter name, whoſe derivation is the beſt.

The ſpecies of *Spatalla*, defined by Mr. Brown, are 15, one of which only finds a place in Mr. Aiton's work. They are diſpoſed in two ſections, of each of which we ſhall give an example or two.

Section 1. *Involucrums ſingle-flowered. Stigma concave, ſpoon-ſhaped. Corolla unequal.* Ten ſpecies.

S. *mollis*. Soft Spatalla. Br. n. 1.—"Involucrum of two entire leaves. Leaves ſtraight, villous, as well as the young branches."—Native of hills at the Cape of Good Hope. Communicated by Mr. John Roxburgh, to Mr. Lambert. An upright *ſhrub*, with copious reddiſh *branches;* the young ones ſlender, erect. *Leaves* ſlightly ſpreading, ſeven or eight lines long, ſilky with moderately ſpreading hairs, and tipped with a very ſharp callous point. *Spike* ſeſſile, erect, ſolitary, denſe, racemoſe, of an oblong cylindrical ſhape, hardly an inch in length. *Bracteas* leafy, twice as long as the partial flower-ſtalks. *Involucral leaves* ovate, villous, the outer one broadeſt. *Corolla* denſely bearded, purpliſh; the marginal hairs of its larger ſegment inflexed. *Scales* under the germen linear permanent.

S. *prolifera*. Proliferous Spatalla. Br. n. 8. (Protea prolifera; Thunb. Diſſ. n. 27. t. 4. Linn. Suppl. 118. Willd. Sp. Pl. v. 1. 518.)—Involucrum of four leaves, withered at the points. Spike in a conical head. Flowers nearly ſeſſile. Stem proliferous.—Native of hills at the Cape of Good Hope. An upright *ſhrub*, from a foot and a half to two feet high, much branched in a proliferous and umbellate manner; the young branches ſomewhat ſilky. *Leaves* cloſely imbricated, hardly three-quarters of an inch long, awl-ſhaped; ſilky on the younger branches. *Spikes* ſeſſile, ſolitary, terminal, but ſurmounted by ſubſequent branches from their baſe. *Corolla* very denſely ſilky; its outer ſegment twice as large as the others. *Stigma* flattiſh, with a central tubercle.

Section 2. *Involucrums with three or four flowers. Stigma rather convex. Corolla almoſt equal.* Five ſpecies.

S. *incurva*. Incurved-leaved Spatalla. Br. n. 11. Ait. n. 1. (Protea incurva; Thunb. Diſſ. n. 22. t. 3. Willd. Sp. Pl. v. 1. 516.)—Spikes racemoſe, ſomewhat ſtalked. Involucrum downy, longer than the bracteas, with about four flowers. Leaves incurved. Corolla unequal.—Native of moiſt, ſandy, rather ſhady ſituations at the Cape of Good Hope. Mr. Maſſon ſent it, in 1789, to Kew, where it flowers in May and June. The *leaves* are numerous, ſlender, above an inch long, ſpreading, aſcending at the points. *Spikes* generally aggregate, oblong, lax. *Bracteas* nearly the length of the partial ſtalks. Mr. Brown notices a variety, or perhaps diſtinct ſpecies, whoſe *leaves* are ſhorter and more crowded, *ſpikes* ſolitary, and *bracteas* longer than the partial ſtalks. *S. incurva* bears a cloſe reſemblance to ſome ſpecies of CONOSPERMUM. See that article.

The deſcriptions of the genera of SOROCEPHALUS (ſee that article), and *Spatalla*, ſuggeſt to us a doubt whether the ſpecies of theſe genera may not, in ſome inſtances at leaſt, differ ſexually only from each other. Not having ſeen many of them, we cannot examine critically into each ſpecies, but, in a general view, the male organs ſeem moſt perfect in *Sorocephalus*, the female in *Spatalla*. The regularity or irregularity of the *corolla* does not ſeem, in this caſe, to conſtitute a ſufficient generic difference.

SPATANGI, in *Natural Hiſtory*, the name of a genus of the echini marini, including all thoſe which are marked in the ſhape of a heart, and have the aperture for the anus in one of the ſides of the upper ſuperficies. Theſe have all a remarkable furrow on the back; their baſe is nearly flat, and they have ſeveral furrows on the vertex. By theſe characters they are diſtinguiſhed from the briſſi, with which they have in common the marks of two lips to their mouth, and want the teeth which the other kinds have.

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Of theſe painful ſpaſmodic diſeaſes, the *tetanus* is the moſt formidable and fatal, in which all the voluntary muſcles are rigidly contracted, and the body and limbs ſtiffly extended; in ſhort, an univerſal cramp exiſts, and the pain of ſuch a condition may be conceived, if we conſider the ſuffering produced by a partial cramp. Sometimes the antagoniſt muſcles of the back are moſt affected, when the body is rigidly bent backwards, like a bow, and reſts upon the back of the head and the heels, when it is called *opiſthotonos;* and ſometimes the anterior muſcles are moſt contracted, and the bend is forwards, which is called *emproſthotonos.* (See TETANUS.) The jaw is firmly locked in this complaint; and when the ſpaſm is confined to that part, it is called TRISMUS, or locked-jaw; which ſee. Leſs formidable, though very painful, ſpaſms occur in the muſcular coat of the inteſtines, conſtituting *colic;* or in that of the ſtomach, which is uſually called *cramp in the ſtomach.* In hyſterical women, various cramps of theſe parts, and of the voluntary muſcles, are liable to occur. The fit of ſpaſmodic *aſthma* is principally produced by a ſpaſmodic contraction of the muſcular fibres about the larynx, and of the muſcles ſubſervient to reſpiration.

In the pathological doctrines of Dr. Cullen relative to the nature of fever, *ſpaſm* holds a diſtinguiſhed place, and is conſidered, indeed, as the eſſence of fever. This hypothetical ſpaſm was ſuppoſed by him to take place in the extremities of the arteries, and eſpecially of thoſe on the ſurface of the body, and to be demonſtrated by the paleneſs and ſhrinking of the external parts, and the ſuppreſſion of the excretions, conſtituting the cold fit; and the hot fit, which enſues, was believed to be an effort of the conſtitution, a reaction of the powers of life, and of the heart and arteries in particular, to overcome and to relax this ſpaſmodic conſtriction of the extreme veſſels; and this reaction, or fever, therefore, is ſeen to continue until the relaxation of the ſpaſm is effected. (See Firſt Lines of Pract. of Phyſic, par. 40. et ſeq.) We have confuted this hypotheſis at conſiderable length, in another place, (ſee FEVER, *Dr. Cullen's Theory*,) and ſhall not dwell upon it here. It is altogether gratuitous, and unſupported by facts; but it has had conſiderable influence in modern practice.

The *cauſes of ſpaſm* may be reduced to two heads: *debility*, and its concomitant irritability, in the whole ſyſtem, or in particular organs, which are, therefore, excited to inordinate actions by the ordinary ſtimuli; and *irritation*, that is, the actual operation of unuſual and extraordinary ſtimuli. If theſe two cauſes are combined, it is obvious that any excitement, very little greater than ordinary, may produce violent ſpaſm, or very inordinate actions: whence it happens, that in conſtitutions of particular irritability, very ſlight irritations will occaſionally produce the moſt ſevere ſpaſmodic diſorders. Thus the moſt violent of all, the tetanus, is often occaſioned by a ſcratch or ſlight wound of the ſkin; and the locked-jaw of new-born infants appears to originate in the irritation of the meconium retained in the bowels. If the irritation of worms, and even morbid ſecretions, in the inteſtines are ſufficient, in children, to produce actual convulſions, it need not be matter of ſurpriſe that colic and cramp of the ſtomach ſhould be occaſioned, in irritable adults, by undigeſted food, and hot ſtimulating drinks. Very ſlight irritations, both external and internal, excite ſpaſms in ſuch habits; even the puncture of a needle (Mem. of the Med. Society of Lond. vol. ii.); and the preſſure of a tumour on a nerve, irritation from diſtended veſſels, or bony excreſcences in the cranium, have all given riſe to ſpaſm.

The *chief remedies* for ſpaſm are thoſe which leſſen irritability, or which excite increaſed power of action, or produce a ſudden and conſiderable commotion, and thoſe which remove the irritating cauſe. The firſt mentioned are uſually called *antiſpaſmodic* medicines. The moſt effectual of theſe are anodyne or narcotic ſubſtances, eſpecially opium, hyoſcyamus, and conium, which tend to leſſen the ſenſibility of the whole frame, and, therefore, to render it leſs liable to be acted upon by irritants. The term *antiſpaſmodic*, however, has been much applied to medicines of a ſtimulant quality, and eſpecially to ſome ſtrong-ſmelling ſubſtances, which alone are much leſs efficacious in relieving ſpaſm than the narcotics. Of the latter claſs are muſk, caſtor, camphor, and aſſafœtida; and of the more ſtimulant claſs are alcohol, æther, ammonia, the eſſential oils, &c. Perhaps the moſt efficacious remedy is compoſed by uniting the latter with the anodynes; for we know of no relief to violent ſpaſmodic pain more effectual than that produced by a combination of laudanum with æther. Among the ſtimulants that are often remedial in caſes of ſpaſm, *heat* is not the leaſt important. Fomentations, hot water, a hot brick, a bag of heated bran, &c. applied externally near the ſeat of ſpaſm, will often afford ſpeedy relief; and a large draught of hot water, taken as warm as the ſtomach will bear it, has produced a ſimilar good effect.

It is probably chiefly from the ſtimulant effect of violent emotions that relief is obtained from them in ſpaſmodic pain; but ſudden terror, or ſurpriſe, or apprehenſion, have ſucceeded in removing it. The influence of mental emotions, indeed, both in producing and curing ſpaſm, and even convulſions of the moſt violent nature, is equally curious and inexplicable. See IMITATION and CONVULSIONS.

Where ſpaſm depends upon irritation, the cauſe muſt be inveſtigated, and, if poſſible, removed by appropriate remedies, if within their reach. Thus clearing the bowels, where there is an obvious irritation from worms, undigeſted aliment, morbid bile, &c. will ſometimes entirely remove the ſpaſms. In order to prevent a recurrence, by invigorating the ſyſtem, and thus leſſening its irritability, after the ſpaſms have been ſubdued, it is often neceſſary to reſort to the uſe of tonic remedies. Of theſe a great variety has been employed, at different periods, with various reputation. Cold bathing, the uſe of the ſhower-bath, or tepid bathing, as at Buxton, may be conſidered as one of the moſt effectual tonics; after which may be mentioned ſome of the metallic tonics, ſuch as the various preparations of iron, copper, zinc, and ſilver, all of which are often efficient remedies. The cinchona, columba, caſcarilla, gentian, and other vegetable aromatic bitters, with or without an addition of the mineral acids, have alſo their value as tonics, and contribute to reſtore vigour and leſſen irritability in debilitated habits.

SPASMODIC, ſomething belonging to a ſpaſm, or convulſion; as ſpaſmodic medicine, ſpaſmodic diſeaſe, &c.

Hunger, according to M. Hecquet, is a ſpaſmodic affection of the fibres of the ſtomach; unleſs it ariſe from the fibres being too much moiſtened by the liquors thereof, ſo as to incapacitate them for their office. See HUNGER.

SPAT, a term uſed by the fiſhermen for the ſpawn of oyſters, which is caſt in the month of May.

SPATAGOIDES, in *Natural Hiſtory*, the name of a genus of the echini marini, the characters of which are, that it has the aperture for the anus on one ſide of the upper ſurface, and has a large furrow on the back, which makes it of a cordated form; but has no furrows on the vertex, but only four or five ſmooth rays, made of a number of ſlight tranſverſe ſtriæ.

SPATALLA, in *Botany*, a name of Mr. Saliſbury's.—Brown Tr. of Linn. Soc. v. 10. 143. Ait. Hort. Kew. v. 1. 203.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juſſ. Brown.

Eſſ. Ch. Corolla four-cleft. Stamens in the concave tips of the ſegments. Nectary four ſcales beneath the germen. Stigma oblique, dilated. Nut ſuperior. Involucrum of from two to four leaves, containing one, or a very few, flowers. Common receptacle naked.

An occaſional irregularity in the *corolla*, and the oblique *ſtigma*, are the only characters which diſtinguiſh this genus from *Sorocephalus*; for in habit they ſtrictly accord. We cannot but, therefore, adviſe their union, under the latter name, whoſe derivation is the beſt.

The ſpecies of *Spatalla*, defined by Mr. Brown, are 15, one of which only finds a place in Mr. Aiton's work. They are diſpoſed in two ſections, of each of which we ſhall give an example or two.

Section 1. *Involucrums ſingle-flowered. Stigma concave, ſpoon-ſhaped. Corolla unequal.* Ten ſpecies.

S. *mollis*. Soft Spatalla. Br. n. 1.—"Involucrum of two entire leaves. Leaves ſtraight, villous, as well as the young branches."—Native of hills at the Cape of Good Hope. Communicated by Mr. John Roxburgh, to Mr. Lambert. An upright *ſhrub*, with copious reddiſh *branches*; the young ones ſlender, erect. *Leaves* ſlightly ſpreading, ſeven or eight lines long, ſilky with moderately ſpreading hairs, and tipped with a very ſharp callous point. *Spike* ſeſſile, erect, ſolitary, denſe, racemoſe, of an oblong cylindrical ſhape, hardly an inch in length. *Bracteas* leafy, twice as long as the partial flower-ſtalks. *Involucral leaves* ovate, villous, the outer one broadeſt. *Corolla* denſely bearded, purpliſh; the marginal hairs of its larger ſegment inflexed. *Scales* under the germen linear permanent.

S. *prolifera*. Proliferous Spatalla. Br. n. 8. (Protea prolifera; Thunb. Diſſ. n. 27. t. 4. Linn. Suppl. 118. Willd. Sp. Pl. v. 1. 518.)—Involucrum of four leaves, withered at the points. Spike in a conical head. Flowers nearly ſeſſile. Stem proliferous.—Native of hills at the Cape of Good Hope. An upright *ſhrub*, from a foot and a half to two feet high, much branched in a proliferous and umbellate manner; the young branches ſomewhat ſilky. *Leaves* cloſely imbricated, hardly three-quarters of an inch long, awl-ſhaped; ſilky on the younger branches. *Spikes* ſeſſile, ſolitary, terminal, but ſurmounted by ſubſequent branches from their baſe. *Corolla* very denſely ſilky; its outer ſegment twice as large as the others. *Stigma* flattiſh, with a central tubercle.

Section 2. *Involucrums with three or four flowers. Stigma rather convex. Corolla almoſt equal.* Five ſpecies.

S. *incurva*. Incurved-leaved Spatalla. Br. n. 11. Ait. n. 1. (Protea incurva; Thunb. Diſſ. n. 22. t. 3. Willd. Sp. Pl. v. 1. 516.)—Spikes racemoſe, ſomewhat ſtalked. Involucrum downy, longer than the bracteas, with about four flowers. Leaves incurved. Corolla unequal.—Native of moiſt, ſandy, rather ſhady ſituations at the Cape of Good Hope. Mr. Maſſon ſent it, in 1789, to Kew, where it flowers in May and June. The *leaves* are numerous, ſlender, above an inch long, ſpreading, aſcending at the points. *Spikes* generally aggregate, oblong, lax. *Bracteas* nearly the length of the partial ſtalks. Mr. Brown notices a variety, or perhaps diſtinct ſpecies, whoſe *leaves* are ſhorter and more crowded, *ſpikes* ſolitary, and *bracteas* longer than the partial ſtalks. *S. incurva* bears a cloſe reſemblance to ſome ſpecies of CONOSPERMUM. See that article.

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SPATHALIUM, among the Romans, an ornament which the women wore about their hands, not unlike the coral ones of the moderns.

SPATHELIA, in *Botany*, altered from Dr. Patrick Browne's name for the ſame plant, *Spathe*, and alluding to the ſimple undivided ſtem, crowned with a tuft of luxuriant leaves, like the Palm tribe; *σπαθη* being a palm-tree, or palm-branch.—Linn. Gen. 148. Schreb. 198. Willd. Sp. Pl. v. 1. 1496. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 171. Juſſ. 371. Lamarck Illuſtr. t. 209. Gærtn. t. 58. (Spathe; Browne Jam. 187.)—Claſs and order, *Pentandria Trigynia*. Nat. Ord. *Terebintaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five oblong, coloured leaves. *Cor.* Petals five, oblong, equal. *Stam.* Filaments five, awl-ſhaped, aſcending, furniſhed with a tooth at the baſe; anthers ovate. *Piſt.* Germen ovate, ſhorter than the ſtamens; ſtyles three, very ſhort; ſtigmas three, roundiſh. *Peric.* Capſule oblong, triangular, with three wings, of three cells, not burſting; each cell furniſhed with a lateral channel, full of reſin. *Seeds* ſolitary, oblong, priſmatic, or nearly cylindrical, tapering at each end.

Eſſ. Ch. Calyx of five leaves. Petals five. Capſule with three winged angles, and three cells. Seeds ſolitary.

Obſ. Gærtner remarks, that the capſule is ſometimes compreſſed, with two oppoſite wings only, and two cells; but this ſeems to ariſe merely from a failure of impregnation of one of the ſtigmas.

1. S. *ſimplex.* Sumach-leaved Spathelia. Linn. Sp. Pl. 386. Willd. n. 1. Ait. n. 1. (Aceri aut paliuro affinis arbor, caudice non ramoſo, foliis ſorbi ſylveſtris, floribus pentapetalis racemoſis ſpecioſis purpureis, fructu ſicco tribus membranulis extantibus alato; Sloane Jam. v. 2. 28. t. 171.)—Plentiful by the ſides of rivers, among the rocky hills of Jamaica, according to Sloane and Browne. The latter erroneouſly calls it the Maiden-plum tree. This very handſome plant is ſaid to have been introduced into the ſtoves of England, in 1778, by Dr. William Wright. The *root* is of a ſpreading nature, not ſtriking deep. *Stem* quite ſimple and erect, an inch thick, naked, round, riſing like a palm-tree, Sloane ſays, to the height of 40 feet, and crowned at the ſummit with a large tuft of pinnate, crenate, ſpreading *leaves*, ſurmounted, in the flowering ſeaſon, with a vaſt compound *panicle*, many feet in height, of handſome purple *flowers*. The *capſules* are about an inch long.

SPATHESTER, the name of a chirurgical inſtrument uſed to draw the prepuce over the glans.

SPATHINUS, in *Natural Hiſtory*, a name given by the Greeks to the ſtag or deer, when in its ſecond year.

In the firſt, it was called *nebrus;* in the third year, *dicrotus;* and after this *ceraſtes*, as long as it lived.

SPATHIUM, in *Botany*, ſo denominated by Loureiro, from *σπαθιὸν*, *a little ſheath*, alluding to the form of its calyx.—Loureir. Cochinch. 217.—Claſs and order, *Hexandria Trigynia*. Nat. Ord. *Inundatæ*, Linn. *Naïades*, Juſſ.

Gen. Ch. *Cal.* Sheath ſtalked, of one leaf, roundiſh, ſpreading, ſingle-flowered. *Cor.* none. *Stam.* Filaments ſix, ſhort, inſerted into the receptacle; anthers roundiſh, of two cells. *Piſt.* Germen (ſuperior) roundiſh, with four horns; ſtyle none; ſtigmas four, oblong, reflexed. *Peric.* Berries four, ovate, pointed, ſingle-ſeeded. *Seeds* roundiſh.

Eſſ. Ch. Sheath roundiſh, ſtalked, ſingle-flowered. Corolla none. Berries four, with ſingle ſeeds.

1. S. *chinenſe.* *Thong pin ngau* of the Chineſe.—Native of marſhy places, near Canton in China. The *ſtem* is erect, three feet high, herbaceous, with ſpreading, flaccid, furrowed *branches*. *Leaves* heart-ſhaped, lanceolate, five-ribbed, ſmooth, ſcattered, with claſping *footſtalks*. *Spikes* linear, nearly terminal. Such is the deſcription of Loureiro, who conceives the above plant to be ſomewhat akin to the Linnæan *Aponogeton*, and alſo to *Potamogeton*. We have no acquaintance with it.

SPATHODEA, a genus founded by Paliſot de Beauvois, in his *Flore d'Oware & de Benin*, on ſome of the Linnæan *Bignoniæ*, and named from the ſheath-like form of their calyx. It is adopted by Mr. Brown, in his Prodr. Nov. Holl. v. 1. 471, under the following character.

Calyx ſheath-like, cloven down one ſide, either toothed or entire at the end. Corolla ſomewhat funnel-ſhaped, with a five-lobed, rather unequal, limb. Stamens two long and two ſhort, with a fifth abortive filament. Capſule pod-like, falcate, imperfectly four-celled. *Partition* tranſverſe, corky.

The genus is ſhrubby or arboreous; with oppoſite, rarely alternate, pinnate *leaves*, ſometimes ſimple. *Flowers* moſtly panicled.

Bignonia ſpathacea, ſee Bignonia, n. 18, is an example of *Spathodea*, as is alſo *S. heterophylla*, and perhaps *alternifolia*, of Brown.

SPATHOMELE, a word uſed by ſome to expreſs the ſpatula, uſed by the apothecaries and ſurgeons in mixing and ſpreading ointments and plaſters.

SPATHOSE, in *Mineralogy*, having a cryſtalline ſtructure.

SPATHULARIA, in *Botany*, from the ſpatulate ſhape of its head, a genus of *Fungi*, conſiſting of only one ſpecies.—Perſoon Syn. Fung. 610.—Claſs and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi*. Sect. *Gymnocarpi*, *helvelloidei*.

Eſſ. Ch. Club-ſhaped. *Head* compreſſed, membranous, decurrent at each ſide.

1. S. *flavida.* Yellow Spathularia. Perſ. Diſp. Meth. 36. Comment. 34—36. (Clavaria Spathula; Dickſ. Crypt. faſc. 1. 21. Fl. Dan. t. 658. C. ſpatulata glabra; Schmid. Ic. t. 50. Elvela ſecunda; Schæff. Fung. t. 149. Helvella ſpatulata; Sowerb. Fung. t. 35.)—Found in fir woods, in autumn. Mr. Crowe firſt diſcovered it at Coſſey, near Norwich, where, in the plantations of ſir George Jerningham, it is very abundant, growing erect, in tufts. The *ſtalk* is about a finger's length, half an inch in diameter, hollow, rather uneven, whitiſh. *Head* vertical, obtuſe, hollow, ſomewhat obovate, or inverſely heart-ſhaped, pale buff, or yellowiſh, diſcharging innumerable minute *ſeeds*, in the form of ſmoke, from marginal pores. See Clavaria, n. 17.

SPATIUM, Lat., ſpace, is applied to the void between the lines of the ſtaff, upon which muſic is written. Spaces at firſt were not uſed, but there was a line for every ſound (ſee Notation); but when the lines were reduced to four, as in the canto fermo of the Romiſh ritual, and afterwards increaſed to five, as in the preſent ſecular muſic, the ſpaces came into uſe; and the loweſt was called the firſt, and ſo on to the fourth, fifth, and ſixth, which unites the baſe with the treble. See Riga, Lines, and Staff.

SPATLING-Poppy, a name given to the common field-lychnis, a ſpecies of cucubalus, from the white froth found on it in the ſpring. See Froth-*Spit*.

SPATOLA, in *Geography*, a town of Naples, in Calabria Ultra; 14 miles S. of Squillace.

SPATTERDASHES, a kind of covering for the legs, made of leather, &c. Thoſe of ſoldiers are made of coarſe linen, waxed over and buttoned tight.

SPATTS, a ſmall ſort of ſpatterdaſhes, reaching only a little above the ankle.

SPATULA, or Spathula, formed from *ſpatha*, of the Greek, σπαθιον, which ſignifies the ſame; an inſtrument uſed by ſurgeons and apothecaries; made flat at one end, and round at the other; ſerving to ſpread their plaſters and unguents.

The ſurgeons have little ſteel ſpatulas. And the apothecaries have alſo large ones of wood, to ſtir their drugs in diluting, tempering, or boiling them.

The ſpatula is uſed by ſurgeons to depreſs the tongue, in order to examine the ſtate of the tonſils, uvula, and fauces, when they are affected with any diſorders. It is alſo uſed to ſuſpend the tongue, when the frænum is to be divided; for which purpoſe it has a fiſſure at its extremity, and ſhould rather be made of ſilver than of any other metal. Theſe ſpatulæ are made of different ſhapes.

SPAVIN, formed from the French *eſparvin*, which ſignifies the ſame; a diſeaſe in a horſe: being a ſwelling or ſtiffneſs, uſually in the ham, which cauſes him to halt.

There are two kinds of ſpavins, *viz.* the *ox*, which is a callous tumour, at the bottom of the ham, on the inſide, hard as a bone, and very painful. While it is yet young, ſome horſes only halt with it at the firſt coming out of the ſtable. The *dry* ſpavin is more eaſily perceived, by the horſe's raiſing one of his hind-legs, with a twitch, higher than the other: but ſometimes it is found in both legs.

This kind, which ſome alſo call *ſtring-halt*, frequently degenerates into the *ox* ſpavin; for which there is no remedy, but to apply the fire; and even this is not always ſucceſsful.

There are two other kinds of ſpavin, which have their ſeat in the hoof, *viz.* the *blood* ſpavin, which is a ſoft tumour, that grows through a horſe's hoof, and is uſually full of blood; and the *bone* ſpavin, or cruſty ſubſtance growing on the inſide of the hoof, under the joint.

SPAWDER, in *Rural Economy*, a term provincially ſignifying an injury, by the legs of animals being forced too far aſunder on ice, or ſlippery roads, &c.

SPAWN, in *Gardening*, the progeny or offspring of plants or other vegetables; but which is moſtly applied to ſuch ſmall offsets, ſuckers, and ſprouts, as riſe numerouſly from the roots, &c. of certain plants, ſerving for the purpoſe of increaſe, which, as being parts ſimilar to the whole plant, when ſeparated from the parent vegetable and planted out, readily grow, and commence proper plants, and thereby renew or increaſe their reſpective kinds with great facility and abundance. Some plants produce them in large quantities, others ſcarcely at all. (See Suckers.) And in a more general acceptation, it is likewiſe peculiarly applied to the progeny of muſhrooms, being an offspring from the root of thoſe *fungi*, conſiſting of minute white parts, ſhooting and running in the earth or dung, like ſmall white thready fibres, aſſuming the appearance of ſlender white ſtrings, which are productive of numerous minute white knobs, appearing at firſt of the ſize of ſmall pin-heads, the whole ſmelling ſtrong of the muſhroom; and thoſe little knobs being infant plants, they gradually increaſe in ſize to proper muſhrooms, which are quick of growth, and of very ſhort duration; but the ſame ſpawn running in the earth, &c. furniſhes a plentiful ſupply of muſhrooms from the bottom in regular ſucceſſion for a conſiderable time, ſometimes ſeveral months. See Agaricus.

This ſort of muſhroom ſpawn may be procured at all ſeaſons of the year, but more plentifully towards the end of ſummer and in autumn, from the places of its growth and production; ſuch as old muſhroom-beds, old horſe-dung hot-beds, and horſe-dunghills that are moderately dry, and which have remained undiſturbed ſeveral months; alſo ſometimes in old compoſt heaps, conſiſting chiefly of horſe-dung; in all of which the ſpawny ſubſtance diſcovers itſelf in dry lumps of dung and earth, which lumps ſhould be taken up entire: likewiſe in ſtable-yards, where any quantity of horſe-dung has lain dry and undiſturbed any conſiderable length of time, lumps of ſpawn are often obtained. It is alſo found in great perfection in the horſe-rides belonging to great inns, livery-ſtables, and horſe-dealers, eſpecially on the ſides next the walls; likewiſe in horſe-mill tracts, where horſes are conſtantly employed in working and dropping their dung, which is ſwept together on the ſides, there to remain; alſo in kitchen-gardens, where any piece of ground has been dunged in the ſpring with new, or but moderately rotted ſtable-dung, or old dry hot-bed dung, &c. and only ſlightly turned in, as already ſhewn under the head of making theſe beds. And ſometimes it is produced naturally all over the ſurface of an old cucumber or melon hot-bed, both in the dung and earth, in autumn or winter, where the frame and lights have been continued over the bed; and where the earth of the bed is of a loamy nature, the ſpawn in which is often remarkably fine and ſtrong; for in this kind of earth, of a moderately light quality, it is generally of a ſuperior quality, and very productive; ſo as ſometimes, in ſuch old beds, where the frames and glaſſes remain, and the ſurface of the bed is covered thickly with dry ſtraw, litter, or hay, under the glaſſes, to produce a full crop of good muſhrooms towards the ſpring. Muſhroom ſpawn is alſo obtained in meadows and paſtures towards the end of ſummer and in autumn, before the rain and cold commences, as in the months of Auguſt and September, when the muſhrooms riſe naturally, ſerving as a direction to the place where to find it; but that found in the other places is moſtly the beſt in quality. Some caution is alſo neceſſary in collecting ſpawn from fields to have it of the right ſort.

On this ſubject it is neceſſary to obſerve, that there is alſo a fruitful and barren ſort of muſhroom ſpawn; the former is diſtinguiſhed by the ſubſtance of the fibry or ſtringy white ſhoots, &c. and muſhroom-like ſmell, as before obſerved; but in the latter ſort, the thready fibres are far more abundant, fine, and downy, often appearing like a fine white down, and, being of no ſubſtance, produce only a flaſh of ſmall white fungi, deſtitute of the fleſhy part, and which, by the muſhroom-men, is commonly called *white-cup*.

Methods are ſometimes practiſed to obtain muſhroom ſpawn more abundantly by art, by the effects of horſe-dung, both in hot-beds and compoſt heaps; ſometimes, in the former caſe, by planting ſmall pieces of ſpawn, or ſpawny earth, along the top edge of the later cucumber hot-beds in ſummer, or in the ſides of any horſe-dung heaps, having a little warmth remaining; ſo that the moderate heat of the dung in the bed or heap may ſet the ſpawn a-running, ſo as ſometimes to produce a few muſhrooms in autumn, and increaſe it conſiderably for future uſe in ſpawning proper muſhroom-beds: and in the ſecond caſe, by a compoſt of dung and loamy earth together; procuring in ſpring, or early in ſummer, a quantity of freſh horſe-dung, conſiſting of plenty of ſhort ſtuff, and a due proportion of long; and caſting the whole into a heap to ferment a fortnight or a month, that the rank burning vapour may paſs away; then having ſome loamy earth, or other good ſubſtantial mould, or any ſpawny ſoil from old beds, form the dung into a long narrow ridge, mixing ſome of the earth occaſionally towards the outſide; and in a fortnight or three weeks, when the heat becomes quite moderate, covering the whole with dry long litter to defend it from the wet, permitting the whole to remain a conſiderable time, when good ſpawn will often be produced. The heaps for this uſe are beſt formed in dry ſheds, &c.

In collecting it from any of theſe places, the lumps of dung and earth in which it appears ſhould be taken up as entire as poſſible, put into a baſket, and carried into ſome dry ſhed, or other place, when the heaps are made out of doors, till wanted, or it may be immediately uſed in making the beds.

The practice of introducing this ſort of ſpawn, in a ſuitable manner, into beds properly formed and conſtructed for the reception of it, is the beſt and moſt convenient method, which has yet been found, of raiſing crops of muſhrooms in garden cultivation. The beds for this uſe are, as has been ſeen, conſtantly prepared with new freſh horſe-dung which has undergone the proceſs of fermentation, by being thrown into a heap, in order to take off the firſt violent coarſe heat, and then formed in the long narrow ridge manner, ſomewhat in the ſhape of a roof, for throwing off moiſture, and left expoſed in that ſtate until it becomes in a proper ſtate of heat, when the portions of ſpawny matter are inſerted all over the ſurface, but only juſt within it, the whole moulded over an inch or two in thickneſs, and then covered cloſely with dry litter to a proper depth. The parts of the ſpawn are conſequently planted in a ſort of hot-bed, by means of which they rapidly advance in growth, and ſoon furniſh ſupplies of good muſhrooms for uſe. The ſpawn, being forced into action in this way, is often not longer than ſix or eight weeks in producing plentifully; the ſame bed frequently continuing to afford a ſupply for five or ſix months, or longer; but new beds are to be made every year, and ſometimes two or three times in that ſpace of time, in order to furniſh a conſtant ſucceſſion of good muſhrooms. See AGARICUS, and SPAWNING *Muſhroom-Beds*.

Where there is plenty of this freſh ſtable littery dung and the ſhort ſtuff in mixture, muſhrooms are ſometimes not only abundantly ſupplied, but plenty of ſpawn for future beds.

No proper ſeed of the muſhroom has hitherto been diſcovered by which crops of it can be raiſed by the gardener, though it is well known that it produces ſeed like other plants, and is naturally produced in that way, as well as by ſpawn. The extremely minute ſeeds are ſaid, in this caſe, to be ſituated and contained in the *lamellæ* or gills, which, when full grown, and the ſeeds become quite ripe, diſcharge and diſperſe them upon the ſurrounding ground, from which they are conveyed by the wind and other means to other diſtant ſituations, where the ſoils are ſuited to their growth. In theſe they fix themſelves and grow, their roots increaſing rapidly ſo as to produce proper ſpawn.

The ſituations in which proper ſupplies of good ſpawn are to be met with, as well as the formation of it, will in ſome meaſure be ſeen from what has been ſaid. That which is produced in the horſe-dung methods is, however, conſtantly to be preferred to ſuch as is procured from the field, for all the purpoſes of cultivation in the garden, as producing thicker, firmer, more fleſhy, and richer flavoured muſhrooms. All old worn-out ſpawn ſhould, of courſe, be rejected, as improper and unfit for being made uſe of in this culture, and the new virgin ſpawn, as it is termed, or ſuch as has not been in production of muſhroom crops, be employed, as in ſome inſtances, even the young offspring ſpawn of ſuch as has been long wrought from bed to bed, will degenerate; there being not unfrequently a very material difference in the goodneſs of that which is freſh and full of heart, and that which has been long in uſe, the former producing fine and abundant crops, while the latter only ſends up a flaſh of ſmall trifling heads at firſt, of none or very little ſubſtance, and perhaps no more of any conſequence afterwards.

New littery and plenty of ſhort horſe-dung, eſpecially when mixed with a little loamy earth, are the moſt remarkably and abundantly productive of good ſpawn. When they have lain together for a conſiderable length of time, they are moſtly in a peculiarly fit ſtate for producing it in large quantities.

Spawn of this ſort keeps well when laid up cloſe in a dry place, or when put up in hampers or baſkets, and covered in a cloſe thick manner by dry litter or mats. The drier it is put up and kept within moderate limits the better, as the more it will improve in its productive properties, and take more freely in the beds when planted, retaining its vegetative qualities for many months.

As this ſort of ſpawn is of great importance and value in many places, where large quantities of muſhrooms are raiſed for ſale in the markets, certain perſons in ſuch ſituations often employ themſelves at particular ſeaſons of the year, but eſpecially in the autumn, in going about to different parts and collecting it, which near large towns moſtly pays them well, being of ready ſale at a high price, as ſix or ſeven ſhillings the buſhel, and more in ſome caſes.

When it is to be provided in the vicinity of the metropolis, it will commonly be met with in the moſt ready manner at the neat-houſe gardens on the different ſide of it, at the different markets in it, where vegetables are expoſed for ſale, and in the principal nurſery garden grounds.

It is capable of being packed up and ſent to any diſtance when neceſſary.

SPAWN, *Fiſh*, in *Rural Economy*, the oviparous or egg-like granulated ſubſtance which is depoſited by female fiſhes, in order to its being impregnated by the more liquid ſeminal matter of the males, and be thereby rendered productive of the young progeny or fry of the particular ſort or kind.

Each ſort of fiſh has its peculiar habit or economy in the performance and mode of depoſiting this material, as may be ſeen in the following article. Some ſorts of fiſh are likewiſe much more productive of it than others, conſequently more prolific. This is the caſe with the herring and the ſalmon, the former of which is only a fiſh that weighs from five to ten ounces, according to Harmer, but in which the ſpawn weighs 480 grains, and has the amazing number of 36,960 eggs, when examined about the month of October: the latter, though a much larger fiſh, is productive of ſpawn in a very high degree, the number of its ova being almoſt countleſs. And there are other ſorts of fiſh, which probably equal or out-number either of theſe, as the mackarel, ſprat, and ſome others. It is neceſſary that fiſh ſhould be as little as poſſible diſturbed at the time of their depoſiting their ſpawn in the rivers, and on the banks of the ſea-ſhores, or other places, as it may not only be prejudicial to them, but injurious in preventing the male fiſh from impregnating it in a proper manner.

SPAWNING *of Fiſh*, the act of depoſiting the raw, ſpawning, or oviparous matter of the female, and of its being impregnated by that of the male, for the purpoſe of breeding or producing their young. Moſt ſorts of river-fiſh, and many of thoſe of the ſea kind, produce their young progeny in this way. This operation or work of impregnation is accompliſhed in different manners as to the mode of its depoſition, according to the nature and habits of the fiſh, and the ſeaſons at which the ſpawning takes place. In thoſe fiſhes which ſpawn in the more ſtill and ſhallow waters during the ſpring and ſummer ſeaſons, ſuch, for inſtance, as thoſe of the pike, bream, carp, perch, and ſome other kinds, it would ſeem to be moſt commonly the habit to depoſit their ſpawny material on the leaves and vegetables which lie juſt below the ſurface of the water, which is in all probability the moſt favourable ſituation for it in different reſpects. While in thoſe fiſhes which caſt their ſpawn in the winter ſeaſon, ſuch as the ſalmon, trout, herring, and many other ſorts, ſpots and places very near the ſources or beginnings of rivers and ſtreams, or the more rapid freſh-water currents, are moſtly ſought for and fixed upon in this intention, where there is a conſtant flow of freſh water, where all ſtagnation is prevented, and where the water is the moſt fully aerated, either in its natural ſituation or during its fall in rain, as being probably the moſt ſuitable and favourable for the purpoſe. A proper and ſuitable degree of warmth may alſo be neceſſary in this buſineſs.

In all other caſes the fiſhes probably depoſit their ſpawny oviparous matters in ſuch ſituations as are the moſt ſuitable to their particular economies, and where there is the neceſſary heat, as well as where the water is the moſt fully ſaturated and impregnated with air, as it is now well aſcertained, that their impregnated ſpawny oviparous matters do not produce young ones, any more than ſeeds vegetate, except where they are freely ſupplied with air. The fiſh in the egg or ſpawn, derives its oxygen from the air which is diſſolved in the water that ſurrounds or flows over it, which, in the firſt of the above caſes, is much ſupplied to the water by the leaves of the plants on which it is depoſited, in performing their healthy functions; which alſo probably afford a better and more ſuitable ſituation for the male fiſhes impregnating it upon than any others: and in the latter caſe, it is gained from the perpetual flowings of ſuch freſh and fully aerated waters over it, after it has been the moſt conveniently and effectually impregnated in ſuch ſhallow parts, currents, and ſtreamlets. It has indeed been ſuggeſted, that in this latter caſe, it is the inſtinct leading the fiſhes to provide a proper ſupply of air for their ſpawny oviparous material, which is to be depoſited, that carries or forces them from the ſeas, lakes, and other ſimilar ſituations, into mountainous countries; and which impels and induces them to move againſt the ſtreams, as well as to endeavour and make efforts for overleaping weirs, cataracts, mill-dams, and other ſimilar erections and works. See Seed.

The ſpawning and generation of fiſh was however formerly conſidered as of a very different nature, and as being performed in a very different manner. It is ſtated, in ſpeaking of the herring, by the writer of a paper in the third volume of the "Tranſactions of the Highland Society of Scotland," that a very ſingular and ſeemingly unphiloſophical notion had been held with regard to the impregnation of the ova or eggs of fiſh, and which is not by any means the doctrine or hypotheſis of yeſterday, but which has prevailed, in a greater or leſs degree, for upwards of two thouſand years; that is, from the days of Herodotus, who in treating and ſpeaking of the fiſh in the Nile, makes the following obſervation. "At the ſeaſon of ſpawning they move in vaſt multitudes towards the ſea, the males lead the way, and emit the engendering principle in their paſſage; this the females *abſorb* as they follow, and in conſequence conceive, and when their ova are depoſited, they are conſequently matured into fry." Beloe's Herod.

And ſtrange and abſurd as this ſuppoſition and proceſs ſeem to be, it is aſſerted, it is ſaid, to be the caſe by Linnæus, the moſt learned of all others in the ſcience of animal hiſtory: he tenaciouſly affirms, it is maintained, that there can be no impregnation of the eggs of any animal out of the body, and that as fiſh have no organs of generation, that deficiency is made up for by adopting the ſyſtem or notion of Herodotus. This abſurd and unfounded notion has likewiſe, it is added, been attempted to be ſupported by Kalm, the friend and countryman of the above celebrated naturaliſt, on a ſtory ſuppoſed to have been told by Franklin about two rivers in his province (New England in North America,) which fell into the ſea nearly together; in one of which no herrings were ever taken, while in the other they were abundantly caught; the fiſh, when they come to depoſit their ſpawn, always paſſing up that river without ever entering the other. In order to try to make the fiſh take to the other river, this perſon is ſaid to have put out his nets and taken ſome of them, as they were coming up for ſpawning in the productive river. He is ſaid to have taken "the *ſpawn out of them*, and to have carefully carried it acroſs the land into the other river, where *it was hatched*, and the conſequence was, that every year afterwards they caught more herrings in that river; and this is, it is ſaid, ſtill the caſe." But on inquiry in that country, the writer of the above paper remarks, both the river and the ſtory were unknown to all who were inquired of about the matter.

The ſame ſtory is ſince ſuppoſed to have been trumped up by a French writer of the name of Nouel, with this ſtrong ſhade of difference; that the former *cuts* the ova out of the belly of the herring, while the latter ſays, that the ſpawn was collected from off plants, where it had been depoſited. At one of the ſittings of the National Inſtitute in France, in the year 1799, a memoir was read by this member of inſtruction at Rouen, on the means and advantages of naturalizing the herring, a ſalt-water fiſh, in the water of the Seine, near its mouth, &c.; in which, after noticing the various means by which this may be accompliſhed, it is obſerved, that "herrings having been found aſcending from the ſea into one river of the American province, (noticed above,) while a ſingle individual was never ſeen in another, ſeparated from the other by a narrow tongue of land, and which alſo communicated with the ſea, this philoſopher (Dr. Franklin) took the *leaves off ſome plants on which the herrings had depoſited their ova*, already fecundated, and conveyed them to the river which was deprived of the annual viſit of theſe fiſh. The ſucceſs of the experiment ſurpaſſed his expectation, the ova was completely productive, and the following year the river was peopled with a numerous ſhoal of herrings, which, ſince that time, continued to frequent it." Phil. Mag. vol. x. p. 163.

This account the writer of the above paper conſiders as evidently founded upon the former, and both, he thinks, come in a very queſtionable ſhape; however, the theory of the latter is ſuppoſed more rational, and not entirely againſt eſtabliſhed facts; though it ſhould be conſidered, he conceives, that the European herring is not a native of freſh water, and, as he thinks, never will be naturalized in ſuch waters; but that the ſpawn of fiſhes, being fecundated in their own waters, may be tranſported; and when placed in the ſame homogeneal element upon leaves, ſand, or other matters, where the ſun and air, as we have ſeen above, can have free acceſs, or a proper heat, with oxygen air, as has been ſhewn already, received, ſuch ova, raw, or eggs, will be animated and become fry in the ſame time they would have done in their parent beds, cannot be doubted. This is a practice, it is ſaid, which is well known in China; the Miſſionaries to which have noticed two or three things about it which are ſingular enough; the firſt of which is, that in the great river Yangtſe Kyang, not far from the city Kyus-king-fu, in the province of Kyang-ſi, a prodigious number of barks meet every year to buy the ſpawn of fiſhes. About May the people of the country dam up the river for nine or ten leagues together, in ſeveral places, with mats and hurdles, leaving only room enough for barks to paſs, in order to ſtop the ſpawn, which they know how to diſtinguiſh at firſt ſight, though the water is ſcarcely altered; with this water mixed with the ſpawn, they fill ſeveral veſſels to ſell to the merchants, who, at this ſeaſon, arrive in great numbers to buy and tranſport it into divers provinces, taking care to have it ſtirred up from time to time: this water is ſold by meaſure to ſuch as have fiſh-ponds and pools belonging to their houſes. The manner of propagating the gold-fiſh from ſpawn is likewiſe deſerving of attentive conſideration. Du Halde's Deſcrip. of China.

It is ſuppoſed by the writer of the paper, that herrings which caſt their ſpawn in the winter months, without doubt depoſit it on our ſhores; but whether upon gravel, ſand, ſtones, fuci, or other plants, is not well aſcertained; but thus far we know, it is ſaid, that it cannot be in deep water, unleſs we ſuppoſe it to have ſuch a buoyancy as to be within reach of the ſun's genial influence, and, as has been ſince ſhewn, that of the free action of the air.

It is believed, and the ſame writer thinks with reaſon, that it is impregnated by the male after it is emitted by the ſpawner or ſpawning-fiſh. The raw ſpawn, or eggs, of theſe fiſh, become animated, it is ſaid, in the month of April. It is noticed, that the *fucus palmatus*, and indeed all the numerous ſpecies of fuci which grow upon our coaſts, it is hardly to be doubted, harbour the ſpawn of fiſhes; but that the opinion may readily be either confirmed or confuted by the aſſiſtance of a glaſs of moderate magnifying power.

It is ſuggeſted, likewiſe, that the cauſe or reaſon of the herring's quitting the deep ſeas, is unqueſtionably that of its caſting its ſpawn in its native water, as the banks and mouths of the rivers where it was produced. And the ſame is the caſe with the ſalmon, the ſhad, the pilchard, and ſome others; all of which prefer their natal waters for the purpoſe of ſpawning in; and though the herring and pilchard ſometimes deviate from this courſe, the ſalmon and ſhad do it very ſeldom, being more ſober and ſteady in their attachment to their parent haunts. The heavieſt ſalmon are met with in the large rivers, and the largeſt herrings in the deep waters, each coaſt and river producing fiſh which are different in taſte, ſize, and appearance, as is remarkably ſeen in the ſhads and ſalmons of different rivers, and the herrings of different ſituations. The fry of the herring, as well as of the ſalmon, when they have attained ſufficient ſize and ſtrength, quit the ſhallows and make for the deeps: when the ſhoals of the former enter the bays, and other ſimilar places, the young ones are noticed to take their final departure from them.

The fecundity of different kinds of fiſhes is very different; but that of the herring and ſome others is very great. See Spawn, *Fiſh*.

Spawning or *Laying Oyſter-Beds*, the manner of preparing, diſtributing, and managing them, in the mouths of the breeding-rivers in particular counties and diſtricts, as in Eſſex, and probably ſome others. The exact method of performing the buſineſs has not been deſcribed; but they are ſpawned or laid ſomewhat in the bed-manner. The principal rivers in the county of Eſſex, where this ſort of work, or that of breeding oyſters, is carried on, according to the Corrected Agricultural Report of that diſtrict, are thoſe of the Crouch, the Blackwater, and the Coln; but the firſt is by far the moſt certain in produce of any of them. The beds, or layings, are made in the creeks, and other ſimilar places, on the ſides or parts which adjoin the mouths, openings, or beginnings of theſe rivers. It is from theſe rivers that the oyſter-layings, or beds, are uſually ſtocked; though ſome are conſtantly ſupplied from Portſmouth, or places in its neighbourhood, being brought in the largeſt ſort of oyſter-veſſels, not only into this county, but Kent, where they are laid for the enſuing ſeaſon. The Colcheſter oyſter-beds are chiefly at Wivenhoe, being partly ſupplied by the Kentiſh oyſter-ſmacks. The beds, or layings, in theſe different ſituations, are likewiſe, in all probability, ſupplied or furniſhed with oyſters from ſeveral other places on the ſouthern coaſt of this country, as well as the northern one of France.

The breeding-rivers in the county of Eſſex are ſaid to be very uncertain as to the quantity of oyſters they produce; as in ſome ſeaſons they afford a great quantity, while at other times they only produce what is called a good ſprinkling, and ſometimes there is none at all. But they ſeldom all produce or fail, it is obſerved, in the ſame ſeaſon. See Oyster and *Oyſter*-Fishery.

The oyſter-fiſheries, in different places, are of very great importance to the country at large, as well as to particular counties and diſtricts, eſpecially that of Eſſex; as they employ great numbers of ſmall veſſels, require the labour of many men, and afford conſiderable profit in the produce of food which they ſupply, as being principally an article of luxury. In the county juſt mentioned there are ſeveral of theſe oyſter-fiſheries. In the Blackwater river and neighbouring parts, there is a conſiderable fiſhery of this nature; and Weſt-Merſea is one of the principal ſtations of the dredgers: above thirty boats, it is ſaid, belong to the iſland, and are almoſt conſtantly at work in this buſineſs. Veſſels come from Kent to purchaſe the oyſters, and they ſell ſome to Wivenhoe, where what are called the Colcheſter beds are ſituated. They are ſold by the tub of two buſhels, and are generally from 4*s.* to 6*s.* a tub; but at preſent (1807) 6*s.* A dredging-boat is from fourteen to thirty or forty tons burthen: all are decked and built at Wivenhoe, Brightlingſea, and places thereabouts. The price is 10*l.* a ton for the hull of the veſſel only; the fitting out of one of twenty tons requiring the amount of 150*l.* From two to four men are required for each veſſel, who are paid by ſhares; and the maſter has a ſhare for the veſſel. In the ſpring ſeaſon they go to dredge on the coaſts of Hants and Dorſet. Sometimes one hundred and thirty veſſels have been counted at work within ſight of Merſea. This oyſter-fiſhery is, it is ſaid, an object of conſiderable conſequence to the country, from the earnings being great, and ſome other circumſtances: but when the men die, their families, it is ſaid, come to the pariſh, greatly increaſed by the number of apprentices which they have taken. Nothing, however, the writer of the report thinks, can be ſo prepoſterous as a police of the poor, which permits the benefits of commerce and manufactures to load the land with rates to the amount of 8*s.* in the pound, when a very ſmall contribution by a box-club, or benefit ſociety, would readily prevent the evil. See SOCIETIES, *Friendly*.

The following intereſting account of the oyſter-buſineſs in the ſame diſtrict, is from Mr. Bennet Hawes of Merſea, given as from his own local knowledge of the places where it is carried on, in the above report. The number of veſſels which are employed in it, of from eight to forty or fifty tons, is nearly two hundred, in which are employed from four hundred to five hundred men and boys. A veſſel carrying three men has one ſhare and a half of all the earnings, and the men one ſhare each. Large veſſels have generally, it is ſaid, two ſhares; but none, it is believed, more than this.

It is ſaid that the veſſels which are built at Eaſt Donyland, Wivenhoe, Brightlingſea, Burnham, and Merſea, for this buſineſs, will laſt from thirty to forty years, when proper care is taken of them. The writer was informed by a perſon then living at Wivenhoe, that he had, within the laſt twenty years, built one hundred veſſels for the oyſter buſineſs alone.

There has been an increaſe of boats, and of courſe of men, of more than one half within the laſt thirty years.

At Burnham they have ſeven dredging ſmacks, belonging to the company that hire the river of ſir Henry Mildmay, beſides four other private ones, and ſome ſmaller veſſels. The ſmacks are from eighteen to twenty tons. And there are only about one hundred fiſhermen and ſailors about the place, which are much too few, it is thought, for ſo fine a river.

Moſt of the veſſels of ſixteen tons and upwards, go, it is ſaid, to Portſmouth, or places adjacent, in the month of March, to catch and carry oyſters; thoſe under twenty-five tons being employed in catching them, and the larger ones in carrying them into this county and Kent, to be uſed as noticed above; they generally return from thence in the month of June, when the large ones go after mackarel, herrings, and ſprats, during the latter part of the ſummer, and in the enſuing winter, the ſmaller ones to the catching of oyſters in the breeding rivers, as above.

The oyſters are ſold to London, Hamburgh, Bremen, and, in time of peace, to Holland, France, and Flanders.

The price has varied but little for theſe laſt ten years.

The quantity conſumed in a ſeaſon is ſcarcely to be calculated; but it is ſuppoſed that it cannot be leſs than 12,000 or 15,000 buſhels.

This ſort of fiſhery is ſo much blended with the others, that it is almoſt impoſſible to ſtate the capital which is employed in it, but it is ſuppoſed to be from 60,000*l.* to 80,000*l.*

SPAWNING *Muſhroom-Beds*, in *Gardening*, the practice of planting or putting the muſhroom ſpawn into the beds or ridges formed for raiſing crops of this ſort. It is performed in ſeveral different manners, as by putting it into the dungy matter immediately below the ſurface of the beds, which is called ſpawning in the dung; by depoſiting it upon the ſurface of the dung, which is termed ſpawning on the ſurface; and by placing it in the mould by which the beds have been previouſly covered, which is denominated ſpawning in the earth. In all theſe modes of performing the work of ſpawning the beds, they are afterwards to be earthed or moulded over in a neat even manner, with finely reduced rich, loamy, mellow, dry, mouldy earth, ſo as to perfectly cover in the planted ſpawny ſubſtance, this being done in the two firſt methods of planting, to a much greater depth than in the laſt mode, where an earthy coat, or caſing, has been before ſupplied; an inch and a half, or two inches in depth of mould, being neceſſary in the former caſes, while an inch or leſs may be fully ſufficient in the latter caſe. The ſpawn is properly divided into pieces, and put into the beds in all theſe modes in a regular manner, at narrow diſtances, both in the rows and ſpaces between them, as about ſix or ſeven inches in each, over the whole of the different ſides and ends of them. There is little difference in theſe modes of putting in the ſpawn, except that in the two firſt, and eſpecially in the ſecond, it can be laid in rather more cloſely than in the laſt, by which means, ſometimes, a more forward and plentiful ſupply of muſhrooms is produced.

After the earthing has been properly accompliſhed in theſe different caſes, the beds are ready for the reception of the ſtraw coverings, as no light is ever requiſite in the growth of theſe crops. Theſe ſtraw coverings ſhould invariably be applied as ſoon as ever the ſtate of the beds, in regard to the heat they produce and retain, will permit, after the ſpawning of them is finiſhed. It ſhould be done to a conſiderable thickneſs, eſpecially where the beds are not in ſheds, but expoſed to the effects of the weather, in order to afford the ſpawn a proper degree of heat and full protection. Such ſtrawy littery materials may be gradually ſhook upon them, from the thickneſs of half a foot, to ſuch depths as are ſufficient to produce a ſuitable warmth for promoting the growth of the ſpawny material. They are to be lightly and regularly ſhaken on over the whole, and to remain conſtantly, having in ſome caſes other ſorts of coverings laid over them, as no ſort of moiſture muſt come near the ſpawn in theſe caſes.

As little expoſure to the full air as poſſible, after ſpawning the beds, ſhould take place in performing any ſort of work about them, as there is much injury and check produced by it in the growth of the ſpawn, and, of courſe, in the crops to be raiſed by it.

The proper running and knitting of the ſpawn, which may be ſeen by turning up a little of the ſtrawy coverings, ſhews the ſpawning of the beds to have been ſucceſsfully performed; but this ſhould not be judged of too haſtily, as this ſort of ſpawn is ſometimes ſlow in coming into an active ſtate of vegetation. There is alſo a fine full ſmell of the muſhroom in all ſuch caſes. See AGARICUS.

SPAWS, mineral waters ariſing out of the earth; impregnated with nitre, ſulphur, alum, bitumen, copperas, or other mineral matter, in paſſing through the ſtrata thereof; and hence endued with ſome medicinal qualities, cathartic, diuretic, emetic, alterant, or the like. See *Mineral* WATERS and SPA.

SPAX, a name given by ſome authors to the common tænia, a ſmall fiſh of the anguilliform kind, frequent on the ſhores of Italy.

SPAYING, in *Rural Economy*, the operation of cutting, caſtrating, or removing the female parts of different kinds of animals, as ſows, heifers, mares, &c. in order to prevent any future conception, and promote their fattening. It is uſually performed by cutting them in the mid-flank, on the left ſide, with a ſharp knife or lancet, in order to extirpate or cut off the parts deſtined to conception, and then ſtitching up the wound, anointing the part with tar-ſalve, and keeping the animal warm for two or three days. The general way is to make the inciſion in a ſloping manner, two inches and a half long, that the fore-finger may be put in towards the back, to feel for the ovaries, which are two kernels as big as acorns, one on each ſide of the uterus, one of which being drawn to the wound, the cord or ſtring is cut, and thus both taken out.

It may be noticed, that in the Annals of Agriculture, Mr. Foot has ſuggeſted the practice of ſpaying old cows and heifers; as it is a method, he apprehends, that might be performed with ſafety, and prove of general uſe in grazing; as cows, when they grow old and fail in their milk, are often attended with difficulty, where the bull goes at large, to keep them from him, eſpecially on commons, during the ſummer, which put him on trying the experiment on a cow of ſmall value, whoſe profit for the pail was ſo far over, that ſhe would not milk for about three months before ſhe became dry. After ſhe had calved about a month, he had her cut; the operator was an ingenious perſon, and performed the buſineſs well, that with a little care of keeping her from the cold (being early in the ſpring) for about a fortnight he thought her out of danger; and continued milking her as uſual all the time. She ſoon began to thrive, gaining fleſh, and before the ſummer was over, by the time ſhe was quite dry, was much improved, though kept no better than the other part of the dairy on very middling paſturage. At Michaelmas, had ſhe been put to turnips, or good rouen, ſhe would have been fat by Chriſtmas, or ſoon after. When killed, ſhe ſold at 3*s.* 6*d.* a ſtone, about half fat at that time, which he laid at one ſhilling a ſtone more than ſhe would have done had ſhe not been cut. And afterwards he had two others cut, that continued to be milked, and grazed well; one he had killed, the other he ſold alive, which improved and paid beyond expectation. And though little has yet been done in this way, he is perſuaded it will be found of general utility, if attended to. But, however, lately he accidentally met the perſon that performed the operation, who informed him that he had been ſent for within twelve months, or thereabouts, to cut near forty in like manner, which having all done well, none failed; that there appears little or no danger in the caſe; and he believes it may be found of great advantage to the grazier and farmer, if they are inclined to practiſe it, as well as to the public at large. In confirmation of the above, the perſons who have tried the experiment are, he is informed, William Colhoun, eſq. Norfolk, who has cut eight; Mr. Martin, Exning, Suffolk, who has cut ſix; Mr. Cayſon, Chippenham, who has had the operation performed on twenty; and Mr. Robinſon, Eriſwell, who has performed it on four or ſix.

And he may further add, that moſt of theſe were young heifers between two and three years old (ſome old cows), that had not taken bull; the young ſtock appears to thrive apace, and grow in ſize, as well as to be likely to anſwer for the butcher ſoon; they may be fattened with turnips in the winter, or kept on another ſummer, as the grazier pleaſes. And in Yorkſhire it is very common to fatten their heifers at three years old, which anſwer as great a purpoſe for grazing, and are more profitable than older ſteers or heifers, &c. but thoſe are kept from the bull.

Farther, although there is a method generally practiſed in ſpaying calves that are intended for heifers of that name, which are uſually cut about ſix weeks or two months old, yet this other method of treatment, he thinks, is preferable and not ſo dangerous, for the two-years old beaſts may be ſuppoſed ſtronger and more fit to undergo the operation; and, in the next place, it is performed quite differently; what is cut away, is only the ends of what is termed the *luſts*, or generative parts, which are not, when ſeparated from the other parts, bigger than the end of a man's thumb to the firſt joint, that makes the operation leſs painful and dangerous when rightly performed. But he would not adviſe every butcher, or inexperienced artiſt, to undertake what they do not underſtand. He thinks this obſervation is due to the operators, who have cut upwards of forty head of cow-ſtock in this manner, (as they informed him,) which have all done, and are doing, well, and he recommends them to public encouragement in an art that is likely to be attended with general utility to the public. They are William Bailey and ſon, Lakenheath, Suffolk. He may further obſerve, that a heifer at two or three years old may be defective in the bag, in the loſs of teats, or thoſe of ſmall ſize, not larger than an ewe's, which ſeldom are profitable for the pail, which may be cut after this mode and grazed.

And Mr. Marſhall, in his Rural Economy of Yorkſhire, remarks, that it is a fact well eſtabliſhed in the common practice of that diſtrict, that ſpayed heifers work better, and have, in general, more wind, than oxen; and it is not doubted that ſpayed mares would have an equal preference to geldings. The reaſon held out againſt this practice, though formidable at firſt ſight, proves a mere ſhadow on examination. The ſpaying of fillies would undoubtedly ſpoil them for brood mares. But does not the gelding of a colt ſpoil him for a ſtallion? What breeder, when his mares foal, wiſhes for fillies? and what dealer would not give 2*s.* 6*d.* for each, to have his mares changed into geldings, or perhaps into animals ſuperior to geldings? Beſides, in the ſpring of the year, open mares are faint and troubleſome. The only requiſites appear to be a ſafe cutter, and a man of ſpirit to ſet him to work, to bring the ſpaying of female foals into common practice; and it does not follow that, becauſe a part of the female foals ſhould be cut, there would not be open mares to breed from; more than it does, that becauſe ſome heifers are ſpayed for the yoke, or for fattening, there are not cows ſufficient for the purpoſes of breeding, and the dairy. He does not mean, however, to recommend a practice of which he has had no experience; but if the experiment has not been tried, it ſtrikes him forcibly, that it is worth the trial; and that it is more than time it were ſet about. Since this, he however ſtates, that it had been tried in the ſouthern diſtricts, as he ſaw a mare in 1791, then riſing five or ſix years old, which had been ſpayed at eight days old by a colt-cutter in the neighbourhood of Petworth; and that ſhe was a well-bred mare, and of a ſize proper for hunting. The farmer to whom ſhe belonged aſked ſeventy guineas for her, a proof that in his eſtimation, at leaſt, ſhe had not been injured by the operation. And it is probable, that this practice had been attempted long before that period. See CATTLE.

There can be no doubt but that the notion of injury being done by the ſpaying of female animals is wholly erroneous, and without any foundation in truth or correct obſervation, as the experience of every day ſhews it to be ſo in the moſt full and ſatisfactory manner. The chief reaſon why a practice, which is beneficial in ſo many points of view to the intereſts and advantages of the farmer, has been ſo little attended to, is the difficulty which is conſtantly experienced from the want of a ſufficient number of expert and proper perſons for performing the operation. Such perſons are far from being common in any, much leſs in every diſtrict, as ſome knowledge of a nature which is not readily acquired, and much experience in the practice of cutting, are indiſpenſably neceſſary to the ſucceſs of the undertaking. Whenever, however, the utility and benefits of the practice become better underſtood and more fully appreciated by the farmer, and the operators more numerous, much greater attention and importance will be beſtowed upon it, as it is capable of relieving him from much trouble, of greatly promoting his profits, and of benefiting him in a variety of ways. The facts are long ſince well proved and aſcertained, that animals which have undergone this operation, are more diſpoſed to feed or take on fleſh, more quiet in their habits, and capable of being managed with much greater eaſe and facility in any way whatever, than they were before it was performed. It may alſo have advantages in other ways, in different ſorts of animals; it may render the filly, in the horſe kind, nearly equal to the gelt colt for ſeveral different uſes; and the heifer, in the neat cattle kind, nearly equal to the ox, for all ſorts of farm-labour. The females of ſome other ſorts of animals may likewiſe, by this means, be made to nearly equal the caſtrated males in uſefulneſs for a variety of purpoſes and intentions; and in all caſes be rendered a good deal more valuable, or manageable, than they are in the preſent cuſtom which prevails with them.

Spaying *of Fiſh*. See *Caſtration of* Fish.

SPEAKER *of the Houſe of Commons*, a member of the houſe, elected by a majority of the votes, to act as chairman, or preſident, in putting queſtions, reading briefs or bills, keeping order, reprimanding the refractory, adjourning the houſe, &c.

The firſt thing done by the commons upon the firſt meeting of a parliament is to chooſe a ſpeaker, who is to be approved of by the king; and who, upon his admiſſion, begs his majeſty, that the commons, during their ſitting, may have *free acceſs to his majeſty*, *freedom of ſpeech in their own houſe*, and *ſecurity from arreſts*. See Parliament.

The ſpeaker is not allowed to perſuade, or diſſuade, in paſſing of a bill, but only to make a ſhort and plain narrative; nor to vote, unleſs the houſe be equally divided. The lord chancellor, or keeper, or any other appointed by the king's commiſſion, is uſually *ſpeaker of the houſe of lords*; and if none be thus appointed, the houſe of lords (it is ſaid) may elect. The ſpeaker of the houſe of lords, if a lord of parliament, may give his opinion, or argue any queſtion in the houſe.

The *ſpeaker of the convocation* is called *prolocutor*.

Speaker is uſed by *rhetorical* writers in the ſame ſenſe with orator. See Oratory. See alſo Elocution, Pronunciation, and Action.

As to the character and addreſs of an orator, it is neceſſary that every thing appear eaſy and natural, and the diſpoſition of the ſpeaker be diſcovered by his words: thus would he expreſs what Quintilian calls a propriety of manners: accordingly, the ancient rhetoricians made it a neceſſary qualification in an orator, to be a good man; ſince he ſhould always be conſiſtent with himſelf, or, as we ſay, talk in character. There are four qualifications more eſpecially ſuited to the character of an orator, which ſhould always appear in his diſcourſes, in order to render what he ſays acceptable to his hearers; theſe are wiſdom, integrity, benevolence, and modeſty. See an illuſtration and inforcement of them in Ward's Orat. vol. i. lect. 10.

SPEAKING, the art, or act, of expreſſing one's thoughts in articulate ſounds or words.

Pliny, Ælian, Plutarch, and other authors, make mention of ſeveral beaſts that have ſpoken: and Pliny himſelf ſpeaks with aſſurance, in his hiſtory, of an ox that ſpoke. Philoſtratus, in his life of Apollonius, gives the like quality to an elm, and even to ſhips. Homer makes Xanthos, one of Achilles's horſes, ſpeak; in which he has been followed by Oppian. But theſe are all fabulous ſtories; we have much better authority for a ſerpent and an aſs's ſpeaking, unleſs the caſes here referred to be allegorical. See Language.

Speaking-*Trumpet*. See Trumpet, and Stentorophonic.

SPEAN, in *Geography*, a river of Scotland, which forms a communication between loch Laggan and loch Lochly.

SPEAR, in *Armoury*. See Lance.

Spear, in the *Manege*. The feather of a horſe, called the *ſtroke of the ſpear*, is a mark in the neck, or near the ſhoulder of ſome Barbs, and ſome Turkey and Spaniſh horſes, repreſenting the blow or cut of a ſpear in thoſe places, with ſome reſemblance of a ſcar. This feather is an infallible ſign of a good horſe.

Spear-*Hand*, or *ſword-hand* of a horſeman, is his right hand.

Spear-*Foot*, of a horſe, is the far-foot behind. See Far.

Spear, *King's*, in *Botany*. See Asphodelus.

Spear-*Thiſtle*, in *Agriculture*, a plant of the weed kind, which is often troubleſome in land. It is a biennial, and of courſe readily deſtroyed by taking care to have it mown down or cut over before the time of its perfecting its ſeeds. It is not unfrequently termed the bur-thiſtle.

SPEARMINT, in *Botany*. See Mentha.

SPEARWORT, the Engliſh name of the ranunculus flammeus.

This is with us generally eſteemed a poiſon, but the Scots uſe it as a medicine. They beat it, and ſqueeze out the juice, which they take as a purge, drinking a little melted butter or oil before and after it, to prevent its taking the ſkin off from the throat. It operates very violently, but with robuſt conſtitutions it does very well.

They uſe it alſo externally in caſes of pain in the head, or any other part of the body. They bruiſe the leaves to a ſort of paſte, and apply them to the part; they ſoon raiſe a bliſter, and a large quantity of water is diſcharged, after which the pain goes off. This is a ſhort way of bliſtering, and anſwers as ſafely and as well as our's by the cantharides: but it is a wonder that people, who ſee this quality in the plant, ſhould dare to take it into their mouths and ſtomachs.

Spearwort is very prejudicial to ſheep, as cauſing the rot. It is alſo troubleſome in lands of the more wet kinds.

SPECIA, in *Geography*, an iſland in the Grecian Archipelago, about 10 miles in circumference, at the entrance of the gulf of Napoli. N. lat. 37° 15′. E. long. 23° 23′.

Specia *Poulo*, a ſmall iſland near the ſouth coaſt of Specia.

SPECIAL, ſomething that is particular, or has a particular deſignation; from the Latin *ſpecies*: in oppoſition to *general*, of *genus*. See General, Particular, Species, and Genus.

The king, in his letters, frequently ſays, of our ſpecial grace, full power, and royal authority.

Special *Aſſiſe*, *Attorney*, *Bail*, *Caſe*, *Fee-tail*, *Iſſue*, *Jury*, *Plea*, *Seſſion*, *Statute*, *Verdict*, and *Warrant*. See the articles.

SPECIALTY, in *Law*, is moſt commonly taken for a bond, bill, or other inſtrument in writing. Accordingly, debts by ſpecialty, or ſpecial contract, are ſuch by which a ſum of money becomes, or is acknowledged to be, due by deed or inſtrument under ſeal: ſuch as by deed of covenant, by deed of ſale, by leaſe reſerving rent, or by bond or obligation. Theſe are looked upon as the next claſs of debts after thoſe of record, being confirmed by ſpecial evidence under ſeal.

SPECIE, in *Commerce*, gold and ſilver coin, diſtinguiſhed from paper-money; but in Germany, the word ſpecie is applied to the rix-dollar, and its diviſions, as coined after the rate of the empire.

SPECIES, an idea, which relates to ſome other more general one, or is compriſed under a more univerſal diviſion of a genus; as in the definition of any thing, we obtain its general nature or genus, by comparing it with other things that are moſt like to itſelf, and obſerving wherein its eſſence or nature agrees with them; ſo we obtain the eſſential or ſpecific difference, by conſidering the moſt remarkable and primary attribute, property, or idea, in which this differs from thoſe other things that are moſt like it: and this attribute, or ſpecific difference, diſtinguiſhes each ſpecies from one another, while they ſtand ranked under the ſame genus.

The word is Latin, formed from the ancient verb *ſpecio, I ſee;* as if a ſpecies of things were a collection of all the things ſeen at one view.

Species is a mere term of relation: and the ſame idea may be a ſpecies, when compared to another more general one; and a genus, with regard to a more particular one. Thus body is a genus, with regard to an animate and inanimate body; and a ſpecies, with regard to ſubſtance.

The laſt ſpecies is that which can only be divided into individuals.

Animal is a ſpecies, with regard to body; and man is a ſpecies, with regard to animal. God deſtroyed mankind by the deluge; but he preſerved the ſpecies.

SPECIES, in *Logic*, is one of the five words, called by Porphyry, *univerſals.*

SPECIES, in *Rhetoric*, is that which comprehends under it all the individuals of the ſame nature. From hence, we may argue; he is a man, therefore he has a rational ſoul. And orators ſometimes take occaſion to deſcend from the theſis or genus, to the hypotheſis or ſpecies; that is, in treating upon what is more general to introduce ſome particular contained under it, for the better illuſtration of the general.

SPECIES, in the *Ancient Muſic*, denotes a ſubdiviſion of one of the genera.

The genera of muſic were three, the enharmonic, chromatic, and diatonic; the two laſt of which were variouſly ſubdivided into ſpecies: nor was the firſt without ſpecies, though thoſe had not particular names, as the ſpecies of the other two had. Theſe ſpecies were alſo called the *chroai*, colours of the genera. See GENUS.

SPECIES is alſo applied, by ancient muſicians, to the different diſpoſitions of the tones and ſemitones in a fourth, fifth, or octave. Hence they ſay there are three ſpecies of fourths, four of fifths, ſeven of octaves. Wallis's Append. Ptolem. Harm. p. 171.

The Grecians expreſſed this ſenſe of the term ſpecies by ειδος, or by σχημα. The Latin word, *figura*, has alſo been taken in the ſame ſenſe. Ariſtox. p. 6, 74. Ed. Meib. Wallis, ibid. p. 170.

SPECIES, in *Optics*, the image painted on the retina by the rays of light reflected from the ſeveral points of the ſurface of an object, received in at the pupilla, and collected in their paſſage through the cryſtalline, &c.

Philoſophers have been in great doubt, whether the ſpecies of objects, which give the ſoul an occaſion of ſeeing, are an effuſion of the ſubſtance of the body; or a mere impreſſion which they make on all ambient bodies, and which theſe all reflect, when in a proper diſtance and diſpoſition; or, laſtly, whether they are not ſome other more ſubtile body, as light, which receives all theſe impreſſions from bodies, and is continually ſent and returned from one to another, with the different figures and impreſſions it has taken. But the moderns have decided this point by their invention of artificial eyes, in which the ſpecies of objects are received on a paper or linen cloth, in the ſame manner as they are received in the natural eye. The ancients have diſtinguiſhed the ſpecies, by which objects become viſible, into *impreſſæ* and *expreſſæ.* The former are ſuch as come from without, or are ſent from the object to the organ; ſuch are thoſe we have already been ſpeaking of. And the latter are thoſe, on the contrary, which proceed from within; or that are ſent from the organ to the object.

Le Clerc, in his ſyſtem of viſion, by one of thoſe revolutions very frequent in philoſophical opinions, has called upon the ſtage again the ſpecies *expreſſæ* of the ancient philoſophers. For, according to him, it is not by ſpecies or images impreſſed on the optic nerve, that the ſoul ſees objects; but by rays, which ſhe herſelf directs to them, and which ſhe uſes as a blind man does his ſtaff, to grope out objects.

The Peripatetics account for viſion, from a kind of *intentional* ſpecies, thus: every object, ſay they, expreſſes a perfect image of itſelf on the air next to it. This expreſſes another leſs one on the air next to that; and this a third ſtill leſs. Thus are the images continued from the object to the cryſtalline, which theſe philoſophers hold the principal organ of ſeeing. Theſe they call *ſpecies intentionales;* and to account the better for their generation, they affirm, that objects exhibit them in the ſame manner, as mirrors do a man's face. See VISION.

SPECIES, in *Theology*, denote the appearances of the bread and wine in the ſacrament after conſecration. Or, as the Romaniſts define them, the accidents remaining in the bread and wine, by which they become ſenſible to us, after their ſubſtance is deſtroyed.

The ſpecies of the bread, &c. are its whiteneſs, quantity, figure, friableneſs, &c. Of wine, its flavour, quickneſs, ſpecific gravity, &c.

The generality of Romiſh divines hold, that the ſpecies are abſolute accidents. And the Carteſians, who are bound to deny any ſuch things as abſolute accidents, are greatly puzzled to explain the ſpecies, without incurring the cenſure of hereſy. F. Magnan is forced to aſſert, that the ſpecies are mere deluſions and appearances, which God impreſſes on our ſenſes.

SPECIES, in *Commerce*, are the ſeveral pieces of gold, ſilver, copper, &c. which, having paſſed their full preparation and coinage, are current in public.

SPECIES, *Decried*, or *cried down*, are ſuch as the ſovereign has forbidden to be received in payment.

SPECIES, *Light*, are thoſe which fall ſhort of the weight preſcribed by law.

The weights of the current coins, as coined, are now as follow; the ſtandard of gold being 3*l.* 17*s.* 10½*d. per* oz. the mint price of gold; and the ſtandard of ſilver being 5*s.* 2*d. per* oz. mint price of ſilver.

		dwt.	grs.
Gold,	guinea	5	9½
	half-guinea	2	16¾
Silver,	crown	19	8½
	half-crown	9	16¼
	ſhilling	4	20
	ſixpence	2	10

The current weight of gold:

	dwt.	grs.
Guinea	5	8
Half ditto	2	16

Under this weight no gold was allowed to paſs by proclamation.

Species, *Falſe*, are thoſe of different metal or alloy from what they ſhould be, &c.

Species, in *Algebra*, are the ſymbols, or characters, by which quantities are repreſented.

Species *Aromaticæ*, a new name given in the late London Diſpenſatory to the compoſition uſually called *ſpecies diambræ*. The College obſerved, that the intention of this medicine was beſt anſwered, by compoſing it of ſuch ſpices as the daily experience of the table ſhews were moſt grateful to the ſtomach, and by avoiding all ingredients which, though of the aromatic kind, are accompanied with any thing nauſeous and diſguſtful in their flavour; and, therefore, have ordered it to be now made in the following manner. Take cinnamon two ounces, cardamom-ſeeds, ginger, and long pepper, of each an ounce; make all together into a fine powder.

Species *e Scordio*, the ingredients of the diaſcordium electuary in a dry form. The recipe is ſomething altered in the late London Pharmacopeia, and ſtands thus: take bole armenic, four ounces; ſcordium, two ounces; cinnamon, an ounce and half; ſtorax, roots of tormentil, biſtort, gentian, dittany of Crete, galbanum, and gum arabic and red roſes, each an ounce; long pepper and ginger, each half an ounce; opium, three drachms; this may be left out at pleaſure; and all are to be beat to a fine powder.

Species, in *Gardening*, has ſome which conſiſt only of one, as the flowering ruſh, the hop, and ſome more; while in others they are numerous, as in the ſun-flower, the geranium, the honeyſuckle, the willow, and a great many more. There is often, too, ſome degree of ſimilarity in the culinary or domeſtic and economical uſes, as well as the medicinal properties, in the ſpecies of cultivated garden and other plants, which belong to the ſame genus or family, as in the caſes of garlick, onion, leek, ſhallot, and chives; cabbages, ſavoys, brocoli, and cauliflower; parſley and celery; the bay-tree, benjamin-tree, ſaſſafras, and cinnamon; mugwort, wormwood, tarragon, and ſouthernwood: and the ſame takes place in many other inſtances.

The ſpecies likewiſe, in ſome caſes, ſerves to denote the mode of culture and management which are neceſſary in the raiſing and growing of different plants, in the garden manner, as well as their habits of growth and production.

Species *of Plants*, in *Syſtematic Botany*, appear, as far as can be aſcertained from the univerſal experience of thoſe who are converſant with them, as well as from every thing that can be gathered from the records of remote antiquity, to remain diſtinct from each other, marked by their appropriate characters and qualities, and renewing themſelves periodically by ſexual generation. Such being the caſe with all the plants of which we have any knowledge, we conclude it to be ſo with the reſt, as well as with animals. The White Blackbird of Ariſtotle ſtill inhabits the Cyllenian groves and copſes of Arcadia, undiſturbed by the revolutions of two thouſand years; and we doubt not that the banks of the Alpheus have been fringed with the ſame violets and primroſes, through uncounted ages, as thoſe with which they are now, every ſpring, adorned.

Various plants indeed, and eſpecially domeſtic ones, like domeſtic animals, are found liable to ſome variations of colour, luxuriance, and ſenſible qualities, which have led curious inquirers to doubt whether any ſpecies are certainly permanent. This doubt could ariſe only from a ſlight view of the ſubject. Whatever caſual aberrations there may be in the ſeminal offspring of cultivated plants; a little obſervation will prove how tranſient ſuch varieties are, and how uniformly their deſcendants, if they be capable of producing any, reſume the natural characters of the ſpecies to which they belong. Nothing can better exemplify this fact, than the ſeries of experiments inſtituted, on a moſt extenſive ſcale, upon the Apple-tree, by the celebrated preſident of the Horticultural Society, Mr. Andrew Knight. They prove that every thing but ſexual propagation is only the extenſion of an individual, whoſe corporeal frame has but a certain limited exiſtence; the period of which is indeed much longer in ſome varieties than in others; and hence the valuable Golden-pippin and Nonpareil have enriched our orchards for a long courſe of years, while numerous new varieties of apples are found to endure but for a few ſeaſons. Some, however, promiſe to be more laſting, and to ſupply the place to our deſcendants, of thoſe kinds, of which we can tranſmit to them only the names. When varieties originate in the croſs impregnation of plants of different ſpecies, they partake of the inability to procreate which belongs to mule animals, and are moreover ſeldom capable of being long increaſed by cuttings, budding, or other methods. For confirmation of this, ſee the article Pelargonium.

The technical diſcrimination of the ſpecies of plants, but vaguely and ſuperficially attended to by the ancients, makes an intereſting part of the philoſophy of modern botany, which conſiders their differences as indiſputably founded in nature, and for the moſt part extends that opinion, even to thoſe aſſemblages of ſpecies which we term *genera*. On this ſubject the reader may conſult the article Genus.

Although the diſtinctive characters of genera are wiſely limited, by the moſt philoſophical botaniſts, to the parts of fructification, thoſe of ſpecies are allowed to be taken from any part of the plant. Some characters are found more important or conſtant in one tribe, others in another; none are abſolute, or invariably conſtant, in any. Number, which in the natural orders of *Caryophylleæ* and *Roſaceæ* will ſometimes afford even a generic diſtinction, in others, and even in what regards the ſtamens of the *Caryophylleæ* themſelves, will hardly be found to limit a ſpecies. The differences between ſimple or compound leaves, entire or indented, oppoſite or alternate ones, are uſually ſtriking and unchangeable; but exceptions may be found to all theſe. Colour of flowers is, on the other hand, ſeldom to be relied on as a ſpecific difference. It appears ſo in *Meſembryanthemum*, but to prove it the ſpecies muſt be cultivated from ſeed. Yet the yellow diſk of a compound flower has never been known to change hues with its blue or white radius, nor does ſuch a variation ſeem within the bounds of poſſibility. Pubeſcence is found variable both in ſtructure and quantity; but leſs, or not at all, ſo in direction. Hence the ſpecific characters of *Menthæ*, and more recently of the genus *Myoſotis*, have been determined better than by any other means.

The infloreſcence, or mode of connection of the flowers, is pointed out by Linnæus, as yielding the beſt ſpecific characters; though he, in theory at leaſt, excludes it from all authority in founding genera. In graſſes, nevertheleſs, every body recurs to this mark; though perhaps ſounder principles may hereafter be diſcovered for arranging even theſe.

The root almoſt invariably affords good and unchangeable ſpecific characters; but it is not always acceſſible, nor readily preſerved in a herbarium. Some graſſes moreover change their fibrous roots into bulbous ones, in conſequence of a fluctuation of ſoil or nutriment; and the bulbs of other plants very much alter their texture or appearance from ſimilar cauſes.

Great experience and ſagacity, with perhaps a peculiar talent, are requiſite to form a good judge of ſpecific characters. To convey a preciſe idea of them to others, requires a clearneſs of definition, and a command of language, granted to very few. Linnæus, with good reaſon, limits ſuch characters to a certain number of words, hardly exceeding twelve. However narrow theſe bounds may appear, we believe them to be in general, if not always, ſufficient; and every perſon will perceive that the conſequence of their tranſgreſſion is uſually feebleneſs, if not confuſion, of definition. It muſt always be remembered that ſpecific characters are *differences*, not *deſcriptions*. Hence a ſpecific character for a ſolitary ſpecies of any genus, is an abſurdity. It cannot contraſt ſuch a ſpecies with what are unknown, or perhaps do not exiſt. A ſhort deſcription may be very commodious or ſatisfactory to give an idea of the plant, eſpecially if the author miſtruſts his genus or its definition; but if the genus be good, the very characters which he will ſelect to delineate the habit, or prominent peculiarities, of the only known ſpecies, will, moſt likely, be common to any new ones that may ſubſequently be diſcovered.

Linnæus remarks, that the detection of genuine ſpecific diſtinctions is the ſummit of botanical ſkill. To which we may add, that thoſe have moſt excelled in this department who have caught the greateſt ſhare of the genius of this great man, whoſe definitions come as near to perfection as art can come to nature.

SPECIFIC, in *Philoſophy*, that which is proper and peculiar to any thing; or that characterizes it, and diſtinguiſhes it from every other thing. See PROPER, &c.

Thus, the attracting of iron is ſpecific to the load-ſtone, or is a ſpecific property of the load-ſtone. A juſt definition ſhould contain the ſpecific notion of the thing defined, or that which ſpecifies and diſtinguiſhes it from every thing elſe.

SPECIFIC, in *Medicine*, ſuch articles in the materia medica as have the ſpecial power of curing particular diſeaſes, in all perſons, and under all circumſtances, without demanding any attention to particular indications. In other words, a *ſpecific* is a certain antidote againſt a given diſeaſe. Notwithſtanding, however, the multitude of ſuch ſpecifics, which are every day announced by boaſting quacks, and teſtified to by all ranks of people, who are their dupes, it unfortunately happens that no ſuch remedies exiſt. As ſound ſcience has extended, all theſe vaunted ſpecifics have ſucceſſively been baniſhed from the confidence of men of ſenſe and information; and almoſt every remedy has ſome obvious action upon the animal ſyſtem, ſo that the principles of its operation in particular diſeaſes may be pointed out. Peruvian bark was formerly ſuppoſed to be a ſpecific for intermittents and agues; but it is now known to fail in many caſes, and not to be more efficacious than other medicines of a tonic power, ſuch as arſenic, and ſome combinations of bitters with aromatics, which are popularly uſed in agueiſh countries. The two medicines which approach the neareſt in their qualities to the character of *ſpecifics*, are *mercury*, as the antidote to the venereal poiſon, and *ſulphur*, to that of the itch. Indeed it is only in caſes of the actual exiſtence of a morbid poiſon, that any diſtinct antidote can poſſibly exiſt. But even with reſpect to theſe two medicines, it is well aſcertained that there are caſes of diſeaſe, ſo accurately reſembling lues venerea, as not to be diſtinguiſhable by the moſt acute and experienced eye, which nevertheleſs recover without the aid of mercury (ſee Mr. Abernethy's "Account of Diſeaſes which ſtrikingly reſemble the Venereal Diſeaſe"): and we know that the powers of ſulphur in curing the itch are conſiderably augmented by the addition of other ſubſtances, ſuch as hellebore, muriate of ammonia, the white oxyd of mercury, &c. All other inſtances of pretended ſpecifics are impoſitions.

SPECIFIC *Gravity*, in *Hydroſtatics*. See *Specific* GRAVITY.

SPECIFIC *Gravity of Living Men*. Mr. Robertſon, in order to determine the ſpecific gravity of men, prepared a ciſtern, 78 inches long, 30 inches wide, and 30 inches deep; and having procured 10 men for his purpoſe, the height of each was taken, and his weight; and afterwards they plunged ſucceſſively into the ciſtern. A ruler, graduated to inches and decimal parts of an inch, was fixed to one end of the ciſtern, and the height of the water noted before each man went in, and to what height it roſe when he immerſed himſelf under its ſurface.

The following table contains the ſeveral reſults of his experiments.

No. of Men.	Height.		Weight.	Height of Water before immerſed.	Height of Water when immerſed.	Water raiſed.	Solidity.	Weight of Water.
	Ft.	In.	Pounds.	In.	In.	In.		Pounds.
1	6	2	161	19.30	21.20	1.90	2.573	160.8
2	5	$10\frac{3}{8}$	147	19.25	21.16	1.91	2.586	161.6
3	5	$0\frac{1}{2}$	156	19.21	21.06	1.85	2.505	156.6
4	5	$6\frac{3}{4}$	140	19.17	21.21	2.04	2.763	172.6
5	5	$5\frac{7}{8}$	158	19.13	21.21	2.08	2.817	176.0
6	5	$5\frac{1}{2}$	158	19.09	21.26	2.17	2.939	183.7
7	5	$4\frac{3}{8}$	140	19.05	21.06	2.01	2.722	170.1
8	5	$3\frac{1}{8}$	132	19.01	20.86	1.85	2.505	156.6
9	5	$4\frac{1}{8}$	121	18.97	20.76	1.79	2.424	151.5
10	5	$3\frac{1}{4}$	146	18.93	20.66	1.73	2.343	146.4

One of the reaſons, Mr. Robertſon ſays, that induced him to make theſe experiments, was a deſire of knowing what quantity of fir or oak-timber would be ſufficient to keep a man afloat in river or ſea-water, thinking that moſt men were ſpecifically heavier than river or common freſh water; but the contrary appears from the trials above recited: for, excepting the firſt and laſt, every man was lighter than his equal bulk of freſh water, and much more ſo than his equal bulk of ſea-water: conſequently, if perſons who fall into water had preſence of mind enough to avoid the fright uſual on ſuch accidents, many might be preſerved from drowning; and a piece of wood, not larger than an oar, would buoy a man partly above water as long as he had ſpirits to keep his hold. Phil. Tranſ. vol. l. art. 5.

SPECIFIC *Gravity of Metals*. See the ſeveral metals.

SPECIFIC *Heat*. See HEAT.

SPECIFIC *Names*, in *Natural Hiſtory*, are thoſe epithets compoſed each of one or more terms, and placed after the generical name, in the denomination of any ſpecies of plant, animal, or mineral, expreſſing thoſe characters by which it differs from all the other ſpecies of that genus.

The more accurate of the modern naturaliſts have, in their ſeveral provinces, ſet about the reformation of the ſpecific names of things. They firſt obſerve, that many of the ſpecific names of the ancients no way anſwered the intent of their formation, but expreſſed the more trivial diſtinctions, or accidents, while they omitted the realities, and more eſſential grounds of diſtinction. On this foundation the critical writers of our times diſtinguiſh the old ſpecific names into the genuine or true, and the ſpurious or falſe ones.

The genuine names are thoſe which expreſs thoſe characters,

ters, by means of which the thing becomes a different ſpecies; theſe are invariable, and by theſe names the thing is, in ſome ſort, deſcribed. The falſe ones are thoſe ſpecific names which do not, and cannot diſtinguiſh the ſpecies called by them from the others of the ſame genus, which may as well belong to ſome other ſpecies as to that, and which therefore are of no uſe to the ſtudent. The true formation of theſe names is on the real characters of the body to be named; but inſtead of this, theſe falſe ones are often formed from accidental or variable diſtinctions.

Specific *Waters*. See Water.

SPECIFICATION, a term expreſſing the engineer's ſtatement of the particulars of width, depth, ſlopes, &c. which a certain length of canal is to have, when the excavation is to be made by contract.

Specification is likewiſe a term uſed in obtaining patents. See Patent.

SPECILLUM, a probe, one of the moſt common inſtruments of ſurgery. See *Surgical Plates*.

SPECIOUS Arithmetic. See Arithmetic.

SPECKHAVEN, in *Geography*, a harbour on the W. coaſt of Weſt Greenland. N. lat. 64°. W. long. 49° 40′.

SPECKLED Beans, in *Agriculture*, a term applied to ſome ſorts of the kidney-bean, which are occaſionally cultivated in the field, in ſome diſtricts. The principal varieties which are grown and cultivated in this way in ſome parts of the county of Kent, are the black ſpeckled and the red ſpeckled; but many others may be employed for the ſame purpoſe.

The tillage preparation of the land for field-crops of this ſort is the ſame as that which is made uſe of for the growth of the common pea and bean; and the manure, which is commonly ploughed in before the ſeed is put into the ground, is of the more rotten dung kind. See Peas and Beans.

The time of planting crops of this nature in the field is in the early part of the ſpring, as from about the eighth to the twentieth of May, as when it is done earlier, the crops are in danger of being injured, or wholly deſtroyed, by the occurrence of a froſty morning, which is then liable to take place.

In ſetting, the ſeed-beans are dropped by the hand into holes, or ſmall furrows or drills made for the purpoſe in the land, in the quantity of from five to ten gallons to the acre, in proportion to the ſize of the ſort which is employed; the ſmaller the ſort of bean, the leſs the quantity which is neceſſary.

The crops are repeatedly hoed while growing, ſo as to be kept perfectly clean and free from weeds of all kinds; and in their more early growth the fine mould is a little drawn up to the rows, in order to promote the advancing of the young plants.

The harveſting of the crops is by pulling up the plants by the roots, as the beans become ripe, during the beginning of the autumnal ſeaſon. The more early ſorts are commonly ready and fit to be pulled about the end of Auguſt; but the late ones are often not ripe and ready for pulling until the month of October. Thoſe which ripen ſo late in the ſeaſon, and are in danger of being injured by wet weather, are frequently tied up in ſmall bunches, and hung upon poles to finiſh their ripening, and, when thoroughly dry, are threſhed out and ſent to market, as they ſeldom keep well.

Theſe ſorts of bean-crops are much cultivated and attended to about the town of Sandwich, and in the Iſle of Thanet, in the ſame county, as well, perhaps, as in ſome other ſouthern parts of the iſland, for the purpoſe of ſupplying the London ſeedſmen with theſe kinds of beans. See Phaseolus.

This is a profitable ſort of culture in ſome caſes and ſeaſons, but liable to much uncertainty.

SPECTABILES, among the Romans, a title of honour given to the ſecond rank, or degree of nobility, under the Roman emperors, being unknown in the time of the republic. There were two other degrees; the firſt had the title of *illuſtres*, and the third that of *clariſſimi*.

SPECTACLE, Spectaculum, *Show*; ſome extraordinary object, which draws the view and attention; and is not beheld without ſome emotion or paſſion of the mind.

The term is chiefly uſed, by the ancients, for theatrical and amphitheatrical performances; for comedies, combats of gladiators, and of beaſts; and even for ſolemn proceſſions, as thoſe of the Circus, &c.

The people of Rome were extremely fond of ſpectacles; and the Roman hiſtorians obſerve, that there was no ſurer way of gaining their affections, and making parties to introduce tyranny and oppreſſion, than by the uſe of ſpectacles.

SPECTACLES, an optic machine, conſiſting of two lenſes ſet in a frame, and applied on the noſe, to aſſiſt in defects of the organ of ſight.

It is well known, that parallel rays, or ſuch rays as proceed from a very diſtant luminous point, will be collected, by the refractions of all the humours through which they muſt paſs in the eye, to a focus on the retina, which is the true place of the image. But at the ſame time it is evident, that if that be the focal diſtance for parallel rays, it cannot be the focal diſtance for diverging rays; or, in other words, when the objects are ſituated at a few feet diſtance from the eye, their true images muſt be formed farther back; conſequently their images upon the retina muſt be imperfect, unleſs the retina be ſituated farther back by an elongation of the axis of the eye, or the focal diſtance be ſhortened by the alteration of ſome other part. But ſince we may perceive either diſtant or near objects diſtinctly, it is evident that ſome ſuch alteration does actually and neceſſarily take place. This is called the adjuſtment, or accommodation of the eye for diſtinct viſion; but the difficulty is to determine how this adjuſtment is effected.

By ſome perſons it has been attributed to a change in the length of the eye, and by others to a change of curvature in the cornea; but ſome very recent experiments render thoſe alterations unlikely, at leaſt to the full amount of what may be required. Other ingenious perſons have attributed the alteration to a change either of the ſhape of the cryſtalline lens, or of its ſituation, or of both; and this opinion ſeems upon the whole to be nearer the truth.

That the eye cannot ſee both near and remote objects diſtinctly at the ſame time, may be eaſily proved. Let a tree, a houſe, or ſome other object, be upwards of fifty feet from you; ſhut one eye, and whilſt you are looking with a ſingle eye at the tree, &c. hold a pin, a pencil, or ſome other object, in the ſame direction, at about a foot diſtance from the eye; and it will be found, that whilſt you ſee the pin diſtinctly, the tree will appear indiſtinct; but if you adjuſt your eye ſo as to ſee the tree diſtinctly, then the pin will appear indiſtinct.

The eyes of ſome perſons are more capable of adjuſtment than thoſe of others. In old perſons the humours grow thicker, and the parts leſs pliable; hence their eyes are leſs capable of adjuſtment than thoſe of young perſons.

The eyes of ſome perſons can be adjuſted for diſtant objects better than for near objects, and *vice verſâ*. When the eye is defective, and by its ſize or other conformation, parallel rays form their foci before they arrive at the retina, then the perſon can ſee very near objects only. Such perſons are ſaid to be near-ſighted, or they are called *myopes*. When the eye is flatter than ordinary, then the foci of rays from pretty near objects are formed beyond the retina. Perſons with ſuch eyes are called *preſbytæ;* they can adjuſt their eyes for objects beyond a certain diſtance only. The latter is generally the caſe with old perſons; but the eyes of old perſons ſometimes are incapable of adjuſtment both for very near and for very diſtant objects. This comes from a rigidity or want of pliability in the parts. Thoſe defects are frequently brought on or increaſed by habit, as by the conſtant cuſtom of viewing objects either from too near or from too great a diſtance; as alſo by the uſe of improper glaſſes.

Thoſe imperfections may in a great meaſure be remedied by the uſe of proper glaſſes or ſpectacles; for ſince, in near-ſighted perſons, the rays of light converge to a focus too ſoon, *viz.* before they come to the retina, concave lenſes, which diminiſh the convergency, muſt remove the imperfection. And for thoſe who can ſee diſtant objects only with tolerable diſtinctneſs, *viz.* in whoſe eyes the rays do not converge ſoon enough, convex lenſes, which increaſe the convergency, muſt remove the imperfection.

When the defect comes from rigidity, as in ſome old perſons, then thoſe perſons require concave glaſſes for viewing diſtant objects, and convex glaſſes for viewing near objects; for their eyes want both adjuſtments.

The capability of adjuſtment is greater or leſs in different eyes, and it is frequently different in the two eyes of the very ſame perſon; but in all eyes there is a limit, within which viſion is not diſtinct. This is called the *limit of diſtinct viſion;* and with ſome perſons it is as ſhort as one inch, whilſt in others it exceeds twenty inches; but in common it will be found to lie between ſix and ten inches.

In Spain, and at Venice eſpecially, ſpectacles have been uſed with a different view from either of thoſe above ſtated; all the people of note and faſhion there have them continually on their noſes: a folly, that has its ſource in the natural pride of thoſe people, who value themſelves on a profound wiſdom; and affect to ſtare very near at every thing; as if their eyes were weakened, and worn out with exceſs of attention. Vign. de Mary.

F. Cherubin, a Capuchin, deſcribes a kind of ſpectacle teleſcopes, for the viewing of remote objects with both eyes; hence called *binoculi;* though F. Rheita had mentioned the ſame before him, in his "Oculus Enoch et Eliæ." See Binocle.

The ſame author invented a kind of ſpectacles, with three or four glaſſes, which performed extraordinarily.

Spectacles were certainly unknown to the ancients. Franciſco Redi, in a very learned treatiſe on ſpectacles, will have them to have been invented in the 13th century, between the years 1280 and 1311, (probably about the year 1299 or 1300,) and adds, that Alexander de Spina, a monk of the order of Predicants of St. Catharine, at Piſa, firſt communicated the ſecret, which was of his own invention; upon learning that another perſon had it as well as himſelf. This hiſtory is written in the chronicles of that convent.

The ſame author tells us, that in an old manuſcript ſtill preſerved in his library, compoſed in 1299, ſpectacles are mentioned as a thing invented about that time: and that a famous Jacobin, one Jourdon de Rivalto, in a treatiſe compoſed in 1305, ſays expreſsly, that it was not yet twenty years ſince the invention of ſpectacles. He likewiſe quotes Bernard Gordon in his "Lilium Medicinæ," written the ſame year, where he ſpeaks of a collyrium, good to enable an old man to read without ſpectacles.

Muſchenbroeck, Introd. vol. ii. p. 786, obſerves, that it is inſcribed on the tomb of Salvinus Armatus, a nobleman of Florence, who died in 1317, that he was the inventor of ſpectacles.

Du-Cange, however, carries the invention of ſpectacles farther back; aſſuring us, that there is a Greek poem in manuſcript in the late French king's library, which ſhews, that ſpectacles were in uſe in the year 1150; nevertheleſs, the Dictionary of the Academy della Cruſca, under the word *occhiale*, inclines to Redi's ſide; and quotes a paſſage from Jourdon's Sermons, which ſays that ſpectacles had not been twenty years in uſe: and Salvati has obſerved, that thoſe ſermons were compoſed between the years 1330 and 1336.

It is probable that the firſt hint of the conſtruction and uſe of ſpectacles was derived from the writings either of Alhazen, who lived in the 12th century, or of our own countryman Roger Bacon, who was born in 1214, and died in 1292 or 1294. The following remarkable paſſage occurs in Bacon's "Opus Majus," by Jebb, p. 352. "Si vero homo aſpiciat literas et alias res minutas per medium cryſtalli vel vitri, vel alterius perſpicui ſuppoſiti literis, et ſit portio minor ſpheræ, cujus convexitas ſit verſus oculum et oculus ſit in aere, longe melius videbit literas, et apparebunt ei majores.—Et ideo hoc inſtrumentum eſt utile ſenibus et habentibus oculos debiles: nam literam quantumcunque parvam poſſunt videre in ſufficienti magnitudine." Hence, and from other paſſages in his writings much to the ſame purpoſe, Molyneux, Plott, and others, have attributed to him the invention of reading-glaſſes.

Dr. Smith, indeed, obſerving that there are ſome miſtakes in his reaſoning on this ſubject, has diſputed his claim. See Molyneux's Dioptrics, p. 256. Smith's Optics, Rem. 86—89.

The eſſential and extenſive uſe of ſpectacles, which affords comfort to ſo great a number of individuals, who would otherwiſe be a burden to themſelves and to ſociety, is an inſtance of the great uſefulneſs of the ſcience of optics.

No pains have been ſpared to render ſpectacles as perfect as poſſible, and a variety of contrivances have been from time to time offered to the public. Spectacles have been made with two lenſes for each eye; alſo the lenſes have been made plano-convex, or plano-concave, or of other ſhapes; but, upon the whole, ſingle lenſes, either double concave, or double convex, of clear glaſs, well poliſhed and regularly formed, are the beſt.

When the eyes of perſons firſt begin to be affected by age, the opticians furniſh them with ſpectacle lenſes, of about forty inches focus, which glaſſes are therefore called number 1ſt, or glaſſes of the firſt ſight; *viz.* for the ſight when it firſt begins to be impaired by age. But there is conſiderable difference between the focal diſtances of ſpectacles. N° 1, made by different opticians. When the focal length is about ſixteen inches, the lenſes are called N° 2. About twelve inches are the focal length of N° 3. Ten inches are what they call N° 4. Nine inches are thoſe of N° 5. Eight inches give the focal length of N° 6. Seven inches are the focal length of N° 7. Six inches are the focal length of N° 8. And ſometimes they make ſpectacles of a focus ſhorter ſtill. Concave ſpectacles are alſo named by ſimilar numbers.

In chooſing ſpectacles, actual trial is the beſt guide; but care muſt be had to uſe ſpectacles that do not magnify more than is juſt ſufficient either for reading, or for other neceſſary purpoſes.

When a variety of ſpectacles cannot actually be tried, the defect of the ſight may be expreſſed by mentioning the diſtance from which the perſon can read, or other peculiarities, from which the neceſſary glaſſes may be determined pretty nearly. For an account of the inſtrument for meaſuring the exact limits of diſtinct viſion, invented by Dr. Porterfield, and improved by Dr. T. Young, ſee Optometer.

Huygens conceived, that the glaſſes of ſpectacles, inſtead of being equally curved on both ſides, ſhould have the curvatures of their oppoſite ſurfaces in the proportion of 6 to 1, and the moſt convex ſide turned towards the object, becauſe he had demonſtrated that ſuch a form was beſt ſuited to the object-glaſſes of teleſcopes, as having leſs aberration than any other form of lens.

Dr. Wollaſton obſerves, that although it may be true that ſuch a form of glaſs was beſt calculated for the object-glaſs of a teleſcope, previouſly to the celebrated diſcovery of the achromatic object-glaſs by the late Mr. Dollond, yet whatever advantages might at any time be expected from the teleſcopic object-glaſs ſo ſhaped, theſe were not to be obtained by a ſimilar conſtruction in ſpectacles, as may eaſily be ſeen by conſidering the different uſes of the reſpective inſtruments.

In a teleſcope, in the firſt place, our view is neceſſarily confined to a very ſmall diſtance on each ſide of the axis; and, ſecondly, every part of the object-glaſs contributes to the diſtinctneſs of any object viewed.

It is under theſe circumſtances alone, that the proportion of the curvatures above-mentioned might be proper for a ſingle object-glaſs, as being capable of collecting into the ſame focus the rays that fall on every part of it parallel to the axis. But by ſpectacles, on the contrary, objects are to be viewed, if poſſible, in every direction in which they might be ſeen by the naked eye, which is often removed from the centres of the glaſſes; conſequently, a conſtruction that is calculated to repreſent correctly central objects alone cannot be the moſt advantageous.

In ſpectacles alſo the portion of the glaſs employed at once is ſcarcely larger than the pupil of the eye; ſo that any endeavour to procure the concurrence of all parts of a glaſs in any one effect is evidently ſuperfluous, and may alſo be ſhewn to be prejudicial.

Mr. B. Martin, ſo well known by his numerous writings upon philoſophical and mathematical ſubjects, made ſpectacles ſixty years ago, which he called viſual glaſſes, and in which the two glaſſes were not ſituated in the ſame plane, or with their axes parallel to each other, but were placed inclined to each other, in the ſame angle as the pencils of rays muſt proceed from the objects which are viewed, and come to the two eyes. Reſpecting the common glaſſes, this writer obſerves, in his treatiſe upon ſpectacles, that he conſidered the two glaſſes of a common pair of ſpectacles, when placed both in the ſame plane, and with their axes parallel to each other, as being moſt adapted to view objects at a very great diſtance, where we can ſee no objects with them at all; for, when we uſe ſpectacles, the axes of both eyes are always turned to the object which we view, and meet in a point in it, as in reading, writing, working with a needle, &c.; conſequently the axes of the eyes, and of the glaſſes, are ſo far from coinciding, that they make a conſiderable angle with each other, by which means the eye is deprived of the principal pencil of rays, *viz.* thoſe rays which belong to the axes of each of the glaſſes, and which will make the moſt perfect part of the image on the retina of the eye, and which rays alone can produce perfect viſion. Thoſe rays alone can enter the eye from the object we look at, which come on one ſide of the glaſs, or obliquely to its axis, and are therefore regularly refracted to the eye, ſo as to make the viſion in proportion imperfect.

As the action of light upon the eye tends gradually to weaken it, no more of ſuch an active principle ſhould be admitted into ſo delicate and fine a ſtructure as that of the eye, than what is quite neceſſary to illuminate the object, and make it ſufficiently viſible. But the common ſize of ſpectacle-glaſſes pours in upon the eye-balls three times as much as is neceſſary for this purpoſe, and, therefore, is very prejudicial to the eyes in that reſpect, for in time it makes them weak and watery. Further, it is well known that only a particular quantity of light is proper for perfect and diſtinct viſion; and that a greater or leſs degree of it always impairs and confuſes the image, and conſequently the viſion of the object. For this purpoſe, in microſcopes, teleſcopes, and other optical inſtruments, proviſions are made to regulate the quantity of light by proper apertures and diaphragms; but in ſpectacles, where the quantity of light ſhould be in the higheſt degree regulated and adjuſted, no proviſion at all has been made, but the tender ſyſtem of the eye has been left defenceleſs from the ſuperfluous and injurious particles of light.

In common ſpectacles, only thoſe rays of light which fall near the axis of the glaſſes, can be regularly refracted to the eye, and conſequently only ſuch can make the image, or viſion of the object, in any degree perfect: and, therefore, conſidering the unreaſonable area or diameter of the glaſſes of common ſpectacles, there muſt neceſſarily be a great quantity of light that will not only annoy the image by ſuffuſion, but greatly affect the eye, and render the image imperfect by an irregular refraction from all the extreme parts of the glaſs.

The lenſes of Mr. Martin's ſpectacles were ſo fixed in their frame, that the axes of the two glaſſes were inclined to each other, and met in one point, ſituated at the ſame diſtance from the glaſſes as the focus of each glaſs reſpectively; or, in other words, the foci of the two glaſſes were brought into one common point: whereas in the common ſpectacles, the axes of the two glaſſes being parallel, the two foci are at the ſame diſtance apart as the centres of the glaſſes are. Mr. Martin alſo recommended opticians to make the glaſſes ſmaller; an alteration which was attended with conſiderable advantages: for, before his time, the lenſes were frequently made an inch and a half in diameter.

Dr. Franklin uſed a pair of double or biſected ſpectacles, which he thus deſcribes in a letter to one of his friends. "The ſame convexity of glaſs, through which a man ſees cleareſt and beſt at the diſtance proper for reading, is not the beſt for greater diſtances. I, therefore, had formerly two pairs of ſpectacles, which ſhifted occaſionally; as in travelling I ſometimes read, and often want to regard the proſpects. Finding this change troubleſome, and not always ſufficiently ready, I had the glaſſes cut out, and half of each kind aſſociated in the ſame circle; the leaſt convex, for viewing diſtant objects, in the upper half of the circle; and the moſt convex, proper for reading, in the lower half of the frame. By this means, as I wear my ſpectacles conſtantly, I have only to move my eyes up or down, as I want to ſee diſtinctly far or near; the proper glaſſes being always ready. Although I cannot diſtinguiſh a letter, even of large print, by the naked eye, with the aſſiſtance of this invention, my eyes are as uſeful to me as ever they were;

and if all the other defects and infirmities of old age could be as eaſily and cheaply remedied, it would be worth while to live a good deal longer."

Mr. John Richardſon, an optician of London, obtained a patent in 1797 for an improvement in ſpectacles, which conſiſts in applying extra glaſſes before the common ſingle lenſes, and fitted with joints, ſo that the extra glaſſes can at pleaſure be turned up out of the way, either on one ſide, or upwards. The advantage of this plan is ſtated to be, that it precludes the neceſſity of two pairs of ſpectacles for different views, but that any two different powers of ſight may be inſtantly obtained: for inſtance, the ſpectacles may be fitted with ſuch lenſes as are moſt proper to enable the wearer to ſee a proſpect in walking or riding; but by turning down the extra lenſes, the ſpectacles will magnify in a greater degree, and be proper for reading or writing; and by the ſame means, coloured glaſſes may be applied, to be occaſionally turned down over the lenſes of the ſpectacles, to walk in the ſun-ſhine.

Mr. John Iſaac Hawkins ſome years ago introduced a new kind of ſpectacles, provided with extra arms or joints, which paſs upwards over the temples, in addition to the uſual jointed arms which hold the ſpectacles, by paſſing horizontally round the head. By theſe additional arms the ſpectacles are borne altogether from the head, without reſting upon the noſe, which occaſions an unpleaſant ſenſation to thoſe who firſt begin to uſe ſpectacles, although it wears off in a few days; but the advantage of Mr. Hawkins's plan is, that the glaſſes, without occaſioning any preſſure on the temples, can be placed at any diſtance from the eye, and inclined in any direction, as is found moſt convenient for the view.

Dr. Hyde Wollaſton's periſcopic ſpectacles are now much in uſe, and are ſo called from the facility which they afford the wearer of looking round at various objects. This invention, for which he obtained a patent in 1804, is intended to obviate that defect of the common ſpectacle-glaſſes, which we have before mentioned, *viz.* that no objects appear diſtinct through them, except ſuch as are ſeen through the centre of the glaſſes, or nearly ſo, and that the viſion is indiſtinct, in proportion as the part of the glaſs through which the rays paſs is farther from the centre: this is moſt particularly obſervable in glaſſes of ſhort focal diſtance, and conſiderable magnifying power. It is on this account that opticians have lately made and recommended ſpectacle-glaſſes of leſs diameter than thoſe formerly in uſe, thinking that the extreme parts of the field of viſion, which from indiſtinctneſs were of little uſe, might be ſpared without much inconvenience. But this alteration in the ſize of the glaſſes can ſcarcely be called an improvement, ſince for one defect it only ſubſtituted another ſcarcely leſs objectionable.

Dr. Wollaſton, having conſidered that the portion of any glaſs employed in any one poſition of the eye is but ſmall, perceived, that by making the ſubſtance of a glaſs curved, in the manner of a hollow globe, each portion of it might be ſituated nearly at right angles to the direction of the ſight, and would thereby render lateral objects diſtinct, without impairing the diſtinctneſs at the centre.

To illuſtrate this; ſuppoſing the eye to be placed in the centre of any hollow globe of glaſs, it is plain, that objects would then be ſeen perpendicularly through its ſurface in every direction: conſequently, the more nearly any ſpectacle-glaſs can be made to ſurround the eye, in the manner of a globular ſurface, the more nearly will every part of it be at right angles to the line of ſight, the more uniform will be the power of its different parts, and the more completely will the indiſtinctneſs of lateral objects be avoided. It is evident, that no other rays than thoſe which paſs through the centre of a lens can be at right angles to both ſurfaces; but it is equally clear, that when any ſmall oblique pencil of rays makes equal angles with the two ſurfaces of a thin lens, its inclination to each ſurface will be ſo ſmall, that its focal length will not ſenſibly differ from that of a central pencil. Upon this principle Dr. Wollaſton's ſpectacle-glaſſes are made, of a form not heretofore uſed for that purpoſe; the outer ſurface of each glaſs, or that which is fartheſt from the eye, being ſpherically convex, and the inner ſurface of the ſame glaſs, or that which is neareſt the eye, ſpherically concave. A glaſs of this ſort, adapted for a ſhort-ſighted perſon, will have the interior and concave ſurface of each glaſs more curved than the exterior and convex ſurface of the ſame glaſs, by which the rays of light paſſing through the ſame are diverged, and the degree of curvature of the interior and concave ſurface is to be increaſed in proportion as the perſon who is to uſe the glaſſes is more ſhort-ſighted. On the contrary, for long-ſighted perſons, the form of each glaſs muſt be ſuch as to have the exterior and convex ſurface thereof more curved than the interior and concave ſurface of the ſame glaſs, by which means the rays of light paſſing through the ſame are converged; and the degree of curvature of the exterior and convex ſurface of the glaſs is to be increaſed in proportion as the perſon to uſe the glaſs is more long-ſighted.

With a view of obtaining the ſame effects as Dr. Wollaſton's periſcopic ſpectacles, a new ſpecies of glaſſes have been lately introduced at Paris, made by Chamblant, optician, Rue Baſſe, Porte St. Denis; they are called *conſerves:* theſe glaſſes are ground to cylindrical ſurfaces, inſtead of the ſpherical ſurfaces which have hitherto been employed for ſpectacles and lenſes of all kinds: the oppoſite ſurfaces of each glaſs are ſegments of two different cylinders, inclined to each other at right angles; that is, the axes of the two cylinders are ſituated in parallel planes, but in direction they lie at right angles to each other, and in conſequence, the direction in which one ſurface of ſuch a glaſs is curved, is at right angles to the direction in which the other ſide is curved. On making trial of a pair of theſe glaſſes, we found them very perfect in the field of view, preſenting a very diſtinct viſion of objects viewed through the outer parts of the glaſs, as well as thoſe viewed through its central parts: and the magnifying power of the whole field as nearly equal as the eye could judge.

The inventor has obtained a patent in France for this invention, and makes ſpectacles of all degrees of magnifying power. He propoſes to apply ſimilar lenſes to teleſcopes, microſcopes, and other optical inſtruments, but we have not had an opportunity of examining any of them.

Spectacles are made in great varieties of forms, and ornamented according to faſhion, or to the fancy of the wearer. The frames are made of all kinds of materials, ſuch as gold, ſilver, ſteel, pearl, tortoiſe-ſhell, ivory, bone, and wood. The lenſes are uſually made of glaſs, but the better ſorts are made of natural cryſtal, and are known by the name of pebble-ſpectacles, but in reality moſt of the ſpectacles ſold under that name are made of a hard ſort of glaſs.

It is obſerved by Mr. Ware (Phil. Tranſ. for 1813, part I.) that ſhort-ſightedneſs uſually comes on between the ages of ten and eighteen. This defect of ſight, as ſoon as it is accidentally diſcovered, is little regarded by perſons in the inferior ſtations of ſociety, and no means are uſed for correcting it; hence by increaſed exertions that are made for diſtinguiſhing diſtant objects, the imperfection is not unfrequently

quently overcome. But when perſons in the higher ranks of life diſcover that their diſcernment of diſtant objects is leſs quick or leſs correct than that of others, however ſlight the difference may be, ſuch perſons, influenced perhaps by faſhion more than by neceſſity, recur immediately to the uſe of a concave glaſs; and thus their eyes become ſo fixed in the ſtate requiring its aſſiſtance, that the recovery of diſtant viſion is rendered afterwards extremely difficult, if not quite impoſſible. The number of perſons who actually need this aſſiſtance, is comparatively very inconſiderable; and therefore it ſhould more generally be avoided. The misfortune reſulting from the uſe of concave glaſſes is this, that the near-ſightedneſs is not only fixed by it, but from a habit of inquiry with regard to the extreme perfection of viſion, frequent changes are made for glaſſes that are more and more concave, until at length the near-ſightedneſs becomes ſo conſiderable, as to be rendered ſeriouſly inconvenient and afflicting. It ought to be remembered, that, for common purpoſes, every near-ſighted eye can ſee with nearly equal accuracy through two glaſſes, one of which is one number deeper than the other; and though the ſight be in a ſlight degree more aſſiſted by the deepeſt of theſe than by the other, yet on its being firſt uſed, the deepeſt number always occaſions an uneaſy ſenſation, as if the eye were ſtrained. If, therefore, the glaſs that is moſt concave be at firſt employed, the eye, in a little time, will be accommodated to it, and then a glaſs one number deeper may be uſed with ſimilar advantage to the ſight; and if the wiſh for enjoying the moſt perfect viſion be indulged, this glaſs may ſoon be changed for one that is a number ſtill deeper, and ſo in ſucceſſion, until at length it will be difficult to obtain a glaſs ſufficiently concave to afford the aſſiſtance which the eye requires. Mr. Ware obſerves, that moſt of the near-ſighted perſons whom he has known, have had the right eye more near-ſighted than the left; and he thinks it not improbable, that this difference between the two eyes has been occaſioned by the habit of uſing a ſingle concave hand-glaſs; which, being commonly applied to the right eye, contributes to render this eye more near-ſighted than the other. In ſome caſes children have manifeſted near-ſightedneſs almoſt as ſoon as they begin to take notice of ſurrounding objects; but this, which is occaſioned by ſome degree of opacity in the tranſparent parts of the eye, is very different from that ſtate of the eye to which the term myopic, or near-ſightedneſs, is uſually applied; and by which is ſimply meant too great a convexity either in the cornea or in the cryſtalline, in proportion to the diſtance of theſe parts from the retina. So far from diſcouraging the uſe of ſpectacles in ſuch caſes, it is neceſſary to recur to them, as without them children could not proſecute their learning with eaſe or convenience. Extreme near-ſightedneſs is ſometimes occaſioned by an evident change in the ſpherical figure of the cornea, and its aſſumption of a conical ſhape. This morbid ſtate of the cornea admits of no amendment by any glaſs. The cornea, in moſt caſes of this kind, is preternaturally thin; and it is not unfrequently accompanied with ſymptoms of general debility, under which laſt circumſtance, chalybeate medicines, and bracing applications to the eye, have afforded conſiderable benefit. Near-ſightedneſs, our author ſays, is ſeldom alike in the two eyes, and he has obſerved a few caſes, in which one eye of the ſame perſon has had a near, and the other a diſtant ſight. Dr. Porterfield has ſuggeſted, that the pupils of near-ſighted perſons are more dilated than thoſe of others; but this does not accord with Mr. Ware's obſervations in ſuch caſes. This ingenious writer, whoſe remarks on all circumſtances relating to the eye merit peculiar attention, obſerves, that near-ſightedneſs has no dependence on the greater or ſmaller degree of convexity poſſeſſed by the cornea, when this circumſtance is conſidered alone; ſince the length of the axis of the eye from the cornea to the retina, and the greater or ſmaller degree of convexity in the cryſtalline humour, muſt be alſo regarded before the diſtance of accurate viſion can be determined. It is alſo no leſs evident, that near-ſightedneſs is not neceſſarily occaſioned by a morbid protruſion of the whole eye; ſince ſome perſons are born with eyes of this deſcription, and others acquire the peculiarity, when further advanced in life, in conſequence of a morbid accumulation of *adeps* at the bottom of the orbit, without either of them being more near-ſighted than thoſe who are free from this imperfection. It is a fact often noticed, that old perſons, who have been long accuſtomed to uſe convex glaſſes of conſiderable power, have recovered their former ſight, even at the advanced age of 80 or 90 years, and have then had no further need of them. This amendment is aſcribed by Dr. Porterfield to a decay of *adeps* at the bottom of the orbit; but Mr. Ware attributes this remarkable revolution in the ſight of old perſons to an abſorption of part of the vitreous humours; in conſequence of which, the ſides of the ſclerotica are preſſed inward, and the axis of the eye, by this lateral preſſure, is proportionably lengthened. This kind of alteration is alſo ſufficient to explain the reaſon, why ſuch aged perſons retain the power of diſtinguiſhing objects at a diſtance, at the ſame time that they recover the faculty of ſeeing thoſe that are near; ſince the lengthened axis of the eye leaves the power by which it is adjuſted to ſee at different diſtances, preciſely in the ſame ſtate in which it was before the lengthening of the axis took place. The faculty, ſays Dr. T. Young, of ſeeing at different diſtances, is produced by a power in the cryſtalline humours to become more or leſs convex, according as the object is more or leſs diſtant from the eye.

Although old perſons loſe the power of diſtinguiſhing correctly near objects, and require for this purpoſe the aid of convex glaſſes, they uſually retain the ſight of thoſe that are diſtant as well as when they were young. Inſtances, however, occur of perſons advanced in life, who require the aid of convex glaſſes to enable them to ſee near, as well as diſtant objects. From the caſe of perſons who have had the cryſtalline humour removed, Mr. Ware infers, that this humour is indiſpenſably neceſſary to enable the eye to ſee at different diſtances. Such perſons alſo have leſs power to aſcertain the diſtance of an object when they look through a convex glaſs than when they view it without this aſſiſtance; and accordingly ſuch perſons ſeldom make uſe of glaſſes when they are walking; and the inconvenience of glaſſes is particularly experienced when they deſcend a flight of ſteps, or paſs over uneven ground. Our author obſerves, that near-ſighted perſons do not appear to poſſeſs the ſame extent of viſion that is enjoyed by thoſe who have a diſtant ſight, and he verifies the obſervation by a ſtatement of his own caſe, whoſe range of diſtinct viſion did not extend further than an inch and a quarter in either eye, and within theſe diſtances he always held a book when he read. He recommends the following rule for determining the concavity of a glaſs that is beſt adapted for near-ſighted perſons, to thoſe who are unable, from diſtance or any other cauſe, to ſuit themſelves at the ſhop of an expert optician. The rule is this: multiply the diſtance at which the perſon reads with eaſe, (which in our author's caſe, with his left or beſt eye, was five inches,) by that at which he wiſhes to read, which may be ſtated at 12 inches; divide the product, 60, by 7, the difference between the two, and it leaves nearly 9 inches for the focus of the concave glaſs that ſhall produce the deſired effect. This glaſs anſwers to that ſold under the name of N° 6; and this is a double concave glaſs, ground on a tool of 8 inches radius on one ſide, and 11 inches on the other, the mean between which is very nearly 9 inches. From the whole ſtatement of our author, he infers, 1. That near-ſightedneſs is rarely obſerved in infants, or even in children under ten years of age. It affects the higher claſſes of ſociety more than the lower; and few inſtances occur, if any, in which, if the uſe of concave glaſſes has been adopted, increaſing years have either removed or leſſened this imperfection. 2. Although the uſual effect of time on perfect eyes is that of inducing a neceſſity to make uſe of concave glaſſes, in order to ſee near objects diſtinctly, yet ſometimes, even after the age of 50, and after convex glaſſes have been uſed many years for this purpoſe, the eyes have not only ceaſed to derive benefit from them, when looking at near objects, but they have required concave glaſſes to enable them to diſtinguiſh, with preciſion, objects at a diſtance. 3. Although the cauſe of this change be not always known, yet ſometimes it has been induced by the uſe of evacuating remedies, particularly of leeches applied to the temples; and ſometimes by looking through a microſcope, for a conſiderable length of time, on ſeveral ſucceſſive days. 4. Inſtances are not uncommon, in which perſons far advanced in life, (*viz.* between 80 and 90,) whoſe eyes have been accuſtomed for a long time to the uſe of deeply convex glaſſes, when they have read or written, have ceaſed to derive benefit from theſe glaſſes, and they have become able, without any aſſiſtance, to ſee both near and diſtant objects almoſt as well as when they were young. This change is probably owing to an abſorption of part of the vitreous humour, by which the axis is lengthened; and thus its length, from the cornea to the retina, is brought into the ſame proportion to the flattened ſtate of the cornea, or cryſtalline, or both, which it had to theſe parts before the alteration took place.

SPECTATOR, a perſon preſent at a ſpectacle.

Among the Romans, ſpectators, ſpectatores, more particularly denoted a kind of gladiators, who had received their diſcharge; and were frequently hired to be preſent as ſpectators at the combats of gladiators, &c. with which the people were entertained. See Rudiarius.

SPECTER, in *Conchology*, a name given by the French naturaliſts to a ſpecies of voluta, on which there are ſeveral reddiſh broad bands, compoſed of looſe and irregular figures; the ground colour is a fine white. They are called by Latin writers *concha ſpectrorum*.

SPECTRORUM Candela, in *Natural Hiſtory*, a name by which ſome have called the belemnites.

SPECTRUM, Ocular, in *Optics*, a name given by Dr. Darwin (Phil. Tranſ. for 1786) to an image, reſembling in form the object to which the obſerver was attending, and which continues for ſome time to be viſible, on cloſing his eyes or covering them, after having been long and attentively looking at a bright object, ſuch, *e. g.* as the ſetting ſun. Theſe ocular ſpectra, he ſays, are of four kinds; *viz.* 1. Such as are owing to a leſs ſenſibility of a defined part of the retina, or "ſpectra from defect of ſenſibility." 2. Such as are owing to a greater ſenſibility of a defined part of the retina, or "ſpectra from exceſs of ſenſibility." 3. Such as reſemble their object in colour as well as in form, which may be termed "direct ocular ſpectra." 4. Such as are of a colour contrary to that of their object, which may be termed "reverſe ocular ſpectra." The author, from experiments which he has detailed, concludes, that the retina is in an active, not in a paſſive ſtate, during the exiſtence of theſe ocular ſpectra; and hence he infers, that all viſion is owing to the activity of this organ. In the firſt caſe, the retina is not ſo eaſily excited into action by leſs irritation, after having been lately ſubjected to greater. In the ſecond, the retina is more eaſily excited into action by greater irritation, after having been lately ſubjected to leſs. In the third, a quantity of ſtimulus greater than natural excites the retina into ſpaſmodic action, which ceaſes in a few ſeconds: and a quantity of ſtimulus ſomewhat greater than the laſt excites the retina into ſpaſmodic action, which ceaſes and recurs alternately. In the fourth caſe, the retina, after having been excited into action by a ſtimulus ſomewhat greater than the laſt mentioned, falls into oppoſite ſpaſmodic action. The retina, after having been excited into action by a ſtimulus greater than the laſt mentioned, falls into various ſucceſſive ſpaſmodic actions. With a greater ſtimulus, the retina falls into a fixed ſpaſmodic action, which continues for ſome days; and a quantity of ſtimulus ſtill greater, induces a temporary paralyſis of the organ of viſion. For the illuſtration of the caſes, with miſcellaneous remarks, we muſt refer to the author's paper, *ubi ſupra*.

SPECULA, among the Romans, were places whence a good view might be had of what was doing at a diſtance. The word is particularly uſed to ſignify watch-towers and beacons.

SPECULARES, in *Natural Hiſtory*, the name of a genus of foſſils of the claſs of the talcs.

The word is derived from the Latin *ſpeculum, a looking-glaſs;* the bodies of this kind being naturally of bright, gloſſy, and poliſhed ſurfaces, and in the thicker maſſes not tranſparent, but reflecting the images of things.

The ſpeculares are talcs, compoſed of viſibly ſeparate plates of extreme thinneſs, and each fiſſile again into a number of others yet finer.

The bodies of this genus are the common Muſcovy talc; the *ſpecularis lucida fuſca*, or brown talc, a ſpecies little inferior to the former in beauty, and found in Germany and England; and the *ſpecularis amethyſtina*, called *talc rouge*, or *red talc*, by the French. This is found in Muſcovy and Perſia, and no where elſe, as far as is yet known, and is often imported into France in maſſes, which are of a beautiful purple: we have of it brought into England, but only in thin flakes, fit for the covering of miniature pictures. In theſe flakes it has none of the redneſs natural to it in the lump, but is the fineſt and moſt tranſparent of all the talcs.

Pliny, and other of the ancient writers, as well as ſeveral of the moderns, uſe the term *ſpecularis lapis* for that ſpecies of talc commonly known by the name of *iſinglaſs*, or *Muſcovy glaſs*.

This has been a ſubſtance in great uſe among mechanics, from the earlieſt times of which we have any account. It is found in broad flat maſſes of ten or twelve inches in breadth, and from half an inch to three inches in thickneſs; and is compoſed in theſe of an almoſt infinite number of broad and beautifully even plates, or flakes, laid with a perfect regularity on one another, and ſeldom parting naturally from each other, though by art they may be divided, almoſt without end, into broad and extremely thin laminæ. Theſe are very flexile and elaſtic, and make no efferveſcence with aqua fortis. By the laſt of theſe properties they are diſtinguiſhed from the plated ſpars which ſome have confounded with them, and by their elaſticity from all other foſſile bodies.

It is found in many parts of the world. The iſland of Cyprus abounds with it. It is very common alſo in Ruſſia, and has of late been diſcovered to abound in the Alps, the Apennines, and many of the mountains of Germany. It is imported in large quantities into England, and is uſed by the lanthorn-makers inſtead of horn, in their nicer works; by the painters to cover miniature pictures; and by the microſcope makers to preſerve ſmall objects for viewing by glaſſes. The ancients uſed it inſtead of glaſs in their windows. Hill's Hiſt. of Foſſils, p. 72.

Some take the lapis ſpecularis to have been a ſpecies of gypſum, and compoſed of the acid of vitriol and calcareous earth. It came into uſe at Rome in the age of Seneca (Ep. 90.), and ſoon after its introduction, was applied not only to give light to apartments, but to protect fruit-trees from the ſeverity of the weather; and it is recorded, that the emperor Tiberius was enabled, principally by its means, to have cucumbers at his table during almoſt every month in the year.

Dr. Watſon apprehends it is ſtill uſed in ſome countries in the place of glaſs; however, it is well known that it was ſo uſed in the time of Agricola, for he mentions (De Nat. Foſ. lib. v. p. 257.) two churches in Saxony which were lighted by it. Agricola eſteemed it to have been a ſpecies of plaſter-ſtone, and in ſpeaking of it he remarks, that though it could bear, without being injured, the heat of ſummer and the cold of winter, yet the largeſt maſſes of it were waſted by the rain. However, it differs from plaſter-ſtone in this property, that it does not, after being calcined and wetted with water, ſwell and concrete into a hard ſtony ſubſtance. Watſon's Chem. Eſſ. vol. ii. p. 297, &c.

SPECULARIA, among the Romans, a kind of window caſements, which were uſed before glaſs was introduced for this purpoſe. They conſiſted of tranſparent ſtones, called *lapides ſpeculares*.

SPECULARIA, the art of preparing and making ſpecula, or mirrors: or the laws of mirrors, their phenomena, cauſes, &c. called alſo *catoptrics*.

SPECULARIS LAPIS, in *Natural Hiſtory*. See SPECULARES.

SPECULATION. — *Certitude of Speculation.* See CERTITUDE.

SPECULATION *Shell*, in *Natural Hiſtory*, a name given by the French writers to a very beautiful ſpecies of the voluta, uſually called by us the Guinea-ſhell, from its being brought from that part of the world.

SPECULATIVE *Geometry*, *Mathematics*, and *Philoſophy*. See the ſubſtantives.

SPECULATIVE *Muſic*. By this expreſſion is uſually underſtood ſcientific muſic, harmonics, the ratio or proportions of ſound; in oppoſition to *practical* muſic, which implies muſic compoſed or performed.

SPECULUM, in *Catoptrics*, is a metallic reflector made uſe of in catadioptric teleſcopes, inſtead of the object-glaſs uſed in dioptric teleſcopes.

Newton. — Mr. Newton, afterwards the celebrated ſir Iſaac Newton, had diſcovered that *light conſiſts of rays differently refrangible*, and that conſequently no figure, which could be given to a ſingle piece of glaſs, would make all the tranſmitted rays concentrate in the focus of that glaſs uſed as an object-glaſs: he relinquiſhed his glaſs-works, and immediately turned his mind to the conſideration of what could be done in the conſtruction of a teleſcope, where the rays of light were made to concentrate by reflection; having previouſly diſcovered and proved, that the angle of reflection of all ſorts of rays was equal to the angle of incidence, without the leaſt perceptible diſperſion. Under an impreſſion that an inſtrument, founded on this baſis, might be made more perfect than could be made with glaſſes alone, when uſed in the uſual way, he tried ſuch metallic ſubſtances as promiſed to produce a hard and bright texture, and to admit of a good poliſh, and in February, 1672, laid before the Royal Society an account of a teleſcope of an entire new conſtruction, that gave a diſtinct image, and magnified or increaſed the viſual angle thirty-eight times. It is ſomewhat remarkable, though not ſo much to be wondered at, when we conſider the genius of the inventor, that this firſt attempt detected not only the beſt materials, but the beſt mode of fuſing and mixing them, if not in the beſt proportions; and left ſucceeding inſtrument-makers little more to do than to vary the proportions, and to exemplify the theory which he pointed out by a ſucceſſion of nice and ſkilful manipulations. Copper, tin, and a portion of arſenic, with ſometimes a little ſilver, were then, as they are at this time, the eſſential ingredients of the compound metal that conſtituted the beſt ſpeculum. The ingenious Huygens was no ſooner informed of the occaſion and ſucceſs of this project, than he calculated and candidly acknowledged the advantage that a good concave ſpeculum muſt have over convex glaſſes in concentrating all the different rays of heterogeneous light. With this firſt inſtrument the ſatellites of Jupiter, as well as the lune of Venus's diſc, were clearly perceived. The ſecond teleſcope, however, was more perfect, and a page of the Philoſophical Tranſactions could be diſtinctly read with it at the diſtance of 100 feet. In this conſtruction, which has obtained the name of the Newtonian conſtruction, there were two ſpecula: one ſpeculum, which was ground to a given radius of curvature, was placed at the end of the tube, which was remote from the object to be viewed, and the other, which was ſmall, was plane, and was fixed in an angle of 45° in the axis of viſion, ſo as to reflect the converging rays to a focus, at the focus of a ſmall eye-glaſs placed at the ſide of the tube, not far from its anterior end or aperture where the eye was ſituated to view the object, that actually lay to the left hand. Caſſegrain in the ſame year communicated to the Royal Society the figure of a reflecting teleſcope, where a perforation in the large ſpeculum admitted the eye-piece to be placed as in the dioptric teleſcope, which he thought had ſeveral advantages, but he did not detail any proceſſes he had uſed towards attaining ſuch a conſtruction; in reply to which ſir Iſaac informed him, that Mr. Gregory had deſcribed a ſimilar conſtruction in his " Optica Promota," in the year 1663, from which reply it ſhould ſeem, that *reflection* had been conſidered by Gregory before ſir Iſaac conſtructed his teleſcope, ſo that the *Gregorian* conſtruction muſt be conſidered as preceding the *Newtonian*, ſo far as relates to the arrangement of its parts; but we are not to conclude from thence, that the beſt compoſition for the ſpeculum was not ſir Iſaac Newton's. During the correſpondence that Huygens had with our author, on the ſubject of a metallic ſpeculum, he took occaſion to obſerve, that no doubt the ſuperiority of a parabolic curve for the face of the reflecting metal over a ſpherical one muſt be known to him, and ſir Iſaac was of opinion that ſome mechanical device might be found out, to produce the deſired curvature, better than any of the *conic ſections;* that is, as we ſuppoſe, better than any *tool* formed agreeably to one of the conic ſections: and with this view Mr. Stephen Gray, we find, preſented a project of forming a grinding tool of a *concatenary* ſhape to be ſubſtituted for the parabola, which, however, did not anſwer in practice. The project was this; a piece of clay was formed thin, when ſoft, into an exact circular cake, and laid on a ſuſpended horizontal rim or ring of a ſmaller diameter, ſo as to allow the cake to aſſume the ſhape of the required curve, which it appeared to do; but on baking this convex cake, it was found to have altered its figure, and to have become flat at the vertex, ſo as to be incapable of becoming a proper bed for the bituminous coat that was intended to receive the emery.

In the teleſcope which ſir Iſaac Newton firſt made, the focal length of the concave ſpeculum was 6$\frac{1}{3}$ inches, that of the eye-piece, which was a plano-convex lens, being juſt $\frac{1}{6}$th; but as the metal was neither perfect, nor very highly poliſhed, he thought that the power ought not to be ſo highly charged for opaque objects, particularly as the aperture was only 1$\frac{1}{3}$d of an inch. Suppoſing the performance of any inſtrument to be known and approved, the author propoſes the ſubjoined table to ſhew what ought to be the apertures, lengths, and powers or charges of other inſtruments to perform equally well. In the firſt column the length of the teleſcope is expreſſed in feet; which quantity doubled gives the ſemi-diameter of the ſphere on which the concave metal is to be ground; in the ſecond column are the proportions of the apertures for theſe ſeveral lengths; and in the third column are the proportions of the charges or diameter of the ſpheres, on which the convex ſuperficies of the eye-glaſſes are to be ground.

Lengths.	Apertures.	Charges.
$\frac{1}{2}$	100	100
1	168	119
2	283	141
3	383	157
4	476	168
5	562	178
6	645	186
8	800	200
10	946	211
12	1084	221
16	1345	238
20	1591	251
24	1824	263

Suppoſe, for example, that a half-foot or ſix-inch teleſcope will magnify diſtinctly 30 times with one-inch aperture, and that it be required to find the dimenſions of an analogous four-feet teleſcope; then oppoſite 4, in column 1, we ſee 476, in column 2; and if 100 at the top of this column be conſidered 1.00, then 476 will be 4.76 for the correſponding aperture; alſo 168, in column 3, will be 1.68 for the charge, producing a magnifying power of 145 times; for if the teleſcope of ſix inches magnify 30 times, the focus of its eye-glaſs muſt be $\frac{1}{5}$th of an inch, and $\frac{168}{500} = \frac{1}{3}$ nearly will be the focal length of the eye-glaſs for 4 feet or 48 inches, and conſequently this number divided by $\frac{1}{3}$ will give 145 nearly for its power. "But what the event will really be," ſays Newton, "we muſt wait to ſee determined by experience." And experience, we may add, has ſhewn, that a four-feet reflector, as now made, with the ſmall ſpeculum alſo concave, will do much more.

Hadley.—From this time we do not find that much, if any, improvement took place in the manipulation of the metallic ſpeculum, till about the year 1719, when Mr. Hadley ſucceeded in making two reflecting teleſcopes of 5 feet 3 inches long; one of which he preſented to the Royal Society of London, and deſcribed in the Philoſophical Tranſactions of March and April, 1723. But though Mr. Pound and himſelf made good obſervations on Saturn, Jupiter, and their reſpective ſatellites therewith, nothing is ſaid about the means uſed in caſting, grinding, and poliſhing either of the ſpecula in queſtion. Dr. Robert Smith, in his "Complete Syſtem of Optics," has, however, ſupplied the omiſſion we have juſt noticed, and has ſtated at conſiderable length how Hadley's method of proceeding was practiſed ſucceſsfully by Dr. Bradley and himſelf at Kew, where, after many trials, they produced their firſt ſpecimen, of 26 inches focal length, in May, 1724. The different proceſſes were now made known to Haukſbee, Scarlet, and Hearne, mathematical-inſtrument makers in London, who, from that period, continued to manufacture this inſtrument for ſale, which before had been made only by and for private individuals.

We will give here only a ſhort detail of the proceſſes uſed by Hadley, Smith, and Bradley, in caſting, poliſhing, and figuring their ſpecula; becauſe the modern improvements in this curious art claim our more particular notice. Having fixed on the radius of curvature, and propoſed diameter, of the large ſpeculum, two arcs were ſtruck with a beam-compaſs on two ſlips of braſs, large enough to receive the curves of the ſame radius as that of the ſpeculum; and when the metal was filed away, ſo that one of the curves was convex, and the other concave, they were ground within one another with fine emery, till they exactly fitted each other, and then became gauges for forming the wooden patterns by, which were next made in a lathe, of ſomewhat larger dimenſions than were required for the ſpeculum, that the rough edges of the caſt-metal might be reduced, as the caſe ſhould require. From this wooden pattern another of pewter, containing about one-tenth of regulus of antimony, was caſt in the uſual way, and turned in the lathe to fit the convex braſs gauge, and to exceed the propoſed ſpeculum by one-twentieth of an inch in thickneſs, and double that quantity in diameter. The flaſks for receiving the pewter pattern, for caſting the ſpeculum by, were of iron, and two inches wider, and one inch deeper, than the pattern, in order that the ſand might be every where an inch thick; and the ingates for receiving the fluid metal were ſo made as to allow four or five ſtreams over the face of the ſand, which was obtained at Highgate. This ſand was neither much wetted, nor rendered too adheſive by an admixture of clay; and when the liquid metal was poured in, the flaſks were ſuffered to remain expoſed to the ſun, ſo as to cool gradually, before the metal was taken out, in order that it might neither warp nor crack. With reſpect to the compoſition of the metal, above 150 different mixtures were tried before one was determined on, which was preferred to ſome of the reſt. One of the metals was three parts of copper and one and a quarter of tin, which was hard and white, but found to be porous, eſpecially if great heat was uſed. Another was ſix parts of Hamburgh plate braſs, caſt and milled, with one part of tin only; but the fumes of the calamy ſtone left ſcabrous ſtreaks on the ſurface. A third metal, therefore, compoſed of two parts of the former of theſe compoſitions, and one of the latter, was adopted, as being ſuperior to either; but it was found neceſſary that the copper and braſs ſhould be melted together ſeparately, before the tin was melted and poured in. And much importance was attached to the immediate pouring out of the whole mixture, as ſoon as it could be well ſtirred: for after cooling, leſs heat was neceſſary to melt the whole mixture, than was ſufficient to fuſe one of the ingredients alone; and the leſs heat was uſed in bringing the maſs into a liquid ſtate, the leſs porous the ſpeculum was found to be, when poliſhed. After the metal thus caſt had become cool, it was firſt ground on a common grinding-ſtone a little concave, till all the ſand-holes and inequalities were taken off; and then a ſmaller grinding-ſtone, or a piece of one, was ſhaped ſo convex as to fit the braſs concave pattern, on which the metal was again ground, when fixed upon a block, with a little emery and water, till the gauge fitted it. The diameter of the rough ſtone was to the diameter of the ſpeculum as 6 to 5. When the ſtrokes in grinding were made in a circular direction, they diminiſhed the edges of the ſtone; but when made acroſs, they made it flatter, ſo that it might be made a portion of either a ſmaller or larger ſphere, by the mode of working, and conſequently might be made to grind the concave ſpeculum accordingly. But care was taken that as little of the external hard cruſt was ground away as poſſible, when the figure was once complete, and the ſurface even. When the rough grinding was finiſhed, various other tools were uſed, not only with the ſpeculum, but with each other, to inſure an uniformity of ſhape. A braſs concave tool, ſhaped like the ſpeculum, but of larger diameter, was worked on a marble convex tool, on which were bedded by cement a number of ſmall blue hones, like a pavement; ſo that the working of the braſs concave tool on this pavement made a convex curve over the ſurface of the pavement, which was thus prepared to ſmooth the ſpeculum ſtill further, as well as to improve its figure, by varying the mode of applying the grinding ſtrokes. Again, a poliſhing tool made convex, of glaſs or fine marble, and brought to its figure by the braſs concave tool, was covered with a piece of fine even ſarcenet, and laced tight behind, on which a ſolution of pitch in ſpirits of wine was ſpread evenly with a varniſh bruſh, till its conſiſtence was uniform, and thick enough to receive a portion of fine putty powder, when another tool, made concave of braſs, called a *bruiſer*, was uſed to rub down the gritty matter of the putty occaſionally, as well as to grind ſometimes the bed of hones, when its figure began to alter too much. During the grinding, a wooden handle was cemented on the central part of the ſpeculum, to move it by. It would be tedious to detail all the variety of precautions, with the ſucceſſion of circular, ſpiral, and croſs ſtrokes, recommended for giving perfection to the figure and poliſh of the metal; all which the reader may find in Smith's Optics, from page 301 to page 312, together with the author's mode of examining both the exact length of the focus, and the figure of the curve, by the reflected light of a candle.

In reflecting teleſcopes of various lengths, a given object will appear equally bright and equally diſtinct, when their linear apertures, and alſo their linear amplifications, or magnifying powers, are as the ſquare-ſquare roots of the cubes of their lengths, agreeably to both ſir Iſaac Newton and Dr. Smith. For example, ſuppoſe that a reflecting teleſcope, with an aperture of 2.448 inches, have a ſpeculum of two feet focal length, and an eye-glaſs of $\frac{236}{1000}$th of an inch focus, where the power will be $\frac{24}{.236} = 102$, and that it be required to have another made of three feet focal length, that ſhall produce the ſame brightneſs and diſtinctneſs in the object viewed; firſt we ſhall have $2 \times 2 \times 2 = 8$ for the cube, and the ſquare root of $8 = 2.83$, and again the ſquare root of $2.83 = 1.68$; then $3 \times 3 \times 3 = 27$ is the cube of the new focal length, and 5.2 its ſquare root; and again, the ſquare root of 5.2 will be 2.28; hence, as 1.68 : 2.28 :: 102 : 138; therefore 138 will be the magnifying power of the enlarged teleſcope, 0.261 the focus of its eye-piece, and 3.312 inches its correſponding aperture; for as 1.68 : 2.28 :: 2.448 : 3.312, &c.; and alſo $\frac{36}{138} = 0.261$.

The following table, conſtructed on this propoſition, was calculated by Dr. Smith, which we inſert, as being in a form more intelligible to a common workman, than the one we have before inſerted from the calculation of ſir Iſaac Newton.

Focal Diſtance of Speculum.	Focal Diſtance of Eye-Glaſs.	Magnifying Power.	Aperture.
Feet.	Inches.		Inches.
½	0.167	36	0.864
1	0.199	60	1.440
2	0.236	102	2.448
3	0.261	138	3.312
4	0.281	171	4.104
5	0.297	202	4.848
6	0.311	232	5.568
7	0.323	260	6.240
8	0.334	287	6.888
9	0.344	314	7.536
10	0.353	340	8.160
11	0.362	365	8.760
12	0.367	390	9.360
13	0.377	414	9.936
14	0.384	437	10.488
15	0.391	460	11.040
16	0.397	483	11.592
17	0.403	506	12.143
Continued by Edwards.			
18	0.409	528	12.67
19	0.414	550	13.20
20	0.420	571	13.71
21	0.425	593	14.23
22	0.430	614	14.73
23	0.435	635	15.21
24	0.439	656	15.73

This table is adapted for teleſcopes of the Newtonian conſtruction, in which the figure of the great metal is ſuppoſed to be truly ſpherical; but it is preſumed, that when this table ſuppoſes the conſtruction to be of the Gregorian kind, the focal length is the ſum of the focal lengths of both the ſpecula, or the diſtance that the rays paſs after both reflections, before they come to the eye-glaſs; and that the large ſpeculum is parabolical.

Short.—We do not find that any optician diſtinguiſhed himſelf in the art of making ſpecula for reflecting teleſcopes, after Dr. Smith's time, till we come to Mr. James Short, whoſe compoſition was beautiful, and whoſe poliſh, as well as parabolic figure, were excellent; nay, have been conſidered as ſtandards of perfection for even ſubſequent opticians to imitate. We have, however, to regret that this conſummate workman not only kept his proceſs a ſecret from the other opticians, but, in order to ſecure to himſelf the fame he had acquired of being the firſt in his line of manufactory, ſome little time before his death, as we are credibly informed, he employed his founder, Mr. Juſtice Blackburgh, to deſtroy all his tools, leſt they ſhould fall into ſome perſon's hands, who might avail himſelf of their uſe; and accordingly they were all melted into a liquid maſs: and his long and ſucceſsful experience has no further benefited poſterity, than as it left ſpecimens of workmanſhip to ſhew what ſkilful perſeverance could effect.

Short left behind him, however, a table of the apertures, powers, and prices, of reflecting teleſcopes, conſtructed by him in the Gregorian form; which, not being generally known, we ſhall ſubjoin, by way of effacing the blot on his memory.

Numbers.	Focal Length in Inches.	Diameter of Aperture in Inches.	Magnifying Powers.		Price in Guineas.
1	3	1.1	1 power of	18 times.	3
2	4½	1.3	1	25.	4
3	7	1.9	1	40.	6
4	9½	2.5	2	40, and 60.	8
5 }	12	3.0	2	55, and 85.	10
6 }	12	3.0	4	35, 55, 85, and 110.	14
7	18	3.8	4	55, 95, 130, and 200.	20
8	24	4.5	4	90, 150, 230, and 300.	35
9	36	6.3	4	100, 200, 300, and 400.	75
10	48	7.6	4	120, 260, 380, and 500.	100
11	72	12.2	4	200, 400, 600, and 800.	300
12	144	18.0	4	300, 600, 900, and 1200.	800

In this table Mr. Short *always* overrated the *higheſt* power of his teleſcopes, according to the authority of the Rev. John Edwards, of whom we ſhall have occaſion to ſpeak hereafter; and to this circumſtance alone, we are aſſured by an ingenious and candid optician, it is to be aſcribed, that all following opticians have been obliged, by way of ſatisfying the expectations of their cuſtomers, to overrate the higheſt power of their teleſcopes, in order to obtain a price adequate to their reſpective values. Experimental meaſurements, indeed, ſoon detect this falſe repreſentation; and it would be to the credit of opticians, if they would agree to fix a true meaſure to each power of their teleſcopes, and to ſell them, notwithſtanding, at their accuſtomed prices: for then their purchaſers would not experience diſappointment.

Short made two or three Gregorian teleſcopes of 18 inches focus, with 4.5 inches aperture, and power 170; and half a dozen of 24 inches focus, with 6 inches aperture, with the uſual magnifying powers; but one of a Caſſegrain form, with a convex ſmall ſpeculum, of the ſame dimenſions, intended to have a power of 355, was not diſtinct, and would bear only a power of 231.

Mudge.—In the year 1777, Mr. John Mudge produced a paper to the Royal Society, which is printed in their 67th volume, entitled "Directions for making the beſt Compoſition for the Metals of reflecting Teleſcopes; together with a Deſcription of the Proceſs of grinding, poliſhing, and giving the great Speculum the true parabolic Curve." It will be ſufficient for our preſent purpoſe, if we ſhew in what reſpects Mr. Mudge's metal differs from that which we have juſt deſcribed, and in what his improvements in caſting conſiſt. In the firſt place, Mr. Mudge attempted to aſcertain what metals, and proportions of thoſe, will produce a compoſition that has the three requiſites of extreme hardneſs, whiteneſs, and compactneſs, or exemption from poroſity. The firſt two qualities, after many experiments, he found were united in a mixture of 14½ ounces of grain-tin with two pounds of good Swediſh copper; but the quality of compactneſs was not to be acquired from the mixture ſimply conſidered: it was produced principally from the manner in which the mixture was made. It had been uſual to melt the copper firſt, and then to add the tin, and to pour the liquid mixture, with the ſcoria firſt taken off, into the flaſks, to form the ſpeculum in the firſt melting; but the metal generally turned out to be porous, when poliſhed. Mr. Mudge, on conſidering that putty is tin calcined, began to think, that part of the tin melted in a high heat might be converted into putty, and that the pores might ariſe from this cauſe; he, therefore, poured out the liquid compound to form an ingot, which would fuſe with a lower heat than the copper alone required; and on uſing this metal a ſecond time, fuſed with a moderate heat, it was generally, if not always, found compact. Thus melting a ſecond, or even a third time, proved to be a remedy againſt poroſity; and it was afterwards found, that if an ounce of the tin was reſerved to be put into the mixture at the final melting, the brilliancy of the metal was thereby increaſed. If a ſpoonful of charcoal duſt be thrown into the crucible, before the metal be ſtirred with a wooden ſpatula, and poured into the moulds, Mr. Mudge ſays that the metal will be found to have a cleaner ſurface, than when no ſuch duſt is uſed. For Mr. Mudge's method of grinding, poliſhing, and figuring his ſpecula, ſee our article GRINDING.

Edwards.—In the Nautical Almanac of the year 1787 is printed a memoir, entitled "Directions for making the beſt Compoſition for the Metals of reflecting Teleſcopes, and the Method of caſting, grinding, poliſhing, and giving the great Speculum the true parabolic Figure," by the Rev. John Edwards, B.A., of Ludlow. Theſe directions having been conſidered an improvement on Mr. Mudge's, in ſeveral reſpects, were publiſhed firſt in a pamphlet, which was ſoon bought up by the trade; but at the requeſt of the compoſer of the preſent article, they were reprinted in Nicholſon's Philoſophical Journal, vol. iii. 8vo. Series, p. 490, et. ſeq., in the year 1800; but with the omiſſion of a portion of the appendix.

After what we have already ſaid on this ſubject under our article GRINDING, as well as in the preceding part of our preſent article, it will not be neceſſary to give the whole of Mr. Edwards's memoir, but to dwell more particularly on thoſe methods of proceeding which are peculiarly his own, and which conſtitute his acknowledged improvements. The firſt object that Mr. Edwards had in view was, like that of his predeceſſors, to aſcertain, by a number of trials of various mixtures, made from the metals and ſemi-metals, what compoſition is, on the whole, to be preferred: for which purpoſe he tried ſilver, platina, iron, copper, braſs, lead, and tin, crude antimony, regulus of antimony, martial regulus of antimony, arſenic, biſmuth, zinc, and antimony combined with cawk-ſtone; and in the appendix to his memoir he gave the reſult of 71 mixtures, which we will here tranſcribe, in order that the ſame experiments may not be fruitleſsly repeated by future mechanicians.

1. Copper and grain-tin, equal parts; very bad, ſoft, and of a blue colour.
2. Copper with arſenic $\frac{1}{8}$; but little different from the firſt.
3. Tin 2, copper 1; much worſe than the preceding ones.
4. Copper 32, tin 16, arſenic 4, fixed with nitre; black and brittle.
5. Copper 6, tin $1\frac{3}{4}$, arſenic 1; very indifferent.
6. Copper 32, tin 14, arſenic 2; a very good metal.
7. Copper 32, tin $13\frac{1}{2}$, arſenic 1; not quite ſo good as the ſixth.
8. Copper 32, tin $13\frac{1}{2}$, arſenic $1\frac{1}{2}$; a good metal.
9. Copper 32, tin 15, arſenic 2; much better than any of the above.
10. Copper 6, tin 2, arſenic 1; compact, but very yellow when poliſhed.
11. Copper 3, tin $1\frac{1}{4}$; compact, and whiter than the tenth.
12. Copper 32, tin $14\frac{1}{2}$; a pretty good metal, but poliſhes too yellow.
13. Copper 32, tin 15, arſenic 2, flint-glaſs in powder 3; very bright, but rotten.
14. Braſs 6, tin 1; compact, but too yellow.
15. Two parts of the eleventh compoſition, and one part of the fourteenth compoſition; compact, but much too yellow when poliſhed.
16. Braſs 5, tin 1; ſomewhat whiter than the fourteenth.
17. Braſs 4, tin 1; a good metal, but rather yellow.
18. Braſs 4, tin 1, with arſenic $\frac{1}{10}$; whiter than the ſeventeenth.
19. Braſs 3, tin 1; will not poliſh well.
20. Braſs 2, tin 1; of a ſparry nature.
21. Tin 3, braſs 1; too ſoft, being only a kind of hard pewter.
22. Braſs and arſenic, equal parts; a dirty white colour.
23. Braſs, copper, and arſenic, equal parts; a dingy white.
24. Braſs and platina, equal parts; very difficult to fuſe and mix well together, is then malleable, and of a dingy white colour, like the twenty-ſecond compoſition.
25. Copper 32, tin 14, crude antimony 4; black and rotten.
26. Copper 32, tin 14, crude antimony 1; blueiſh, and rough-grained.
27. Copper 32, tin 15, arſenic 4, biſmuth 2; much too rotten.
28. Copper 32, tin 15, arſenic 3, biſmuth 1; much too yellow when poliſhed, and appears alſo porous.
29. Copper 2, zinc 1; a pale malleable metal.
30. Copper and zinc, equal parts; ſtill malleable and rough-grained.
31. Copper 32, tin 15, arſenic 4, zinc 4; a good metal, but does not take a high luſtre.
32. The thirty-firſt compoſition, fluxed with corroſive ſublimate; a compact and hard metal, but rather yellow when poliſhed.
33. Copper 32, tin 16; a moſt beautiful brilliant compoſition, but much too brittle and rotten.
34. Copper 32, tin 17; blueiſh and rough-grained.
35. Copper 32, tin 18; blueiſh and rough-grained
36. Braſs 2, zinc 1; nearly of a gold colour.
37. Braſs and zinc, equal parts; a pale gold colour, and rough-grained.
38. Spelter 4, tin 1; very rotten.
39. Copper and crude antimony, equal parts; of a ſparry nature.
40. Copper 32, tin 15, arſenic $\frac{1}{4}$th of the whole; a very beautiful and brilliant metal, but tarniſhes when expoſed for ſome time to the air.
41. Silver and biſmuth, equal parts; a yellowiſh-white metal, and not much harder than ſilver itſelf.
42. Silver and tin, equal parts; a white metal, almoſt like ſilver itſelf, and much too ſoft for ſpecula.
43. Silver, tin, and biſmuth, equal parts; a dingy white colour, but much harder than the two preceding compoſitions.
44. Copper 32, tin 15, ſilver 1; a beautiful compact metal, but poliſhes rather too yellow.
45. Copper 32, tin 15, ſilver 2; not ſo white as the preceding.
46. Copper 32, tin 16, braſs 4, arſenic 2; rather too much tin, as the compoſition was of a blueiſh complexion, and rough-grained.
47. Copper 32, tin 15, braſs 1, ſilver 1, arſenic 1; a moſt excellent metal, being by much the whiteſt, hardeſt, and the moſt reflective I have ever yet met with.
48. Common bell-metal; poliſhes very yellow.
49. Common bell-metal 4, regulus of antimony 1; blueiſh and rough-grained.
50. Common bell-metal 6, regulus of antimony 1; ſtill blueiſh and rough-grained.
51. Copper 32, tin 14, regulus of antimony $1\frac{1}{6}$, *viz.* 1 oz. to 1 lb.; too much antimony, it being of a blueiſh colour, and rough-grained.
52. Copper 32, tin 13, regulus of antimony $\frac{1}{16}$; blueiſh and rough.
53. Copper 32, tin 13, regulus of antimony $\frac{1}{32}$, *viz.* 1 oz. to 2 lb.; a very fine metal, in appearance like thirty-three.
54. Copper 32, tin 13, regulus of antimony $\frac{1}{40}$, *viz.* 1 oz. to $2\frac{1}{2}$ lb.; a beautiful metal, not much unlike forty-ſeven, but not quite ſo white.
55. Crude antimony 16, cawk-ſtone 1 or 2 oz.; a very bright glaſſy metal, like the common vitrum antimonii, but by no means fit for mirrors.
56. Copper 32, tin 16, vitrum antimonii made from the cawk-ſtone 1 oz.; a very indifferent compoſition, as the vitrum antimonii did not differ in its effects from crude antimony.
57. Copper 32, tin 14, lead 2; no art can make this compoſition mix intimately, as the lead will always ſeparate from the copper and tin.
58. Copper 32, tin 16, regulus of antimony 3; black, and much too rotten.
59. Copper 32, tin 16, iron-filings 8; a blueiſh-grey colour, and rough-grained, and appeared ſomewhat like ſteel when broken through.
60. Fifty-ninth compoſition 8 oz., tin 1 oz.; a little whiter than the fifty-ninth, but ſtill too blue.
61. Equal parts of fifty-nine and ſixty; ſtill of too blue a colour, and not cloſe-grained.
62. Copper 32, tin 16, arſenic 3, iron-filings $\frac{1}{4}$ of an oz.; a pretty brilliant compoſition, but much inferior to forty-ſeven.
63. Platina 1 oz., braſs 1 oz., cawk-ſtone red-hot $\frac{1}{2}$ oz.; exceſſively difficult to fuſe, and of a dirty light brown colour, and ſomewhat malleable.
64. Copper 32, tin 16, iron-filings 4, regulus of antimony 4, and fluxed with corroſive ſublimate; an exceeding hard and compact metal, but of too blue a colour.

65. Copper 2 oz., tin 1 oz., iron-filings 1 dr., regulus of antimony 1 dr.; too blue a colour, and rough-grained.

66. Regulus of antimony and tin, equal parts; ſparry, and not fit for mirrors.

67. Caſt-ſteel; will not poliſh upon pitch, either with putty, or colcothar of vitriol.

68. Steel 1, tin $\frac{1}{4}$; very rough-grained and blueiſh, and not much different from ſteel itſelf.

69. Steel 1, tin 1; rough-grained, and of a blueiſh colour.

70. Steel 1, and forty-ſeventh compoſition 20 parts; rough-grained, and not near ſo good as forty-ſeven.

71. Steel 1, and forty-ſeventh compoſition 30; not much different from the forty-ſeventh compoſition, but not ſo beautiful and cloſe-grained.

"Many other mixtures," ſays Mr. Edwards, "were tried, by combining the foregoing compoſitions in more than a hundred varieties of proportions; but none of them were found equal to N° 47, as that mixture forms a metal that is the whiteſt, hardeſt, moſt reflective, and takes the higheſt luſtre of any thing I have yet ſeen."

The mixture, therefore, which was at laſt choſen from theſe various experiments, was 32 ounces of pure copper, with 15 or 16 of grain-tin, juſt enough to ſaturate the copper, 1 of braſs, and 1 of arſenic; which compoſition will be ſtill further improved, it is ſaid in a note, but we believe not correctly, by 1 of ſilver. The uſe of the copper was to leſſen the extreme brittleneſs of the mixture; the arſenic rendered the metal cloſe and free from pores; and the ſilver, it was thought, improved the brightneſs, without injuring the hardneſs, when uſed in a ſmall quantity. This mixture, it will be remarked, very much reſembles Mr. Mudge's, who uſed 14½ of grain-tin to 32 of copper, but without arſenic, or other addition: he found 15 *too hard* for the blue ſtone to take hold of; but Mr. Edwards availed himſelf of another ſtone, procured at Edgedon, in Shropſhire, ſituated between Ludlow and Biſhop's Caſtle, which was keen enough to bite a metal with from 15 to 16 of tin to 32 of copper, which compoſition Mr. Mudge conſiders to poſſeſs a *maximum* of whiteneſs as well as of hardneſs. Mr. Mudge, however, ſays, that one of his beſt workmen, called Jackſon, found a ſtone that would cut a metal of one-third tin and two-thirds copper, but the diſcovery of ſuch ſtone, which he always kept a ſecret, coſt him the expence of a journey of two hundred miles; which diſtance exceeds that of Edgedon from London, by about fifty miles; and, therefore, the ſtones of Jackſon and of Mr. Edwards were probably not from the ſame quarry, if they were ſimilar in kind. Edwards's mode of caſting is nearly the ſame as Mudge's, both as to a firſt fuſing for the ingot, with a ſecond fuſing for the ſpeculum at a lower heat; and as to his flaſks and ſand (procured from Highgate), a ſmall portion of the tin was alſo reſerved to be put into the crucible at the ſecond melting, when alſo the arſenic, tied up in paper, was put in; and after the fumes of this ingredient had ceaſed to aſcend, the mixture, ſtirred with a wooden ſpatula, while no breath was inhaled into the lungs, was poured into the flaſks, the moment that about an ounce of powdered reſin, or reſin and nitre, had been thrown in and melted, to give a good face, as Mudge did with the charcoal duſt. The principal difference from Mudge's proceſs is, that in the firſt melting, after the braſs is made as fluid as poſſible, the braſs and ſilver muſt be added with the common black flux, of two parts of tartar to one of nitre, or by ſtirring the melted mixture with a ſpatula of birch; after which the tin muſt be added, and the whole poured out into an ingot, as ſoon as it is found to be in a liquid ſtate; and after the ſecond melting, when the arſenic has been added, and alſo the reſin, the flaſks receive the metal, with the face downwards; the ingate having been made on the back of the metal near its edge, and its breadth increaſing to half the diameter of the metal at the place of joining. The upper part of the ingate ſhould contain as much metal in weight as the ſpeculum and the flaſks ſhould be opened, and the ſand cleared out, while it remains red-hot, with the face ſtill downwards, and then removed by a pair of tongs into an iron pot, containing a large quantity of hot aſhes or ſmall coals, ſufficient to bury the metal, where it muſt remain to cool by degrees with the aſhes. We muſt not, however, omit to mention one precaution, on which ſome ſtreſs ſeems to be laid, *viz.* that when the pattern, with its ingate, or git, is taken out of the ſand, ten or a dozen ſmall holes muſt be made through the ſand at the back of the mould, with a ſmall wire, or common knitting-needle, to permit the air to eſcape while the liquid metal is filling the mould, which are ſafer than one large hole: alſo at the ſecond melting, the flaſks muſt be jogged with a ſlight ſtroke or ſhake, as ſoon as the fluid metal is poured in, to prevent flakes or air-bubbles being formed on the face of the metal. The git may be taken off, when the metal is quite cool, with a common fine half-round file, to make an inciſion, after which a gentle blow will remove it. If, however, the metal is caſt from a mould too thick, it will not take the parabolic figure. For a ſpeculum of 4½ inches diameter, and 18 inches focal length, the thickneſs ſhould be $\frac{4}{10}$ths of an inch at the edge, and the back ſhould be convex, ſo as to allow the whole metal to be of uniform thickneſs when ground, in order that it may not yield to the preſſure, or incumbent weight, during the grinding and poliſhing. The handle ſhould be made of the ſame concavity and convexity as the metal, but double its thickneſs, and only three-fourths of its diameter; it ſhould alſo have a hole through the centre, to receive a ſcrew going into the chuck of a lathe, in order that the edge of the metal may be formed, firſt by a file, and then by a ſtone from Edgedon, while it is revolving.

The ſpeculum being caſt by theſe directions, is next rough-ground on a common grinding-ſtone, formed by a bar of ſteel, while revolving, to the radius of convexity ſuitable for making the deſired concavity of the metal; after this rough-grinding, two tools are all that are requiſite; a convex tool made of lead and tin, or elſe of pewter, and a bed of hones, of the ſort already mentioned; for the convex tool ſerves alſo for a poliſher, in conjunction with its coat of pitch and *colcothar of vitriol*, which is preferred to putty: the poliſh from the latter is indeed of a white ſilvery hue, but that from the former gives a fine dark luſtre, like the complexion of poliſhed ſteel, which is deemed preferable. The colcothar, to be good for this purpoſe, muſt be of a deep red or purple colour, muſt diſſolve in the mouth without gritty lumps, and feel ſoft and oily to the touch. It may be levigated with a little water between two bars of poliſhed ſteel, and worked with two or three additions of water, till it acquires a dark and nearly black colour, when it will be fine enough to be put into a bottle with water for uſe. We will not repeat all the proceſſes to be attended to in the uſe of the convex tool, and of the bed of hones, which we have ſufficiently detailed under our article GRINDING, but remark only on their dimenſions and ſhape, which form eſſential conſiderations in Mr. Edwards's mode of grinding, poliſhing, and particularly of giving the requiſite figure without a ſucceſſion of tentative operations. The bed of hones ſhould be of a circular figure at the circumference, and in every reſpect the ſegment of a ſphere, with a diameter juſt $\frac{2}{10}$ths of an inch wider than that of the metal, when it is four or five inches in diameter; and the reaſon is, that if it is much larger, it will enlarge the circle of concavity of the metal worked on it. The convex tool muſt not, however, exceed the ſpeculum in diameter more than $\frac{1}{10}$th of an inch, otherwiſe it will enlarge the radius of concavity too much. Much water uſed with the bed of hones is detrimental to the figure, and therefore muſt be avoided in bringing out the ſcratches of the grinding-ſtone, and in producing a true ſpherical face. We have ſaid nothing hitherto of the *ſhape* of the rough grinder, or convex tool, to be uſed alſo as a poliſher; this muſt be *elliptical* at its circumference, and the longer diameter muſt be to the ſhorter exactly as 10 to 9, the latter being juſt equal to the diameter of the ſpeculum to be ground and poliſhed by it. This proportion has been found by experience to give the *parabolic* figure in ſpecula of ordinary dimenſions, by the common mode of uſing the tool in all directions; which diſcovery by Mr. Edwards gives him a claim to originality of method, as well as of ſimplicity and certainty in the operations, independently of ſuperior ſkill in the operator. This elliptical tool is uſed firſt after the grinding-ſtone with fine emery and water, before the bed of hones, and again with the colcothar and water as a poliſher, and during the latter operation, it is ſaid to give alſo the parabolic figure. The preparation of this elliptical convex tool, as a poliſher, is thus effected. The pitch is made by boiling tar in a ladle or crucible over a very ſlow fire, till it is very hard when tried cold, and with this an equal quantity of reſin is melted, which prevents too much brittleneſs, and makes a good, hard, unelaſtic coat for the reception of the colcothar. With regard to the requiſite *hardneſs* of the pitch, Mudge and Edwards ſeem to differ in opinion; but as the metal of Edwards is harder than that of the other, and as he uſes a different powder for the poliſh, each opinion may be well founded, ſo far as relates to his own mode of poliſhing. The pitch, or pitch and reſin, being melted in a crucible, is poured on the heated elliptical tool, and ſpread to the thickneſs of a half-crown, with an iron ſpatula; when it is cooled a little, a ſheet of writing-paper is laid on it, and is preſſed equably with the concave face of the ſpeculum itſelf, which does the work of Mudge's concave tool in this reſpect; and when the paper is removed, it will be ſeen, by the fine furrows of its face made thereby, whether or not the impreſſion of the ſpeculum has, at the firſt trial, given its counterpart to the pitch all over; if not, a ſecond impreſſion muſt be taken in like manner, after the pitch has been ſoftened a little before a fire; otherwiſe the face of the ſpeculum might have been dipped in water, to prevent adheſion, and then the paper might have been diſpenſed with. The ſuperfluous pitch muſt now be removed from the edge of the elliptical poliſher, and a cone of wood inſerted into its central ball, to make it perfectly round, like the hole of the metal before the coating was poured on. The pitch is next ſaturated with the colcothar and water, and then poliſhing commences, and is continued, without any particular attention to the ſtrokes, more than is neceſſary for giving the poliſh, and when that is finiſhed by croſs ſtrokes given in all directions, as uſual, the parabolic figure is enſured by the variable dimenſions of the poliſher's diameter. Laſtly, the final poliſh is nearly attained when black mud is generated quickly on the ſurface of the metal, which muſt be partially, but not entirely, wiped off at intervals, till the buſineſs is finiſhed, when the truth of the figure and goodneſs of the metal may be put to the proof that we have deſcribed in our former article, as recommended by Mr. Mudge; or may be tried by Edwards's more convenient teſt, which we ſhall preſently deſcribe.

Since we made the preceding abridgment of Edwards's directions, we have ſeen an extract from one of his letters to Dr. Maſkelyne, containing *an addition* to his former directions, which, as it is ſhort, we will here ſubjoin. "Make the brilliant compoſition firſt of copper and tin. Melt the proportional quantity of ſilver and braſs in a ſmall crucible by itſelf. When you put the brilliant compoſition the ſecond time into the crucible, add alſo the lump of braſs and ſilver melted together before in a ſeparate crucible; and when the whole is now fluid, add the proportional quantity of arſenic, and then pour it off into the flaſks, after the ſcoria is taken off, and a little powdered reſin is thrown into it." The reaſon aſſigned is, that as copper requires more heat to melt it, than either ſilver or braſs does, if the braſs were put into the high heat of melting copper, its lapis calaminaris would calcine, which will not be the caſe when the ingot is made liquid by the lower heat of the ſecond melting. The beſt fuel that Edwards found for melting the metal was coal-coke, as prepared by the maltſters, which caſts no ſmoke, and is more laſting than charcoal: he alſo found, that the blueiſh hue of crown-glaſs uſed for the eye-piece, beſt corrects the yellowiſh colour of objects, as ſhewn by a ſpeculum, and particularly when N° 47 is the compoſition choſen. In trying the figure of the great ſpeculum, Mr. Edwards rejects the diaphragms of Mr. Mudge as unneceſſary, and adopts a more ſimple method, thus; when the ſpecula and eye-piece are in their places, he fixes a circle (of white paper probably) of half an inch, or an inch in diameter, at the diſtance of from fifty to one hundred yards, and gives it a broad black annular margin, by way of contraſt; then, when the teleſcope is adjuſted nicely to diſtinct viſion thereby, the ſcrew that moves the ſmall mirror muſt be turned either way, until a *dark haze* ſurrounds the circle, (or field of view,) which will become broader and broader the further the ſcrew is turned; now, if the haze is more diſtinct, and the edge of it better defined when the ſcrew turns to the right hand, or brings the ſmall ſpeculum nearer, from the point of diſtinct viſion, than when the motion is in a contrary direction, the figure of the great ſpeculum is *ſpherical;* but if, on the contrary, the edge of the haze is better defined by the oppoſite motion, then the figure is *hyperbolical;* and, laſtly, if at equal diſtances on each ſide of the true focal point the appearance of the haze is the ſame, the figure is known to be properly *parabolic*, and fit for its office. The ſmall ſpeculum, in the Gregorian conſtruction, being placed to receive converging rays from the large one, is required to be ſpherical, as we have before ſaid; but in the Newtonian conſtruction it is made plane, and of an oval ſhape, to reflect the rays to the eye, placed at an angle of 90°. Mr. Edwards ſays, he received his inſtruction how to grind and poliſh one of theſe from his friend, Mr. (now Dr.) Herſchel, when he lived at Bath. To grind one of the *elliptical* ſpecula *flat*, a ſmall tool of lead with emery is firſt uſed, and then two or more conſiderably larger ones are uſed; both the tools and bed of hones ſhould not be leſs than ſix inches in diameter. The figure of the tools is not conſidered to be completed, till the ſpeculum can be firſt highly finiſhed upon one of them, and afterwards be applied to another, without receiving any change: the laſt half dozen ſtrokes ſhould be in the direction of the longer axis of the ellipſis. When this is perfected, it muſt be poliſhed upon the pitch-poliſher, of a circular form, the diameter of which is greater than the tranſverſe axis of the ſpeculum by *one-tenth*. As Mr. Edwards ſpeaks of Mr. (Dr.) Herſchel as his friend; and as the doctor has not, that we know of, yet publiſhed the compoſition of his metal and mode of grinding, poliſhing, and figuring it; we may conclude that he practiſes Mr. Edwards's proceſs, and particularly as Mr. Edwards gives us the following information in the poſtſcript of his pamphlet. "Mr. Herſchel chiefly makes uſe of a Newtonian reflector, the focal diſtance of whoſe great mirror is ſeven feet, its aperture 6.25 inches, and powers 227 and 460 times, though ſometimes he uſes a power of 6450 for the fixt ſtars. Note, if the metals of a Newtonian teleſcope are worked as exquiſitely as thoſe in Mr. Herſchel's ſeven-feet reflectors, the higheſt power that ſuch a teleſcope ſhould bear, with perfect diſtinctneſs, will be given, by multiplying the diameter of the great ſpeculum by 74; and the focal diſtance of the ſingle eye-glaſs may be found, by dividing the focal diſtance of the great mirror by the magnifying power: thus, $6.25 \times 74 = 462$, the magnifying power; and

$$\frac{7 \times 12}{462} = 0.182$$ of an inch, will be the focal length of the ſingle eye-glaſs required." When we arrive at our article Telescope, we truſt that we ſhall be able to lay before our readers more minute information reſpecting the ſpecula, as well as other parts of Dr. Herſchel's wonderful inſtruments, than we have room for in our preſent article.

Suppoſing now Mr. Edwards's ſpecula to be finiſhed, it remains that we ſay a few words reſpecting his mode of fixing them in his tube, to give a diſtinct image of the object to be viewed, without which they would be uſeleſs. When the large ſpeculum is made to reſt againſt the inner end of the tube for which it is adapted, the arm which carries the ſmall ſpeculum muſt be firſt adjuſted: in order to do this properly, extend firſt two fine threads, or wires, acroſs the aperture of the tube at right angles, ſo as to interſect each other exactly in the axis of the tube; before the arm is finally faſtened to the ſlider, place it in the tube, and through the eye-piece, without glaſſes, let the eye be directed to the ſcrew-hole in the end of the arm, and if the point of interſection of the croſs-wires be at its centre, the hole is in the axis, but not otherwiſe. When this exactneſs is obtained by mechanical means, the arm may be there made faſt to the ſlider. In the next place, the ſmall ſpeculum muſt be placed parallel to the large one, thus; cut a piece of card into a circle about one-half or two-thirds of the diameter of the mouth of the tube, and fix it concentrically at the mouth with a piece of ſtick, that ſhall biſect the tube, to the middle of which the circular cord may be tied, ſo as to exclude all the light, except an annular portion at the circumference of the tube; this being done, turn the teleſcope to the ſky, and the annular light that falls on the great ſpeculum will be reflected on the little ſpeculum, on which it will form an annular light alſo of ſmaller dimenſions. Now, if the breadth of this ſmall ring of light is obſerved to be equally broad at every ſide of the ſmall ſpeculum, the poſition thereof is parallel to that of the large one, but if not, it muſt be adjuſted till this is the caſe. But it may ſo happen, that this adjuſtment may put the centre of the ſmall ſpeculum out of the axis of the tube, which may be detected thus; examine again the annular light, and take notice whether or not the ring is *concentric* with the circumference of the metal; if not, it muſt be made ſo by the ſcrews of adjuſtment, or otherwiſe. In order to be certain that theſe adjuſtments of the ſmall ſpeculum are accurate, turn the teleſcope again to the ſmall circle of paper with a black margin, with the tube quite open, and having made its image concentric with the ſmall ſpeculum at the point of diſtinct viſion, alter the focus by moving the ſmall ſpeculum gradually, till the black margin becomes a black ſpot, or point; and if this ſpot lie on the centre of the ſmall ſpeculum apparently, the two adjuſtments, for the axis of viſion, and for paralleliſm, are both correct. Again, if a ſtar of the firſt magnitude appear perfectly round and well defined; and alſo if the ſmall ſtars, in the double ſtars, are well ſeen, theſe are proofs of the excellence not only of the figure and poliſh of the metal, but likewiſe of all the adjuſtments.

We have only to add further to what we have ſaid of Edwards's metal and proceſs, that on conferring lately with ſome of the moſt eminent opticians of the preſent day, their opinion is, that reflecting teleſcopes are brought as near to perfection as art and experience can effect, by Watſon, Tulley, and others, but that it is not neceſſary to adhere rigidly to Mr. Edwards's, any more than to Mr. Mudge's directions; the Edgedon ſtones, for inſtance, do not anſwer the deſcription given of them for cutting the hardeſt metals, which are always the beſt when the colour is proper; (the denſity of which, we underſtand, may be determined by their ſpecific gravity, without the trouble of previous poliſhing); neither is a bed of hones indiſpenſably neceſſary; as the fineſt emery, that waſhes off in grinding, may be again uſed to give a ſmooth ſurface before poliſhing, as the Tulleys, father and ſon, have ſometimes done, perhaps more out of curioſity than choice, and have thus begun and finiſhed the proceſs with only *one tool*, unleſs the ſpeculum itſelf be called a tool for equalizing the pitch. Lord Stanhope, and his operator, Mr. Varley, who are engaged in making experiments in poliſhing ſpecula, have uſed Welſh ſlate with ſucceſs for compoſing a bed of poliſhing materials; and no doubt there are various ſtones not tried that may hereafter prove ſuperior to thoſe hitherto uſed for this purpoſe. The braſs and ſilver recommended by Edwards are, moreover, now generally omitted by the beſt opticians, as tending to diminiſh the hardneſs of the metal more than is requiſite; but the arſenic is ſtill retained. And, laſtly, the property of the *elliptic* tool, aſcribed to it by Edwards, is diſallowed by ſeveral of the moſt ſkilful opticians; ſo that, after all, each workman ſucceeds beſt when he practiſes the methods of grinding, poliſhing, and giving the requiſite figure, in which his own ſkill and experience have rendered him moſt expert, and conſequently moſt confident.

Speculum, *Horizontal.* See Horizontal.

Speculum. This name is given to ſeveral inſtruments employed in *Surgery*, for gaining a view of tumours, or ulcers, ſituated within cavities. Thus, there are ſpecula ani, ſpecula auris, &c. The ſpeculum oculi is an inſtrument for opening the eye-lids, and keeping them apart, ſo that the ſurgeon may have a good view of the eye.

Speculum *Muſicæ*, the title of a muſical treatiſe, written in Latin by John de Muris, (ſee Muris,) and only to be found among the MSS. in the late king of France's library, at Paris. It is a treatiſe ſo ample, and ſo ſcarce, that, having procured large extracts from it, and a complete table of its contents, we ſhall be the more minute in our account of it, as it ſeems to have been the ground-work of all the muſical treatiſes that were produced by other writers, till the time of Franchinus Gaforius, in the latter end of the 15th century.

This work, which is written on vellum, in folio, contains ſix hundred pages. The firſt ſentence of the original is, "Libro tertio de Philoſophica Conſolatione Boetius volens reddere Cauſam," &c. It is divided into ſeven books: the firſt of which treats of the invention of muſic, and of its diviſions, and contains 76 chapters; the ſecond, of muſical intervals, 123; the third, of harmonics, or muſical proportion, 56; the fourth, of concords and diſcords, 51; fifth, of the ancient tetrachords, diviſion of the monochord, and doctrines of Boethius, 52 chapters; ſixth, of the modes and notation of the ancients, of the changes made in their ſyſtem by Guido, and of the eccleſiaſtical tones, 113. Book the 7th, of meaſured muſic; of diſcant, in treating of which he has the chapter "de ineptis Diſcantoribus," part of which has been given in the preceding chapter; of the time-table, moods or diviſions of time; of the folly of placing a tail to the ſemibreve, by which he ſeems to mean the minim, without naming it; of perfect and imperfect meaſures; and laſtly, a parallel between ancient and modern muſic, which occupies the laſt five of the 45 chapters into which this book is divided, the concluding ſentence of which is, "Exempli cauſa deſcribere tibi volo quorum figuræ ſunt in hoc ordine conſequentes.

Explicit Tractatus Muſicæ, Magiſtri
Johannis de Muris."

Notwithſtanding all the nice and ſubtle diviſions and ſubdiviſions of his ſeven books into 917 chapters, the practical muſician would at preſent profit but little from the ſtudy of them, as almoſt all the doctrines contained in the firſt five books are ſpeculative, and ſuch as may be found in Ptolemy, Boethius, and other ancient authors, whom almoſt all the muſical writers of later times have copied in pure pedantry, without underſtanding themſelves what they read, and conſequently without conveying any uſeful ſcience to their readers by what they have written. It is only in the two laſt books that De Muris condeſcends to ſpeak of the practical muſic of his own times: in the ſixth book he treats of the eccleſiaſtical tones, notation, and chants, which John Cotton and Walter Odington had done before; and in the ſeventh he defines cantus menſurabilis, diſcant, moods, characters of the different duration of ſounds, as the long, breve, ſemi-breve, and their perfection and imperfection. Here he employs ſeveral chapters in refuting ſuch as have diſputed his doctrines; and laſtly, he draws a parallel between the muſic of the ancients and that of the moderns, in order to aſcertain their ſeveral degrees of perfection.

It is in mere charity to the curious in muſical antiquities that we have beſtowed ſo much pains in examining and deſcribing this book; which, though of difficult acceſs, and more difficult peruſal, might tempt them, from the celebrity of the author, to explore its dark regions, and impair their eyes and patience in ſearch of ſcientific treaſures which it does not contain.

SPECULUM *Veneris*, in *Botany*, a name borrowed from the Flemings, given by Gerarde to an annual ſpecies of *Campanula*, common in gardens, and remarkable for the brilliancy of its deep blue flowers with a white centre. Linnæus has retained this as a ſpecific name, and the plant is commonly called Venus's Looking-glaſs. See CAMPANULA and PENTAGONIA.

SPEEAN, in *Rural Economy*, provincially uſed to ſignify to wean from the dams, as calves, hogs, lambs, and other animals.

SPEEAVE, provincially to ſay or cut young animals.

SPEECH, the act, or art of expreſſing a man's thoughts, by certain ſigns invented for that purpoſe.

Theſe ſigns are principally ſounds made by the voice, and letters. See LANGUAGE.

SPEECH, in *Grammar*, denotes an aſſemblage of ſeveral words ranged in order.

The grammarians generally make eight parts of ſpeech, *i. e.* eight kinds of words uſed in diſcourſe; *viz. noun, pronoun, verb, participle, adverb, conjunction, prepoſition*, and *interjection*; each of which ſee under its proper article.

F. Buffier, one of the laſt writers on grammar, only admits of three parts of ſpeech, *viz. noun, verb*, and *modificative*; which laſt includes the *adverb, conjunction*, and *prepoſition*.

The ingenious Mr. Harris, after Ariſtotle, diſtributes all words into four ſpecies, *viz.* ſubſtantives, or nouns; attributives, or verbs; definitives, or articles; and connectives, or conjunctions; the two former are principals, or ſignificant from themſelves; and the two latter are acceſſories, or ſignificant by relation. Under theſe four ſpecies are included pronouns, adverbs, prepoſitions, and interjections. Hermes, p. 31.

SPEED, JOHN, in *Biography*, a conſiderable elucidator of the geography and hiſtory of Great Britain, was born in 1552, at Farrington, in Cheſhire. He was brought up to the trade of a tailor, and was, by apprenticeſhip, a freeman of the company of Merchant Tailors in London, when that patron of learning, ſir Fulk Greville, diſcovering his attachment to the antiquities of his country, gave him an allowance to enable him to quit his employment, and devote himſelf to ſtudy. His firſt publication was entitled "The Theatre of the Empire of Great Britain, preſenting an exact Geography of the Kingdoms of England, Scotland, and Ireland, and the adjacent Iſles." This work conſiſted of a ſet of maps of all the counties, with the ichnography of the principal towns, and brief deſcriptions, moſtly copied from Camden's Britannia. His greateſt work, the labour of fourteen years, entitled "The Hiſtory of Great Britain," appeared in the year 1614. It is chiefly a compilation from preceding authors and manuſcript records, compriſing all the events in Britiſh hiſtory, from the invaſion of Julius Cæſar to the reign of king James I.; and though rude in ſtyle, yet it contained more valuable matter, and is better arranged, than the preceding chronicles. Speed, it is ſaid, was the firſt Engliſh writer who, ſlighting Geoffrey's tales, fell upon more ſolid matter. He was aſſiſted by ſir Robert Cotton, who reviſed and corrected the whole. Mr. Speed was author of a work entitled "A Cloud of Witneſſes, or Genealogies of Scripture," prefixed to the new tranſlation of the Bible in 1611, and to ſeveral ſubſequent editions of it. This uſeful and induſtrious man paſſed 57 years in the marriage ſtate, with a wife, by whom he had twelve ſons and ſix daughters. He died at London in 1629, and was buried in the church of St. Giles, Cripplegate.

SPEEDWELL, in *Botany*. See VERONICA.

SPEEDWELL, *Female*. See ELATINE.

SPEEDY-CUT, a term uſed to ſignify a kind of cut which happens to a horſe when put to his ſpeed. See SHOEING *of Horſes*.

SPEEN, or *Speenham Land*, in *Geography*. See NEWBURY.

SPEGEL, HAQUIN, in *Biography*, a Swediſh archbiſhop, diſtinguiſhed for great learning, was born in 1645. After acquiring the rudiments of a good education, he was ſent to the academy of Greipſwald; made a tour to Germany, Holland, England, Denmark; and on his return took his degree of maſter of arts at Lund, in 1671. The ſame year he was appointed chaplain to Charles XI., whom he accompanied in his campaigns during the whole Dutch war. In 1685 he was made biſhop of Skara, was tranſlated thence to Linköping in 1691, and in 1711 was raiſed to the archiepiſcopal chair. After the fire which took place at Linköping in 1700, he contributed by his active exertions towards rebuilding the Gymnaſium, a ſervice of ſo much importance, that the remembrance of it is ſtill preſerved by an inſcription on the front of the building. He augmented the library with a great number of excellent books, and on the death of his ſon, preſented to it a collection of medals and coins. He died at Upſal, in 1714. Among his works, which were numerous, are the following: "A Hiſtory of the Swediſh Church; or a Chronicle of the Biſhops, in two Parts;" "Sermons on Chriſt's Sufferings;" "Gloſſarium Linguæ Gothicæ;" beſides a great number of hymns, and various ſermons.

SPEIGHT's Town, in *Geography*, a ſea-port of the iſland of Barbadoes, ſituated on the weſt coaſt, near the northern part of the iſland, formerly much frequented by the Briſtol traders, and thence called Little Briſtol. It is a handſome town, containing about 350 well-built houſes, diſpoſed into four regular and ſpacious ſtreets, of which the longeſt is called Jews'-ſtreet, and, with the other three, leads down to the water ſide. The planters in that part of Barbadoes called Scotland, uſed to ſhip off their goods here for England, which occaſioned the building of ſtore-houſes, and a concourſe of people, to the great advantage of the town; but moſt of the trade is now removed to Bridge-town. It has a ſpacious church, dedicated to St. Peter, which gave name to its precinct, and is the place where the monthly ſeſſions are held. The town is defended by two forts, beſides another in Heathcote's bay, ſome diſtance ſouth of the town. One of the above forts ſtands in the middle of the town, and is mounted with 14 guns; the other, which hath 32, ſtands at the north end of it: but there are, beſides theſe, ſeveral platforms on the ſea-ſhore. N. lat. 13° 15'. E. long. 58° 31'. Edwards's Weſt Indies.

SPEISSE, in *Mineralogy*, a name given by the Germans, and other workers on cobalt, to a ſort of impure regulus of biſmuth, ſometimes occurring in their proceſſes.

It is not uncommon for ores of biſmuth to be mixed with the cobalt in the ſmalt-works. Both this ore and the cobalt yield the blue vitrifiable earth of which ſmalt is made; but in one of them it is blended with arſenic, and in the other with the biſmuth. The ſeparation of it from theſe two minerals requires different proceſſes, and the workmen, therefore, ſeparate the two minerals, and work each by itſelf; but it ſometimes happens that the ore of biſmuth is ſo like to the true cobalt, that it cannot be diſtinguiſhed by the eye, and ſo intimately mixed with it, that it cannot be ſeparated from it; in this caſe the whole is expoſed to the fire together, and after the arſenic is ſublimed in form of meal, there remains a coarſe and impure regulus of biſmuth, which having mixed itſelf with the earth of the cobalt, and other extraneous ſubſtances, is of a reddiſh-white colour, and very impure and friable. This gives them the trouble of a ſecond operation, by which they ſeparate the pure regulus of biſmuth, and the remainder being a mixture of its earth and that of the cobalt, is run together into the blue glaſs called *ſmalt*, the earth of biſmuth ore being of the ſame nature with that of cobalt. Phil. Tranſ. N° 396, p. 199.

SPEL, in *Rural Economy*, a term provincially uſed to ſignify a bar. It alſo ſignifies the thin ſtraight or bent ribs in the work of baſket or ſieve-making in ſome places.

SPELE, in *Geography*, a town of the iſland of Candy; 15 miles S.E. of Candy.

SPELK, in *Rural Economy*, a ſmall thin rod, or piece of wood uſed in thatching. Small hazel rods are moſtly employed in this way.

SPELL, a kind of charm, to drive away a diſeaſe, by hanging a word or ſentence written on a paper about the neck. See Charm.

Spell, in *Sea Language*, the period in which a ſailor, or gang of ſailors, is employed in a particular exerciſe, from which they are relieved as ſoon as the limited time expires. Such are the ſpells to the hand-lead in ſounding, to the pump, to look out on the maſt-head, &c. and to ſteer the ſhip, which laſt is generally called the *trick*.

Spell alſo implies the relief or return of duty to thoſe ſervices: thus it is ſaid, ſpell the pump, ſpell the lead, &c.

SPELLING, that part of grammar properly called orthography.

Dr. Jones gives the following rules, or maxims, of ſpelling.

1. That all words were originally pronounced as ſpelt.

2. That in all words whoſe ſounds have been ſince altered (the origin of the difficulty of ſpelling), the alteration was made for the ſake of eaſe and pleaſure.

And hence, 3. All words that can be written ſeveral ways, muſt be ſpelt according to the hardeſt, harſheſt, and moſt unuſual ſound.

SPELLO, in *Geography*, a town of the Popedom, in the duchy of Spoleto. This was anciently Hiſpellum, and being made a Roman colony by Julius Cæſar, was by him named Colonia Julia Hiſpella. In the year 1529, it was ſacked by Philibert de Châlons, prince of Orange, general of Charles V.; and three years afterwards the walls were ordered to be pulled down by pope Paul III.; 10 miles S.W. of Nocera.

SPELMAN, *Sir* Henry, in *Biography*, an eminent antiquary, was deſcended from an ancient family ſettled in Norfolk. He was born in 1562, at Congham, near Lynn, and having received a common education, he was ſent at an early age to Trinity college, Cambridge. Owing to his father's death, he was called from the univerſity before he had completed his 17th year, and he was afterwards entered of Lincoln's-Inn, in order that he might ſtudy the common law, but his inclination was not favourable to legal purſuits: he ſeems to have given a decided preference to polite literature and antiquities, but theſe purſuits were cut ſhort by an early marriage, which induced him to ſettle upon his eſtate, and take the management of it in his own hands. He did not, however, abandon his antiquarian purſuits, and while he was yet a very young man, he drew up a treatiſe in the Latin language, entitled "Aſpilogia," relative to armorial bearings, and made tranſcripts of ſeveral charters of monaſteries in Norfolk and Suffolk. He was alſo aſſociated to the original ſociety of antiquarians, and became the intimate friend of Cotton, Camden, and other favourers of that claſs of ſtudies. In 1604 he was elected high ſheriff of the country, and about the ſame time communicated to Speed a deſcription of Norfolk, for his work entitled "The Theatre of Great Britain." In 1607 he was nominated by the king one of the commiſſioners for ſettling the titles to lands and manors in certain counties of Ireland, and on this occaſion he went thrice to that country. Farming now became irkſome, becauſe he probably found it unprofitable: he ſold off his ſtock, let his eſtates, and came with his family to London, and he choſe as the particular object of his ſtudies, the antiquities of Engliſh law, as deducible from Engliſh records; but he was diverted from his object by an incidental ſubject. During his reſidence on his eſtate, he had purchaſed the lands of two ſuppreſſed monaſteries, and being involved in a troubleſome law-ſuit in order to defend his title, he began to entertain ſcruples concerning the ſecularization of property once belonging to the church. When, therefore, an uncle of his complained to him of difficulties which he had met with in building upon the glebe of an impropriate parſonage, he plainly gave his opinion, that it was a token of divine diſpleaſure for keeping the parſonage in lay hands, and he drew up a work in 1613, with the title "De non temerandis Eccleſiis; Churches not to be violated; a Tract of the Rights and Reſpects due to Churches, &c." He practiſed what he had pleaded for in theory, and being poſſeſſed of an impropriation in Norfolk, he devoted the profits of it to the augmentation of the vicarage.

By king James he was knighted, and on the revival of the ſociety of antiquarians in 1614, he attended as one of the old members; on which occaſion he wrote "A Diſcourſe concerning the Original of the four Law Terms of the Year." His zeal for the honour of the church and the authority of the canons, induced him to write a tract in anſwer to an apology for archbiſhop Abbot, who had accidentally killed his game-keeper, in which he maintained that the prelate by that act had ceaſed from his office, and could not be reinſtated without a new conſecration. Having in the mean time continued his enquiries into legal antiquities, he found that the knowledge of the Saxon language was abſolutely neceſſary to his purpoſe, which he accordingly ſet about obtaining, and in 1621 he printed a ſpecimen of his propoſed work, which was ſo much approved, that ſeveral eminent ſcholars urged him to its completion. In 1626 he publiſhed the firſt part, under the title of "Archeologus, in modum Gloſſarii ad rem antiquam poſteriorem." Notwithſtanding the applauſe of the learned, the author was not encouraged by the ſale of his work to publiſh the ſecond part during his life, which he had fully prepared for the preſs. It was, however, given to the world after his deceaſe, and the whole was entitled "Gloſſarium Archaiologicorum." The object of this work is the explanation of obſolete words occurring in our laws; and it is not a mere gloſſary, but contains various entire diſſertations. He next employed himſelf in a collection of Engliſh laws and ſtatutes, from the Conqueſt to the ninth year of Henry III., which was printed in 1617. Having been appointed, on the recommendation of archbiſhop Laud, one of the commiſſioners for enquiring into the exaction of fees in the courts and offices throughout England, he publiſhed, in 1628, a tract "De Sepultura," or concerning "Burial Fees." Before our author had finiſhed his gloſſary, he engaged in another conſiderable work, which was "A Hiſtory of the Engliſh Councils." Of this he publiſhed in 1639 the firſt part, which included the period from the firſt introduction of the Chriſtian religion into England to the Norman Conqueſt. A ſecond part, only a ſmall portion of which was of his own compoſition, was printed ſeveral years after his death. In the ſame year he inſtituted a Saxon lecture in the univerſity of Cambridge, which he intended to have rendered perpetual, but his deſign was defeated. In 1639 alſo he publiſhed a treatiſe on "The original Growth, Propagation, and Condition of Tenures by Knights' Service in England," in which he diſplayed an extent of learning that proved his faculties to be perfect, notwithſtanding his advanced age. He lived to complete his 80th year, and died at London in 1641. By the king's order, he was interred in Weſtminſter Abbey. After his deceaſe, two poſthumous works of his were publiſhed, *viz.* "A Treatiſe concerning Tythes," printed in 1647; and "A Hiſtory of Sacrilege," which was deſtroyed at the printer's by the great fire of London, and a plan of it only preſerved. In 1698 biſhop Gibſon publiſhed a folio volume, entitled "Reliquiæ Spelmanniæ," containing a number of his poſthumous tracts relative to the Engliſh laws and antiquities. He was, ſays his biographer, a very reſpectable promoter of antiquarian learning, and a man of great private worth.

SPELMAN, EDWARD, great-grandſon of the preceding, reſided at High-Houſe, near Rougham, Norfolk, where he died in 1767. He had devoted himſelf to literature, and made himſelf known by ſeveral publications of conſiderable worth. The firſt of theſe was a tranſlation of Xenophon's "Cyropedia," in two volumes, 8vo. A more elaborate work was entitled "The Roman Antiquities of Dionyſius Halicarnaſſenſis," tranſlated into Engliſh, with notes and diſſertations, in four volumes, quarto, a work which ſtands high among our tranſlations from the Greek language. One of theſe diſſertations was a verſion of a fragment of Polybius on government, particularly that of Rome, to which the tranſlator prefixed a preface, applying the ſyſtem of Polybius to the Engliſh government. This was printed without his name in 1743. He alſo printed for the uſe of his friends, and for private diſtribution only, "A Diſſertation on the Preſence of the Patricians in the Tributa Comitia:" and after his death the Rev. Mr. Lemon publiſhed in 1775, a poſthumous work of this writer, entitled "Additional Obſervations on the Greek Accents." Gen. Biog.

SPELT, in *Agriculture*, a term applied ſometimes to wheat-graſs, a ſpecies of *triticum*, or wheat. It is ſometimes written *ſpelta*.

SPELTA, in the *Materia Medica*, a name uſed for the grain of the zea dicoccos, commonly called *ſpelt-corn*.

SPELTER, or **SPELTRE**, a name ſometimes given to zinc.

SPELUNCATO, in *Geography*, a town of the iſland of Corſica; 12 miles E. of Corte.

SPENAZZOLA, a town of Naples, in Baſilicata; 13 miles E. of Venoſa.

SPENCE, JOSEPH, in *Biography*, was educated at New college, Oxford, of which he afterwards became a fellow. He took the degree of M.A. in 1727, and in that ſame year made himſelf known by "An Eſſay on Pope's Tranſlation of the Odyſſey." This work diſplayed a cultivated taſte, as well as a ſenſibility to the beauties of poetry, and was ſo favourable to the tranſlator, that he ſought his acquaintance, and admitted him to a familiar intimacy. In the following year he was elected profeſſor of poetry of the univerſity of Oxford, an office which he held for ten years. After this he travelled with the young duke of Newcaſtle, and in 1742, having quitted his fellowſhip, he was preſented by his college to a rectory in Buckinghamſhire. He reſided, however, at Byfleet, in Surrey, at a manſion lent him by the duke his pupil, and thus performed the duties of rector merely by an annual viſit, attended with liberal charities. In the ſame year he was elected king's profeſſor of modern hiſtory, at Oxford: this was a duty as eaſy to be performed as the other, but he did not devote that leiſure which his preferments offered him to indolence, for in 1747, he brought to the preſs his principal work, entitled "Polymetis, or an Enquiry concerning the Agreement between the Works of the Roman Poets and the Remains of ancient Artiſts, being an Attempt to illuſtrate them mutually by each other." This was a folio work, with plates. The performance was extremely well received by the public, and ſtill ſtands very high in the literary world, though it has been ſlighted by ſome few, who perhaps haſtily condemned, before they had given proper attention to it. In 1754 he was preſented with a prebendary of Durham, and he continued to amuſe himſelf with a variety of miſcellaneous compoſitions that appeared in different forms. His laſt publication was an edition of "Holdſworth's Remarks on Virgil," with notes, and additional obſervations of his own. In the month of Auguſt, 1758, he was found drowned in a piece of water in his own garden at Byfleet, into which it is ſuppoſed he had fallen in a fit, the water being too ſhallow to cover him. He is characteriſed as being of a ſocial benevolent diſpoſition, and being very much beloved by his friends. He was ſtudious to draw obſcure merit into notice, of which he gave evident proofs by his printed account of Stephen Duck; Robert Hill, the learned tailor;

and Mr. Blacklock, the blind poet. Several of his detached and miſcellaneous compoſitions were inſerted in the “Muſæum,” and in Dodſley's “Fugitive Pieces.” He had collected ſome MS. volumes of anecdotes of eminent writers, communicated by Pope and others, which are ſtill in the poſſeſſion of the duke of Newcaſtle's family, and from which Dr. Johnſon was permitted to make extracts for his lives of the poets. Gen. Biog.

SPENCER, John, a learned divine of the church of England, was born in 1630, at Bocton-under-Bleane, in Kent. His father dying while he was an infant, the care of educating him was undertaken by an uncle, who ſent him to the free-ſchool of Canterbury. His proficiency in learning procured for him a recommendation to a ſcholarſhip in Caius college, Cambridge, where he was admitted in 1645. Paſſing through the uſual gradations in that univerſity, he was choſen fellow of his college in 1655, and took orders: of courſe he muſt have complied with the requiſitions of the ruling powers at that time. He became diſtinguiſhed for his pulpit compoſitions, and was appointed univerſity preacher, in which capacity he took an opportunity of hailing the event of the Reſtoration by a thanſgiving ſermon, which was printed under the title of the “Righteous Ruler,” which, in reference to the profligate character of the reſtored ſovereign, muſt have been regarded as extremely appropriate! Some enthuſiaſts having, in a periodical paper entitled “Annus Mirabilis,” brought to notice a number of pretended prodigies, as portending future changes in the ſtate, Spencer conceiving it to be of dangerous conſequence thus to unſettle the minds of the people, publiſhed in 1663, “A Diſcourſe concerning Prodigies,” wherein a variety of preſages by them is reprehended, and their true and proper uſe is aſſerted and vindicated. A ſhort extract from the preface will ſhew the nature of the work: “We have,” ſays he, “of late been perſuaded by three or four ſeveral impreſſions of books, that England is grown Africa, and preſents us every year, ſince the return of his majeſty, with a new ſcene of monſtrous and ſtrange ſights; and all held forth to the people, like black clouds behind a ſtorm, the harbingers of ſome ſtrange and unuſual plagues approaching to the ſtate; and this by perſons pretending an intimacy with ſcripture, and the fathers, Greek and Latin, ancient and modern writers.” The work diſplayed a freedom from credulity and ſuperſtition very laudable at that time. To a ſecond edition, in 1665, was added “A Diſcourſe concerning vulgar Prophecies;” in which the vanity of receiving them as the certain indications of any future event is diſcovered, and ſome characters of diſtinction between true and pretended prophets are laid down. This attempt to bring down the public to reaſon and ſobriety was not leſs timely than the former, and might have been uſefully renewed in many other inſtances and at much later periods. The author in the ſame year proceeded doctor in divinity. He was, in 1667, preſented to a living by his college, and in a very ſhort time after was elected to the maſterſhip of that ſociety, an office which he held with high reputation during twenty-ſix years. Several preferments were beſtowed upon him, of which the laſt and moſt conſiderable was the deanery of Ely in 1667. He had previouſly been choſen vice-chancellor of the univerſity of Cambridge, and in that quality he made a ſpeech to the duke of Monmouth, when he was inſtalled chancellor, which was printed by Hearne, in his work entitled “Vindiciæ Thom. Caii.” It was particularly as a maſter of Hebrew literature and antiquities he is known in the learned world. His firſt work was written in the Latin language, a diſſertation “De Urim et Thummim,” which was publiſhed in the year 1678. This was a forerunner of his great work, “De Legibus Hebræorum Ritualibus, et earum Rationibus, Libri Tres,” 2 vols. fol. 1685; a performance conſidered ſo valuable and important, that it was reprinted at the Hague in 1686, and at Leipſic in 1705. The grand object of this work is to prove, in detail, that the rites and ceremonies of the Jewiſh religion were inſtituted in direct oppoſition to the practices of the ſurrounding idolatrous nations, and in order to eſtabliſh the ſtrongeſt diſtinction between the Jews and them. The ſame hypotheſis has been maintained by ſeveral learned men, and has been oppoſed by others, without affecting on either ſide the authority of that religion. Spencer's work is ſtill conſidered as the moſt complete and judicious treatiſe in that view of the queſtion. The author died at the age of ſixty-three, and he was interred with great ſolemnity in the chapel of his college, to which ſociety he was a liberal benefactor. He left behind him many MS. additions to his great work; which were entruſted to the care of biſhop Tenniſon, by whom they were bequeathed to the univerſity of Cambridge, and were eventually publiſhed in four books, under the care of profeſſor Capellow, in two vols. folio. Biog. Brit.

Spencer, in *Geography*, a townſhip of America, in Worceſter county, Maſſachuſetts, taken from Leiceſter, and incorporated in 1733, containing 1453 inhabitants; 11 miles S.W. of Worceſter.

Spencer, a large poſt-townſhip of New York, the capital of Tioga county, is ſituated near the centre of that county, 50 miles S.E. of Bath; bounded N. by Cayuta and Danby, E. by Candor, S. by Oſwego, and W. by Chemung. Spencer was divided in 1811; and Cayuta, Danby, Caroline, and Candor, erected into ſeparate towns from the N. and E. parts. The population of Spencer in 1810 was 3128. It is well ſupplied with ſmall creeks and mill-ſtreams. The Catetant winds acroſs the northern part with numerous branches; the Cayuta forms the weſtern boundary; and ſome ſmaller ſtreams ſpread over the central part. The ſoil is of various qualities, and the ſurface has a conſiderable hilly aſpect, covered with a great variety of foreſt-trees. The ſeat of juſtice for the county has been lately removed from Elmira to this townſhip, and the county buildings are within Drake's ſettlement, as it is called, ſituated on the Catetant creek; where is a ſmall village, denominated Spencer; and as its ſituation is pleaſant and healthy, and it is the centre of county buſineſs, it promiſes to become a flouriſhing county village.

SPENSER, Edmund, in *Biography*, one of the moſt diſtinguiſhed Engliſh poets, was born in London about the year 1553. His parents were in humble life, though in his works he claims kindred with the noble family of the Spenſers of Northamptonſhire. Of his early education nothing is known, but it appears that he was, in 1569, a ſizer in Pembroke college, Cambridge. He, in proper time, took his degrees, and in 1576 he was candidate for a fellowſhip, but was not ſucceſsful. This diſappointment was probably the cauſe of his quitting the univerſity, which he left for a reſidence among his relations in the north of England. Here, it appears, he fell in love, and the object of his affection, whom he has commemorated under the name of Roſalindo, after leading him through the uſual viciſſitudes of a love adventure, finally deſerted him. This circumſtance is ſaid to have given him a turn to paſtoral poetry, ſince his “Shepherd's Complaint,” which is devoted to amorous complaining, was his firſt publication. It was publiſhed in 1579, and dedicated, under the ſignature of Immerito, to Mr. afterwards ſir Philip Sidney. He was introduced to the acquaintance of this celebrated perſon by his friend, Mr. Gabriel Harvey, previouſly to his publiſhing his "Shepherd's Calendar," which ſufficiently refutes a tale concerning his being firſt made known to ſir Philip Sidney by a paſſage in the Faery Queen, and the munificent reward which he received on the occaſion. He was, however, patronized by ſir Philip, who introduced him to his uncle, the favourite Leiceſter, who engaged him as an agent for his ſervice in foreign countries, but it is uncertain whether he ever actually travelled abroad; at any rate he could not have been long in that employ, ſince, in 1580, he was attending lord Grey of Wilton, appointed lord-deputy of Ireland, as his ſecretary. In this ſituation he diſplayed thoſe talents for buſineſs, which are uſually, though often very unjuſtly, repreſented as incompatible with a poetic genius. He returned with lord Grey in 1582, and was probably ſome years an attendant at court, and in 1586 he had a grant from the crown of upwards of 3000 acres of land in the county of Cork, out of the vaſt forfeited property of the earl of Deſmond. In 1587 Spenſer went over to take poſſeſſion of this eſtate; his reſidence was the caſtle of Kilcolman, near Doneraile, where, in the ſtyle of paſtoral poetry, he deſcribes himſelf as keeping his ſheep "under the Mole, that mountain hore," and frequenting the coolly ſhade of the green alders by the Mulla's ſhore. Here it appears he received a viſit in 1589 from ſir Walter Raleigh, who had been a commander in Ireland under lord Grey, and had obtained a large grant of land from the crown. Spenſer celebrates him in a poem under the title of the "Shepherd of the Ocean," and highly extols his courteſy and elegant accompliſhments. At this period Spenſer was engaged in the compoſition of his "Faery Queen," of which he had written the three firſt books; and accompanying Raleigh the next year to England they were publiſhed, with a dedication to queen Elizabeth, and an introductory letter addreſſed to Raleigh, explaining the plan of the whole projected work. Elizabeth rewarded his poetry and dedication by a penſion of 50*l. per annum*, granted in 1591, and he has been termed her laureat, though the title was not formally conferred upon him. Spenſer returned to Ireland in 1591, and married a country laſs of low degree, but the diſturbances in that country forced him to return to England in 1595. Here he printed ſome poems, and drew up a plan for the entire reduction of that iſland in the ſpace of two winters, which work he completed in the next year, giving it the title of "A View of the State of Ireland." This piece remained in MS. till it was printed in 1633 by ſir James Ware, who beſtows much applauſe on the information and judgment diſplayed in it, though he intimates, that it was deficient in moderation: and it is generally admitted, that in what he ſays concerning the hiſtory and antiquities of the country there are many errors, and the fanciful turn of a poet is more conſpicuous than the ſobriety of a judicious enquirer. In 1596 he publiſhed a new edition of his "Faery Queen," with additional books, which only completed half his original deſign. It was currently reported, that the remaining ſix books were loſt by a ſervant, who was entruſted to carry them to England, which certainly would be one of the greateſt diſaſters that a poet could poſſibly ſuffer, and might greatly contribute to break his ſpirits: the fact, however, is very queſtionable, and certainly does not ſtand on good authority; it is moſt probable that they were never finiſhed. He returned to Kilcolman in 1597, but Tyrone having in the next year broken out in rebellion, and overrun the county of Cork, Spenſer was obliged to take refuge with his wife in England, leaving all his property to the ſpoil and ravages of the inſurgents. His houſe was burnt, and with it, it is ſaid, an infant who had not been removed. Reduced to a ſtate of indigence, he ſunk under his misfortunes in the ſame year, or in the beginning of the next. He was interred in Weſtminſter Abbey, at the expence of the earl of Eſſex, ſeveral of his brother poets attending, and throwing into his grave copies of panegyrical verſes. A monument was afterwards erected to his memory by Anne, the celebrated counteſs of Dorſet. Of his family and poſterity nothing is known, except that one of his deſcendants was reſtored in the reign of Charles II. to ſo much of the eſtate in Ireland, as he could prove had belonged to his anceſtor; and that another, or perhaps the ſame, came to England in the reign of William with a ſimilar claim, which was allowed. The works of Spenſer are animated with a fervent ſpirit of piety, and a pure and exalted morality; and though he certainly paid an aſſiduous court to the great, he was not guilty of that meanneſs of adulation, which was too much practiſed even by ſome eminent perſons of that age. The homage paid to the queen was great, but it was deemed impoſſible to carry this too far.

The poetical reputation of Spenſer is chiefly ſupported by his great work the "Faery Queen," for his paſtorals will ſcarcely pleaſe a correct taſte; and though critics admit that there is much occaſional beauty of ſentiment and harmony of verſification in his ſonnets, hymns, and other miſcellaneous pieces, yet on the whole they are ſcarcely diſtinguiſhed from the effuſions of tedious pedantry common in that age. But the "Faery Queen" is juſtly regarded as one of the great compoſitions in Engliſh poetry, and has loſt none of its value by antiquity. "If its plan is ſingularly involved, its allegories often defective and obſcure, and its adventures extravagant, it is, however, abſolutely unrivalled for the fertility of its conceptions, and the vividneſs of its painting. Its great length, and want of intereſt as a fable, deter readers, in general, from a complete peruſal, but it will always be reſorted to by the lovers of poetry as a rich ſtorehouſe of invention, eſpecially of that kind which conſiſts in the perſonification of moral ideas." Biog. Brit.

SPENT, at *Sea*. The ſeamen ſay a ſhip hath ſpent any maſt or yard, when it is broken down by foul weather, or any ſuch accident; but if it be done by an enemy's ſhot in a fight, they ſay, *ſuch a yard*, or *maſt*, *was ſhot by the board*.

SPERA, in *Geography*, a town of European Turkey, in Dobruzzi Tartary; 40 miles S. of Iſmail.

SPERAGE, Asparagus, in *Botany*. See Asparagus.

SPERDILLEN, in *Geography*, a lake of Norway, in Aggerhuus, 32 miles long and 12 wide; 4 miles N. of Chriſtiania.

SPERGULA, in *Botany*, a word which Dodonæus, who is cited as its author, expreſsly ſays was latinized from the name of this herb in Brabant, *Spuerie*, whence its Engliſh appellation, Spurrey. Whether σπυρὶ, a modern Greek name for *Verbaſcum Blattaria*, has any common origin with this Flanders word, or whether both may allude to the copious diſperſion of ſeeds in both caſes, and have been derived from the ancient Greek *σπειρω*, *to ſow*, or *ſcatter*, we can only propoſe as a conjecture. Linnæus, however, ſeems to have had ſome ſuch etymology in contemplation, when he, in Phil. Bot. p. 167, explains *Spergula* by "*a ſcattering of ſeed*;" though probably he looked no further than the Latin, *ſpargo*.—Linn. Gen. 232. Schreb. 312. Willd. Sp. Pl. v. 2. 818. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 502. Prodr. Fl. Græc. Sibth. v. 1. 317. Ait. Hort. Kew. v. 3. 137. Purſh v. 1. 320. Dill. Gen. 131. t. 7. f. 3.

Juſſ. 301. Lamarck Illuſtr. t. 392. Gærtn. t. 130.—Claſs and order, *Decandria Pentagynia*. Nat. Ord. *Caryophyllei*, Linn. *Caryophylleæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five ovate, obtuſe, concave, ſpreading, permanent leaves. *Cor.* Petals five, ovate, concave, ſpreading, undivided, larger than the calyx. *Stam.* Filaments ten, rarely but five, awl-ſhaped, ſhorter than the corolla; anthers roundiſh. *Piſt.* Germen ſuperior, ovate; ſtyles five, ſomewhat reflexed, thread-ſhaped; ſtigmas thickiſh. *Peric.* Capſule ovate, covered partly by the calyx, of one cell, and five valves. *Seeds* numerous, globoſe, but depreſſed, ſurrounded with more or leſs of a notched or dilated border.

Eſſ. Ch. Calyx of five leaves. Petals five, undivided. Capſule ſuperior, ovate, of one cell, with five valves.

Obſ. Linnæus remarks, that this genus differs from *Ceraſtium* in having undivided petals. Their general habit alſo differs more than is the caſe with moſt genera of this natural order, that of *Spergula* nearly according with various *Arenariæ*, from which the five ſtyles only diſtinguiſh it. *S. pentandra* has but five ſtamens.

1. S. *arvenſis*. Rough-ſeeded Corn Spurrey. Linn. Sp. Pl. 630. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1535. Curt. Lond. faſc. 5. t. 31. (Sagina ſpergula; Ger. Em. 1125.)—Leaves whorled. Stalks of the fruit reflexed. Seeds kidney-ſhaped, angular, rough.—Native of corn-fields and waſte ground, on a ſandy ſoil, throughout Europe, flowering from July to September. *Root* annual, ſmall. *Herb* more or leſs downy and viſcid, very various in luxuriance, ſomewhat ſucculent and brittle, with a branched, round, looſely ſpreading *ſtem*, whoſe joints are beſet with copious, whorled, linear, obtuſe *leaves*. *Panicles* terminal, forked, divaricated, level-topped. *Flower-ſtalks* downy; ſtrongly reflexed, from the baſe, as the fruit ripens. *Calyx* membranous at the edge, nearly as long as the white *petals*. *Stamens* generally ten; ſometimes five, or ſome intermediate number. *Capſule* almoſt twice as long as the calyx. *Seeds* numerous, kidney-ſhaped or roundiſh, ſwelling, angular, with an obſolete, not dilated nor membranous, border; when ripe they are black, and rough all over with minute tubercles or briſtles. In Flanders, Germany, and the north of Europe, this herb ſerves as fodder, and poultry are fed with its ſeeds. With us it is a troubleſome weed, on a light ſoil.

2. S. *pentandra*. Smooth-ſeeded Corn Spurrey. Linn. Sp. Pl. 630. Willd. n. 2. Engl. Bot. t. 1536. (S. annua, ſemine foliaceo nigro, circulo membranaceo albo cincto; Dill. Giſſ. 46.)—Leaves whorled. Stalks of the fruit reflexed. Stamens five. Seeds lenticular, ſmooth, with a membranous border.—Native of Germany, England, and probably other parts of Europe, in ſandy ground, flowering in July and Auguſt. Mr. Shepherd, curator of the botanic garden at Liverpool, firſt obſerved this plant about that neighbourhood, growing along with the preceding ſpecies, with which it altogether agrees in general appearance, but the *flowers* are perhaps rather ſmaller, and their *ſtamens* are rarely more than five in number. The moſt remarkable difference is found in the *ſeeds*, which are compreſſed and lenticular, always ſmooth, and bordered by a very conſpicuous whitiſh membrane. Such is the difference likewiſe between *Arenaria marina* and *rubra*. We cannot but feel a miſtruſt of this character, however ſtriking, conſidering the cloſe reſemblance between theſe two *Spergulæ*, at leaſt, in other reſpects. The plant found about Liverpool is certainly what Linnæus and Dillenius intended, and therefore the uncertainty expreſſed in *Fl. Brit.* reſpecting *S. pentandra*, is now removed.

3. S. *nodoſa*. Knotted Spurrey. Linn. Sp. Pl. 630. Willd. n. 3. Fl. Brit. n. 3. Engl. Bot. t. 694. Curt. Lond. faſc. 4. t. 34. Fl. Dan. t. 96. (Saxifraga paluſtris alſinefolia; Ger. Em. 567.)—Leaves oppoſite, awl-ſhaped, ſmooth; the upper ones cluſtered. Calyx without ribs.—Native of wet ſandy heaths and commons, in the colder countries of Europe, flowering in July and Auguſt, but not very common with us. Mr. Goodyer, an accurate and ingenious contributor to the ſecond edition of Gerarde's Herbal, firſt detected this ſpecies in England. Its habit is that of an *Arenaria*, eſpecially the pure white *flowers*. The fibrous perennial *root* produces ſeveral ſpreading or proſtrate *ſtems*, three or four inches long, ſlightly branched, beſet with many pairs of awl-ſhaped, ſhort, ſmooth, dark-green *leaves*, accompanied by axillary tufts of ſmaller ones, giving the herb a knotty or jointed aſpect. *Flowers* large, ſtalked, about the extremities of the ſtems. *Styles* five, as well as the valves of the *capſule*, by which alone this plant is ſeparated from *Arenaria*.

4. S. *laricina*. Larch-leaved Spurrey. Linn. Sp. Pl. 631. Willd. n. 4. Sm. Plant. Ic. t. 18. (Alſine n. 61: Gmel. Sib. v. 4. 155.)—Leaves oppoſite, awl-ſhaped, fringed, cluſtered.—A rare ſpecies, found by Steller in Siberia. It differs from the laſt in being ſomewhat larger, with longer, acute *leaves*, fringed at the baſe. Engliſh botaniſts had been accuſtomed to conſider the following as the true *S. laricina*, till the Linnæan herbarium taught them to correct this error.

5. S. *ſaginoides*. Smooth Awl-ſhaped Spurrey. Linn. Sp. Pl. 631. Willd. n. 5. Fl. Brit. n. 4. Engl. Bot. t. 2105. (Alſine n. 64; Gmel. Sib. v. 4. 157.)—Leaves oppoſite, awl-ſhaped, pointleſs, naked. Flower-ſtalks ſolitary, very long, ſmooth.—A rare inhabitant of the Scottiſh highland mountains, flowering in June. Gmelin found it in Siberia. The perennial fibrous *root* reſembles that of *S. nodoſa*, but the herb is ſmaller, more branched and erect, without any axillary cluſters of *leaves*, and having more reſemblance to a *Sagina* than an *Arenaria*. Every part is quite ſmooth, by which, and the want of a briſtly point to the *leaves*, this *Spergula* eſſentially and conſtantly differs from the more common one next deſcribed. The *flowers* are terminal, rather drooping, on long, ſolitary ſtalks. *Petals* white, roundiſh, hardly ſo long as the *calyx*. *Stamens* ten. Profeſſor Swartz deſcribes but five, which makes us doubtful of his plant. *Seeds* kidney-ſhaped, without any edge or border.

6. S. *ſubulata*. Ciliated Awl-ſhaped Spurrey. Swartz in Stockh. Tranſ. for 1789, 45. t. 1. f. 3. Willd. n. 6. Fl. Brit. n. 5. Engl. Bot. t. 1082. (S. laricina; Hudſ. 203. Fl. Dan. t. 858. S. ſaginoides; Curt. Lond. faſc. 4. t. 35. Sagina procumbens β; Linn. Sp. Pl. 185.)—Leaves oppoſite, awl-ſhaped, fringed, tipped with a briſtly point. Flower-ſtalks ſolitary, very long, ſomewhat hairy.—Native of ſandy barren heaths in the north of Europe, flowering with us from June to Auguſt. It is perennial, and reſembles the laſt in general habit, but the *leaves* are conſtantly fringed with glandular hairs, and tipped with a briſtly point. The *flowers* too are ſmaller, with generally hairy glutinous ſtalks, and uſually but five *ſtamens*. *Seeds* ſmall, compreſſed, pale brown, encircled with a black line, but no dilated border.

7. S. *glabra*. Smooth Capillary Spurrey. Willd. n. 7. (S. ſaginoides; Allion. Pedem. v. 2. 118. t. 64. f. 1, excluding the ſynonyms.)—Leaves oppoſite, thread-ſhaped, ſmooth, cluſtered. Flower-ſtalks ſolitary, very long, ſmooth.—Common in the graſſy alpine paſtures of Savoy, according to Allioni, by whoſe work alone we have any knowledge

of this plant. It vies in magnitude with *S. laricina*, but is much more ſlender in the *foliage*, as well as quite ſmooth. *Petals* white, twice as long as the *calyx*. *Stamens* ten.

SPERGULASTRUM, (ſo called from its reſemblance to *Spergula*,) a genus of Michaux, *Flora Boreali-Americana*, v. 1. 275. The author ſpeaks of it as a doubtful genus, differing from *Spergula* chiefly in having but four *ſtigmas*, or rather *ſtyles*, which in one ſpecies vary to three. Perſoon and Purſh have publiſhed this genus under the appellation of *Micropetalum*, the original name being equally contrary to ſenſe and uſage, becauſe it is formed of another eſtabliſhed one, merely varied in termination.

SPERILEN, in *Geography*, a lake of Norway, in Aggerhuus; 35 miles N. of Chriſtiania.

SPERLING, Otto, in *Biography*, ſon of a perſon of the ſame name, was born at Chriſtiania, in Norway, in 1634. He received the early part of his education at Copenhagen; he afterwards ſtudied at the gymnaſium of Bordeſholm, and then at the academy of Helmſtadt. In 1655 he became private tutor to the ſon of M. Wrangel, governor of Swediſh Pomerania, and in 1658 made a tour to Holland, France, and England. In 1662 he went to Hamburgh, as tutor to the youngeſt ſon of Corfits Ulfeld, and in 1674 took the degree of doctor of laws at Kiel. In 1681 he travelled with the ſons of J. A. Von Bachwald, and ſpent ſome time at Paris, where he was employed in arranging the library of the celebrated Colbert, for which ſervice he received a penſion of 200 rix-dollars as long as that noble-minded man lived. On his return he proceeded to Hamburgh, where he practiſed the law: he was afterwards aſſeſſor in the court of Gluckſtadt, and in 1690 he was invited to Copenhagen, where he was employed in various important affairs. In 1692 he was elected profeſſor of juriſprudence and hiſtory, and afterwards of oratory and hiſtory, in the new knights' academy at Copenhagen. In 1698 he obtained leave to reſign, on account of his age, but in 1701 he reſumed his former ſtation as profeſſor of hiſtory and oratory, in which he continued till the ſuppreſſion of the academy in 1710. He became a member of the Royal Society of London in 1700, and died in 1715. He was author of a great many works, among which were the following: "Monumentum Hamburgenſe Benedictinum;" "De Danicæ Linguæ ac Nominis antiqua Gloria et Prærogativa inter Septentrionales," &c. Gen. Biog.

Sperling, in *Geography*, a town of Pruſſia, in the province of Natangen; 15 miles E. of Angerburg.

SPERLINGA, a town of Sicily, in the valley of Demona; 10 miles S. of Miſtretta.

SPERLONGA, a town of Naples, in Lavora; 7 miles S. of Fundi.

SPERM, Sperma, σπερμα, the ſeed of which an animal is formed.

SPERMACETI, or Parmasitty, in *Pharmacy*, is a whitiſh, flaky, unctuous ſubſtance, prepared from oil; principally from that of a cetaceous fiſh, called by ſome the *male whale*, by others *cachalot*, and by the Latins *orga;* diſtinguiſhed from the common whale by its having teeth in lieu of whale-bone, and by a bunch on its back. See Physeter.

The ancients were ſtrangers to the nature of this preparation; and even Schroder ſeems in doubt, whether to reckon it an animal or mineral ſubſtance.

It had its name *ſpermaceti*, ſeed or ſperm of whale, given it, no doubt, to raiſe its value, by a notion of its ſcarcity. The ſpongy oily maſs from which it is made, is found in a large triangular trunk, four or five feet deep, and ten or twelve long, filling almoſt the whole cavity of the head, and ſeeming to be entirely different from the proper brain of the animal. The oil is ſeparated from it by dripping. In this ſtate it has a yellow unctuous appearance, and is brought to England in barrels. An ordinary ſized whale, it is ſaid, will yield upwards of twelve large barrels of crude ſpermaceti. The mode of purifying it in the large way is as follows: the maſs is put into hair or woollen bags, and preſſed between plates of iron in a ſcrew-preſs, until it becomes hard and brittle. It is then broken in pieces, and thrown into boiling water, where it melts, and the impurities, which riſe to the ſurface or ſink to the bottom, are ſkimmed off or ſeparated from it. After being cooled, and ſeparated from the water, it is put into freſh water in a large boiler, and a weak ley of the potaſh of commerce added to it by degrees. This part of the proceſs is thrice repeated, after which the whole is poured into coolers, when the ſpermaceti concretes into a white ſemitranſparent maſs, which, on being cut into ſmall pieces, aſſumes the flaky appearance which it has in the ſhops. Some of our druggiſts, it is ſaid, poſſeſs the art of making it from the ſediment or fæces of any kind of oil.

Some ſophiſticate it with wax; but the deceit is diſcovered, either by the ſmell of the wax, or by the dulneſs of the colour. Some alſo ſell a preparation of oil gained from the tail of the whale, inſtead of that from the brain; which laſt kind turns yellow, as ſoon as opened to the air. In the general, there is no merchandize that ſhould be kept cloſer from the air than ſpermaceti.

Purified ſpermaceti is an almoſt ſilvery white, friable, ſemitranſparent, unctuous ſubſtance, inodorous and inſipid, or having very little flavour, and only a ſlight tallowy odour. It is ſofter and more brittle than white wax; and it is diſtinguiſhed from every other ſpecies of concrete oil, by its ſuperior tranſparency, high luſtre, and cryſtalline texture. Its ſpecific gravity is 9.433, and it melts at 112° Fahr.; and at a higher temperature evaporates, with little alteration. By the aſſiſtance of a wick, it burns with a clear white flame, ſuperior to that of tallow, and without any diſagreeable odour; and this conſtitutes its excellence as a material for candles. By repeated diſtillation, the ſpermaceti becomes permanently fluid at the common temperature. According to the experiments of Crell, its diſtillation requires a greater heat than fat; and the coagulated oil, thus procured, partly white and partly browniſh. By repeated diſtillation it affords a yellowiſh acid, and becomes more fluid, but coagulates in the cold. The acid, rectified by diſtillation, is entirely colourleſs, and affords the ſame ſalts with earths and alkalies as Crell's ſubacic acid. The oil unites with ammonia into a ſaponaceous emulſion. It may be diffuſed in water by means of the yolk of egg or mucilage. It is ſparingly ſoluble in boiling alcohol, 150 parts of the menſtruum being neceſſary for this purpoſe; and as the ſolution cools, the ſpermaceti is again precipitated. Pure ether very copiouſly diſſolves it, but ſeems to retain none of it when cold. Oil of turpentine has the ſame effect. With cauſtic potaſh it combines into a ſoap, ſoluble in warm water. Fluid ammonia, when cold, has no action upon it; but when warm, very eaſily diſſolves it, forming an emulſion, which is not decompoſed either by ſimple cooling, or by mixture with water; but the addition of an acid inſtantly precipitates the ſpermaceti. With concentrated ſulphuric acid it forms a browniſh ſolution, which, dropped into water, gives up its ſpermaceti, apparently unaltered. Like the other fat oils, it diſſolves ſulphur. By long expoſure to the air, it acquires a yellow tinge, and becomes rancid; but it may be again purified, by being waſhed in a warm ley of potaſs. The great uſe of ſpermaceti is for making candles; and it is alſo employed in medicine.

Spermaceti candles are of modern manufacture: they are made ſmooth, with a fine gloſs, free from rings and ſcars, ſuperior to the fineſt wax candles in colour and luſtre; and, when genuine, leave no ſpot or ſtain on the fineſt ſilk, cloth, or linen.

In medicine, ſpermaceti is demulcent and emollient; but for internal uſe it poſſeſſes no advantages ſuperior to thoſe of the bland oils. It is uſed in dyſentery and irritations of the alimentary canal, and alſo in catarrh and phthiſis; but in the latter caſes it is leſs beneficial than the bland oils. Some imaginary virtues have been aſcribed to ſpermaceti, which have occaſioned the uſe of it by women in child-bed. In its combination with water by means of the yolk of egg, it is a pleaſant vehicle for opium, when the after-pains are troubleſome. It forms a part of the compoſition of ſeveral ointments. The doſe is from ʒſs to ʒjſs, rubbed with ſugar, or in the form of emulſion. It poſſeſſes a property, which is that of ſoftening the ſkin, which has occaſioned its being uſed by the ladies in paſtes, waſhes, &c. Its officinal preparations are the "ceratum ſimplex" of the Edinb. Ph., formed of ſix parts of olive oil, three parts of white wax, and one part of ſpermaceti; the "ceratum cetacei" of the Lond. Ph. (ſee CERATUM); the "unguentum cetacei," or ſpermaceti ointment, of the Lond. Ph., formed by melting together, over a ſlow fire, ſix drachms of ſpermaceti and two drachms of white wax, and ſtirring them conſtantly till they be cold; and the "unguentum ſpermatis ceti," or ointment of ſpermaceti, of the Dubl. Ph., formed by making half a pound of white wax, one pound of ſpermaceti, and three pounds of prepared lard, into an ointment. Theſe ointments conſtitute the ordinary dreſſings for bliſtered ſurfaces and excoriations.

SPERMACOCE, in *Botany*, ſo named by Dillenius, in his *Hortus Elthamenſis* 369, from σπερμα, *ſeed*, and ακωκη, *a ſharp point*, in alluſion to the little erect beaks of the capſules.—Linn. Gen. 50. Schreb. 66. Willd. Sp. Pl. v. 1. 568. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 232. Purſh 105. Juſſ. 197. Lamarck Illuſtr. t. 62. Gærtn. t. 25.—Claſs and order, *Tetrandria Monogynia.* Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſmall, ſuperior, with four teeth, permanent. *Cor.* of one petal, funnel-ſhaped; tube cylindrical, ſlender, longer than the calyx; limb in four deep, obtuſe, widely ſpreading, ſomewhat reflexed ſegments. *Stam.* Filaments four, awl-ſhaped, ſhorter than the corolla; anthers ſimple. *Piſt.* Germen inferior, roundiſh, compreſſed; ſtyle ſimple, divided in the upper part; ſtigmas obtuſe. *Peric.* Capſules two, combined, oblong, gibbous externally, flat on the inner ſide, obtuſe, each with two beaks. *Seeds* ſolitary, roundiſh, rolled in at the edges.

Eſſ. Ch. Corolla of one petal, funnel-ſhaped. Capſules two, combined, each crowned with two teeth.

A genus of extra-European weeds, not recommended by any beauty of aſpect, or known utility, chiefly the produce of the Weſt Indies, or the warmer parts of North America, a few ſpecies only being found in the Eaſt Indies. The plants are generally herbaceous, in many inſtances annual, often rough, with oppoſite, ſimple, entire *leaves;* ſheathing, membranous, jagged or briſtly, *ſtipulas*, like many of the ſame natural order; and numerous, ſmall, white, reddiſh, or blueiſh, whorled or capitate, *flowers*.

Eight ſpecies are enumerated in *Linn. Syſt. Veg.* ed. 14, of which the ſeventh, *S. procumbens*, is the ſame as *Hedyotis fruticoſa* of Linnæus. Willdenow has twenty ſpecies, to which three new ones are added by Purſh. Five find a place in the *Hortus Kewenſis.* We ſhall ſelect a few examples, ſufficient to give a general idea of the whole.

S. *tenuior.* Slender Button-weed. Linn. Sp. Pl. 147. Willd. n. 1. Ait. n. 1. (S. verticillis tenuioribus; Dill. Elth. 370. t. 277. f. 359.)—Stem ſmooth, erect. Leaves lanceolate; rough on the upper ſide. Flowers whorled. Stamens ſhorter than the corolla. Fruit hairy.—Native of the Weſt Indies. Found alſo, according to Purſh, in dry gravelly ſituations, from Virginia to Carolina, flowering from June to Auguſt. *Root* annual. *Stem* ſquare. *Leaves* an inch and a half long, lanceolate, acute. *Flowers* very ſmall, white.

S. *glabra.* Smooth Button-weed. Michaux Boreal-Amer. v. 1. 82. Purſh n. 2.—Stem ſmooth, procumbent. Leaves ovato-lanceolate, ſmooth on both ſides. Flowers whorled. Fruit ſmooth.—On the banks of rivers in moſt of the weſtern territories of North America, flowering in July and Auguſt. The plant is annual. *Flowers* white, longer than in the former.

S. *verticillata.* Denſe-whorled Button-weed. Linn. Sp. Pl. 148. Willd. n. 9. Ait. n. 4. (S. verticillis globoſis; Dill. Elth. 369. t. 277. f. 358.)—Hairy. Leaves lanceolate. Whorls globoſe, many-flowered.—Native of Africa. Cultivated by Sherard. The *ſtem* is ſhrubby, erect, branched, with numerous, narrow, ſomewhat cluſtered *leaves*, and denſe whorls of ſmall, white, very copious *flowers*. Such is the Senegal plant, deſcribed by Dillenius. The Jamaica ſpecimen from Brown, which is ſmooth, and which led Linnæus to admit that circumſtance into his ſpecific definition, may poſſibly be a different ſpecies, but we have not ſufficient materials to decide this point. Swartz ſpeaks of this laſt as having, when in flower, the ſmell of Melilot.

S. *hirta.* Rough Hairy Button-weed. Linn. Sp. Pl. 148. Willd. n. 12. Swartz Obſ. 45. (S. n. 3; Browne Jam. 141.)—Stem branched, hairy. Leaves ovato-lanceolate, rough with callous points. Flowers axillary, crowded, ſeſſile. Stamens prominent.—Native of dry graſſy places in the Weſt Indies. *Root* annual. Angles of the *ſtem* rough with recurved briſtly hairs. *Leaves* ſtalked, an inch and a half or two inches long, rough like a file, eſpecially on the upper ſide. *Stipulas* fringed with long taper briſtles. *Flowers* ſmall, whitiſh, with blue *anthers*. *Fruit* hairy.

S. *villoſa.* Shaggy Button-weed. Swartz Prodr. 29. Ind. Occ. 1943. Willd. n. 13. (Pulegium fruticoſum erectum, verticillis denſiſſimis; Sloane Jam. v. 1. 170.)—"Stem ſhaggy, ſlightly branched. Leaves ovato-lanceolate, downy; the uppermoſt four together. Flowers whorled. Stamens ſhorter than the corolla."—Native of fields and meadows, in the ſouthern part of Jamaica, flowering all the year round. The *ſtem* is herbaceous, a foot high, but little branched, ſquare, clothed with ſoft hairs. *Leaves* obtuſe, with briſtly ribs. *Flowers* white, with whitiſh, nearly ſeſſile, *anthers*. *Swartz.*

S. *procumbens.* Procumbent Corymboſe Button-weed. Linn. Syſt. Nat. ed. 12. v. 2. 115. Willd. n. 19. (S. corymboſa; Linn. Sp. Pl. 149.)—Stem procumbent. Leaves linear-lanceolate, entire, ſmooth-edged. Corymbs lateral, ſtalked, many-flowered.—Native of the Eaſt or Weſt Indies. Of this we have ſeen only an imperfect ſpecimen, in the Linnæan herbarium, which we ſhould rather gueſs to belong to *Hedyotis*, but the *fruit* is not in a ſtate to decide that queſtion. The *leaves* are an inch long. *Flowers* in roundiſh corymboſe heads, compoſed of crowded leafy whorls, on axillary compreſſed ſtalks. *Calyx* recurved, downy. *Corolla* hairy within. *Stamens* prominent.

S. *hyſſopifolia.* Hyſſop-leaved Button-weed. Sm. Inſ. of Georgia, v. 1. 75. t. 38.—Stem decumbent. Leaves linear-lanceolate, fringed with briſtly teeth. Whorls of few flowers.—Native of Surinam and Georgia. A ſpecimen was ſent by Rolander to Linnæus, who marked it *S. ſtrigoſa*, but afterwards effaced that name, nor does this ſpecies ſeem to have been any where deſcribed, till it appeared in the Natural Hiſtory of the Inſects of Georgia, with the plants on which they feed, publiſhed by the writer of this article, from the drawings and papers of Mr. John Abbot. This work is never cited by Willdenow, nor perhaps had it fallen in his way. The ſpecies before us has woody, wavy, decumbent, ſlightly branched, ſmoothiſh *ſtems*. The *leaves* are an inch long, remarkable for being bordered with fine cartilaginous teeth, pointing forward, like thoſe of many ſpecies of *Galium*. Briſtles of the *ſtipulas* numerous, long, and ſtout. *Flowers* reddiſh, three or four in each whorl. *Calyx* fringed. *Fruit* obovate, roughiſh, red even in an early ſtate, though the *calyx* is green. We ſhould ſuſpect this to be the *S. diodina* of Michaux and Purſh, found in dry barren ſoils, on iron ore hills, from Virginia to Carolina, but the *flowers* of that ſpecies are deſcribed as white, and very ſmall, ſolitary and alternate, the *ſtem* and *ſeeds* hairy, which characters do not anſwer to our plant, though the edges of the *leaves* appear to be ſimilarly rough in both.

S. *involucrata*. Long-flowered Button-weed. Purſh n. 4.—" Stem alternately branched, very hiſpid. Leaves ovato-lanceolate, pointed, hairy on both ſides. Stipulas with many briſtles. Heads terminal, bracteated. Stamens prominent."—Found in Carolina by Mr. Fraſer. About a foot high. *Leaves* broad, rather oblique. *Flowers* white, with a very long tube.

SPERMACOCE, in *Gardening*, contains plants of the herbaceous, annual, and ſhrubby kinds; among which the ſpecies cultivated are, the ſlender button-weed (S. tenuior); and the whorl-flowered button-weed (S. verticillata).

Method of Culture.—Theſe plants are increaſed by ſowing the ſeeds on a moderate hot-bed, early in the ſpring, or in pots to be plunged in it. When the plants have attained ſome growth, they ſhould be removed into ſeparate pots, filled with good friable mould, replunging them in the bed. They ſhould afterwards be managed as other plants of the exotic ſtove kind.

They afford variety in hot-houſe and ſtove collections.

SPERMATIC, in *Anatomy*, an epithet applied to various parts belonging to the teſticle, as the artery, veins, nerves, cord, &c. See the deſcription of the teſtis in the article GENERATION.

SPERMATIC *Chord, Diſeaſe of*, in *Surgery*. See HYDROCELE.

SPERMATOCELE, a kind of rupture, occaſioned by a diſtenſion of the ſeminal veſſels, by which they are let fall into the ſcrotum.

SPERMATOPŒA, a name given to ſuch medicines as are ſuppoſed to increaſe the ſemen.

SPERMATOSIS is a term ſometimes uſed for the formation of ſeed.

SPERONE, LA, in *Geography*, a cape at the ſouth-eaſt extremity of Corſica; 4 miles E. of Bonifacio.

SPERONI, SPERONE, in *Biography*, a diſtinguiſhed Italian writer of the 16th century, was the ſon of Bernardino Speroni, a noble of Padua, in which city he was born in the year 1500. He ſtudied under the famous Pomponazzo, in Bologna. He took his degrees in medicine and philoſophy, and was appointed at an early age reader in logic, and profeſſor of philoſophy, in the univerſity; but being greatly attached to his former preceptor Pomponazzo, he returned to Bologna, which he did not quit till the death of that eminent man. He then reſumed the profeſſor's chair at Padua, which he held till the death of his father in 1528, and his own marriage. After this he was employed by his fellow-citizens in public buſineſs, and was entruſted with ſeveral honourable commiſſions. But he was not leſs intent upon literature than diligent in active buſineſs, and became one of the moſt learned men of his time. When reſiding as an envoy at Venice, his ſpeeches before the ſenate were ſo much admired, that it has been affirmed, that the judges and advocates belonging to other courts would leave their own places, to hear his pleadings. Neverthelefs he was not a lawyer by profeſſion, but only took up, occaſionally, the cauſes of his friends. In 1560 Speroni went to Rome, as agent to the duke of Urbino at the Papal court. He obtained the friendſhip of the principal men of letters at that capital, and was on terms of particular intimacy with Charles Borromeo; and on that account he was induced to add theology to his other ſtudies. Pius IV. conferred on him the honour of knighthood; and the dukes of Urbino and Ferrara ſent for him to their different courts, where he was treated with the greateſt reſpect. Almoſt all the princes of Italy followed the example of thoſe ſovereigns, intreating him to take up his abode with them; but he preferred the tranquillity of private life to the honours that might have been ſhowered upon him. He died at the great age of 88, and was interred with every kind of funeral honour. As a writer, his ſtyle is ſpoken of with ſingular approbation: it is ſaid to be entirely free from the affected elegance and the prolixity which characterize many authors of that country and period. It rather ſeems purpoſely to ſhun the moſt ornamented expreſſions, and yet it is inferior to none in true poliſh, and unites gravity and preciſion to harmony and eloquence. One of the moſt celebrated compoſitions of Speroni was a tragedy, entitled "Canace and Macareus," which was much applauded by the Paduan academy degli Inflammati. Some copies of it having got abroad without the knowledge of the author, an incorrect edition was printed at Venice in 1546, but with the imprint Florence. Before, however, this ſurreptitious publication, there appeared in MS. a criticiſm upon it, in which it was treated with ſingular ſeverity. This being afterwards printed, Speroni thought it neceſſary to defend his compoſition, and a long controverſy enſued. The author, no doubt, improved his work before he gave it to the public, ſanctioned by his own authority; and when it thus appeared, it was regarded as one of the beſt productions of that claſs which the age exhibited. Of the other writings of this author, many are moral treatiſes in the form of dialogue, in which he was one of the firſt compoſers in Italian, and in which he is ſaid to have had few equals. The reſt related to polite literature, eloquence, poetry, hiſtory, &c.; all diſplaying an extenſive knowledge of books, and a correct judgment. His works have been collected and publiſhed at Venice, in 5 vols. 4to.

SPERVERIUS, in *Ornithology*, a name by which Bellonius, and ſome other authors, have called the ſparrow-hawk, more commonly known by the names of *niſus*, and *accipiter fringillarius*.

SPESSART, in *Geography*, a large foreſt of Germany, to the right of the Mayne, extending from Wurzburg to Aſchaffenburg.

SPETKER, a river of Switzerland, belonging to the abbey of St. Gal; 4 miles E. of St. Gal.

SPEUSIPPUS, in *Biography*, an Athenian philoſopher, ſon of Eurymedon, by a ſiſter of Plato, ſucceeded his uncle in his ſchool, over which he preſided during eight years, commencing from the death of that illuſtrious philoſopher, in the year B. C. 348. He placed the ſtatues of the Graces in the ſchool built by Plato in the academy, and cloſely adhered to the doctrines of his maſter. His manners, however, were not conformable to his philoſophy: he was vindictive, and a lover of pleaſure. He was likewiſe avaricious, and, contrary to the practice of Plato, exacted a gratuity from his diſciples. He was admitted to the friendſhip of Dion while he reſided at Athens; and it was by his inſtigation that Dion, invited by the malecontents of Syracuſe, undertook his expedition againſt Dionyſius. (See Dion. in Vit. Corn. Nep.) Becoming paralytic in his limbs, he was conveyed to and from the academy in a carriage of ſome kind. Upon one of theſe occaſions he met Diogenes, and ſaluted him; but the cynic, inſtead of returning the civility, upbraided him for enduring to live under ſuch an infirmity. To which Speuſippus replied, "that he did not live in his limbs, but in his mind." At length, overcome by his maladies, and wearied of life, he put an end to his exiſtence, having firſt conſtituted Xenocrates his ſucceſſor in the academy. He was author of ſeveral philoſophical treatiſes, which have periſhed; though it is ſaid that they were held in ſuch eſtimation by Ariſtotle, that he gave three talents for them.

SPEY, in *Geography*, a river of Scotland, which riſes in the loch of that name, about eight miles S.W. from Fort Auguſtus, in the county of Inverneſs, and runs into the North ſea, in the frith of Murray; 3 miles N.W. of Fochabers. N. lat. 57° 40′. W. long. 2° 59′.

SPEYERSBERG, a town of Bavaria, in the biſhopric of Bamberg; 11 miles N. of Bamberg.

SPEYMOUTH, a pariſh of the ſhire of Elgin, Scotland, 1½ mile N.W. from Fochabers.

SPEZZA, or SPETIA, a ſea-port town of the Ligurian republic, ſituated on a gulf of the Adriatic, to which it gives name, and anciently called "Portus Lunæ." At the entrance of the gulf is a ſmall iſland, called "Palmaria," which makes the harbour ſafe and large; 35 miles S.E. of Genoa. N. lat. 44° 9′. E. long. 9° 40′.

SPEZZANO, a town of Italy, in the department of the Panaro; 5 miles S. of Modena.—Alſo, a town of Naples, in Calabria Citra; 4 miles E.N.E. of Coſenza.

SPHACELUS, from σφαζω, *to deſtroy*, implies, in *Surgery*, the complete mortification of a part of the body. See GANGRENE.

SPHACHIA, in *Geography*, a diſtrict or province of the iſland of Crete, lying towards the ſouth, and extending to the eaſt much more than Cidonia, or Kidonia, which is ſituated to the north; it is conſidered as making part of the pachalic of Candia; though the interior police and adminiſtration belong to the inhabitants themſelves, called "Sphachiots." The firſt chain of the high mountains of Sphachia, compriſed in the province of Kidonia, is covered with ſnow for four or five months. It is, in general, ſtony and deſtitute of earth; but it has a few narrow vallies which are ſuſceptible of culture. Barley is ſown here in May, and gathered in September. As ſoon as the ſnow is melted, the flocks are brought to theſe mountains; and though the ground appears almoſt naked, cattle find a food, which, if not abundant, is very reliſhing, and very fit for giving to their milk and fleſh a quality, unattainable by thoſe that are bred in the moſt fertile places. The Sphachiots inhabit the high mountains, which extend from E. to W., from the province of Selino, as far as that of Amari. Independently of a great number of villages, which are ſituated on theſe mountains, ſome are found towards the ſouth coaſt, and among others "Sphachia," their chief place, which is a ſmall harbour that contains ſeven or eight large boats, which the Sphachiots uſe for their trade, and ſometimes alſo for the piracies which they practiſe in imitation of their anceſtors. The Malteſe formerly frequented this harbour, and were furniſhed by the inhabitants with proviſions, and all the aſſiſtance which they wanted. Sphachia produces ſcarcely any oil; but it affords a ſmall quantity of wheat, and barley in greater abundance: it alſo furniſhes honey and wax. The principal production conſiſts in little cheeſes made with ewes' milk, which are exported to Conſtantinople. In winter the Sphachiots drive their flocks to the ſea-ſide, in order to obtain plenty of graſs; but in ſummer they remove them back to feed on the rich paſtures, which the milder temperature and gradual melting of the ſnow always maintain in a ſtate of verdure. With the wine which theſe Greeks make on the firſt link of the chain of their mountains, they indulge themſelves ſo freely, that they conſume their whole ſtock during the three or four months that ſucceed the vintage, and in the remainder of the year they are obliged to drink pure water. The inhabitants of the Sphachian mountains are diſtinguiſhed by their induſtry and activity; they are ſhepherds, agriculturiſts, and artiſans; they occupy their land to advantage, and breed a great number of cattle; and manufacture with tolerable ſkill the cloths which they uſe, as well as the utenſils and implements which they employ. Upon the whole, the Sphachiot has preſerved the energy of the independent man, and the activity of a perſon who enjoys, without moleſtation, the fruit of his labour.

The Sphachiots, who are conſidered as the real deſcendants of thoſe famous Cretans who were ſo long maſters of the country, are diſtinguiſhed from the other Greeks by their tall ſtature, their comely appearance, their love of liberty, their courage, their ſkill, and, above all, the hatred which they have vowed againſt the uſurpers of this iſland. Under the Romans, the Saracens, the Venetians, and the Turks, the Sphachiots found means to preſerve their laws and their cuſtoms. They annually appointed their magiſtrates in the general aſſemblies of the people. Obliged by the Turks to tranſport, in ſummer, from the top of their mountains, the ice neceſſary for the conſumption of the inhabitants of Canea and Retimo, they paid no tax, no impoſt; they had no agas; they never ſaw among them the agents of the Turkiſh government; they formed, in a word, a republic in ſome meaſure independent. When, in 1769, ſome Ruſſian emiſſaries came to diſturb the peace, and impair the happineſs, which theſe privileged Greeks enjoyed on their mountains, the Sphachiots recurred to arms; and ſome hundreds of the braveſt of them went and joined the Mainots, their friends, and proceeded together to offer their ſervices to count Orloff, at a time when they apprehended the Ruſſians were preparing to deliver the Greeks from the Ottoman yoke. The paſha of Candia, informed of the conduct of the Sphachiots, reſolved, in the ſame year 1770, to march againſt them with all the forces of the iſland. He wiſhed to exterminate them, and thus to afford a terrible example of ſeverity to all the Greeks who might be tempted to imitate them. The Turks ſoon united under their colours. The Sphachiots, taking advantage of their rocks and mountains, defended themſelves againſt the attacks of the Turks, and ſheltered themſelves amidſt their crags and precipices. Notwithſtanding their reſiſtance, the Turks perſevered, though tired of a painful and diſagreeable war, and loudly demanding to return home, reduced the Sphachiots to the laſt extremity. Almoſt all their villages were ſet on fire; many of their women and children were carried off, as well as their flocks, and their proviſions were exhauſted. In theſe circumſtances they received with pleaſure the firſt propoſals that were made to them, conſented to pay their annual tribute, and obtained permiſſion to return to their habitations, and continue their barter with the maritime towns. The Turks treated them in the moſt inſulting and cruel manner, loading 3000 or 4000 Greeks with their baggage, and in their different battles placing them in front, ſo as to make a rampart of their bodies. This cowardly and barbarous treatment greatly diſtreſſed theſe brave mountaineers; and frequently prevented their firing on their enemies, for fear of injuring thoſe whom they conſidered as their brethren, ſtill more unfortunate than themſelves. Although the Sphachiots pay their karatch with the greateſt repugnance, and are diſpoſed to avail themſelves of the firſt favourable moment for ſhaking off the yoke, which hangs heavy on their necks, they took care, during the laſt war of the Ruſſians againſt the Turks, to reſiſt the ſolicitations addreſſed to them for taking a part in any hoſtile armaments. By this wary conduct, they have preſerved the few privileges which they have remaining. Olivier's Travels.

SPHÆCULÆ, among the Romans, were tickets of wood, *teſſeræ ligneæ*, by which the emperors ſcattered their preſents to people of both ſexes in the theatre, or circus.

SPHÆRANTHUS, in *Botany*, derived from σφαιρα, *a ſphere*, or *globe*, and ανθος, *a flower*, from the aggregation of its florets into globular heads.—Linn. Gen. 452. Schreb. 591. Willd. Sp. Pl. v. 3. 2394. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 184. Juſſ. 176. Lamarck Dict. v. 7. 321. Illuſtr. t. 718. Gærtn. t. 164. Loureir. Cochinch. 509. Vaill. Mem. de l'Acad. des Sc. 1719. t. 20. f. 12.—Claſs and order, *Syngeneſia Polygamia Segregata*. Nat. Ord. *Compoſitæ Capitatæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* globular, imbricated with pointed, permanent ſcales, clothing the general receptacle on all ſides; *partial* one to each ſcale of the common calyx, many-flowered, of five linear, equal, erect leaves. *Cor. partial* compriſing about three perfect florets in the diſk, and moſtly five female ones in the radius. *Perfect florets* of one petal, funnel-ſhaped, with a five-cleft, ſpreading limb; *female* awl-ſhaped, tubular, with a trifid, very ſmall, cloſed mouth. *Stam.* (in the perfect florets) Filaments five, capillary, very ſhort; anthers cylindrical, tubular, longer than the corolla. *Piſt.* (in the perfect florets) Germen ſhrivelled; ſtyle long and rather thick; ſtigma quite ſimple: (in the female florets) Germen oblong; ſtyle ſetaceous, the length of the ſtamens; ſtigma cloven. *Peric.* none, except the unchanged calyx. *Seeds* (in the perfect florets) none; (in the female) ſolitary, oblong, naked. *Recept. common* ſcaly; *partial* naked.

Eſſ. Ch. Partial calyx eight-flowered. Florets tubular, perfect; ſome imperfectly female. Receptacle ſcaly. Down none.

1. S. *indicus*. Indian Sphæranthus. Linn. Sp. Pl. 1314. Fl. Zeylan. 312. Willd. n. 1. (S. purpurea alata ſerrata; Burman. Zeylan. 220. t. 94. f. 3.)—Leaves lanceolate, ſerrated, decurrent, ſmooth. Peduncles winged. Wings of the ſtem and ſtalks ſerrated.—Native of the Eaſt Indies. It flowers at Kew, in the ſtove, from Auguſt to December. *Root* perennial. *Stems* herbaceous, branched above and below, ſmooth. *Leaves* alternate, ſeſſile, lanceolate, naked, ſerrated, remarkably decurrent, involute, having the fragrance of oil of lavender. *Flowers* ſolitary, terminal, globular, of a blue or purpliſh colour.

2. S. *microcephalus*. Small-headed Sphæranthus. Willd. n. 2.—Leaves obovato-lanceolate, ſlightly pointed, ſerrated, decurrent, ſmooth. Peduncles winged. Wings of the ſtem and ſtalks entire.—Native of Java.—Willdenow, upon whoſe authority this and the following ſpecies are adopted, ſays, that this is very like the preceding, but that its *wings* are entire, not ſerrated. *Leaves* obovato-lanceolate, obtuſe, with minute, very diſtant, pointed ſerratures. *Flowers* in oblong, not ſpherical, heads, about half as big as thoſe of the laſt ſpecies.

3. S. *hirtus*. Hairy Sphæranthus. Willd. n. 3. Lamarck Illuſtr. t. 718. f. 1.—Leaves obovate, ſerrated, hairy, decurrent. Peduncles winged.—Allied to the firſt ſpecies, but diſtinct in having obovate *leaves*, and ſmaller *heads of flowers*, as well as in the hairineſs of all its parts.

4. S. *africanus*. African Sphæranthus. Linn. Sp. Pl. 1314. Thunb. Prodr. 169. (Scabioſa minor, alato caule, maderaſpatenſis; Pluk. Alm. 335. t. 108. f. 7.)—Leaves decurrent, ovate, ſerrated. Peduncles round.—Native of the Cape of Good Hope and Madras, flowering at Kew in July and Auguſt. *Stem* herbaceous, about ten inches high. *Leaves* alternate, ovate-lanceolate. *Peduncles* ſuſtaining three or four globular *heads of flowers* of a pale yellow colour.

5. S. *chinenſis*. Linn. Mant. 119. Willd. n. 5.—Leaves ſeſſile, pinnatifid.—Native of India. Why then (ſays profeſſor Martyn) is it named *chinenſis*?—It is extremely like *S. indicus*, but a much ſmaller plant, with pinnate, ſinuated *leaves*, and, if we miſtake not, is the very ſame as the Linnæan *Artemiſia maderaſpatana*.

6. S. *cochinchinenſis*. Loureir. Cochinch. 510.—Leaves decurrent, oblong, undivided. Flowers in heart-ſhaped, ovate, nearly ſeſſile, terminal heads.—Native of China and Cochinchina, among corn, and in gardens.—Stem herbaceous, a foot and half high, erect, round, ſmooth, whitiſh, with a few aſcending branches. *Leaves* alternate, ſeſſile, undulated, rugoſe, woolly. *Flowers* white, tinged with a little purple. Loureiro obſerves, that the laſt ſpecies (*S. chinenſis*) differs from this only in having pinnatifid leaves.

SPHÆRIA, a genus of the fungus tribe, defined by Micheli, but properly named by Haller, in alluſion to the ſpherical ſhape of the ſeed-veſſels.—Hall. Hiſt. v. 2. 120. Schreb. Gen. 770. Perſ. Syn. 1. Lamarck t. 879. (Lichen-agaricus; Mich. Gen. 103. t. 54, 55.)—Claſs and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi, angiocarpi*.

Eſſ. Ch. *Capſules* roundiſh, immerſed, filled with jelly, which becomes a maſs of minute, volatile, *ſeeds*.

Perſoon reckons up 184 ſpecies, diſtributed in eight ſections, of each of which we ſhall exhibit examples.

Sect. 1. *Cauleſcent; elongated or club-ſhaped; their ſubſtance either fleſhy or corky*. Ten ſpecies.

S. *militaris*. Scarlet Club-ſhaped Sphæria. Perſ. n. 1. Obſ. Mycolog. faſc. 2. 66. t. 6. f. 3. Sowerb. Fung. t. 60. (Clavaria militaris; Linn. Sp. Pl. 1652. Hudſ. 638. With. v. 4. 361? C. militaris crocea; Vaill. Pariſ. 39. t. 7. f. 4. C. granuloſa; Bulliard t. 496. f. 1.)—Tawny red, or ſcarlet, fleſhy, club-ſhaped. Head granulated with the prominent ſeed-veſſels. Perſoon mentions this as found in autumn, after great rains, in wet graſſy places, always growing out of ſome dead caterpillar or chryſalis. The only ſpecimen we ever ſaw was gathered on a dry gravelly bank above Thorpe, near Norwich, and meaſured about an inch in height, the head being ovate, of a beautiful ſcarlet, granulated like orange-peel; the ſtalk paler and ſmooth. The figures above cited are rather taller, and generally more yellowiſh. Withering appears to confound various diſtinct ſpecies under the above name.

S. *entomorhiza*. Slender-ſtalked Sphæria. Dickſ. Crypt.

faſc. 1. 22. t. 3. f. 3. Perſ. n. 4. With. v. 4. 389.—Stalk elongated, ſlender, ſimple or divided, ſomewhat compreſſed. Head roundiſh, brown.—Found by the late Rev. Mr. Lightfoot, in the woods of the ducheſs dowager of Portland at Bulſtrode, in autumn, but rarely, growing out of ſome dead inſect. The *ſtalk* was uſually two or three inches high, wavy, ſlender, blackiſh; ſometimes deeply cloven. *Heads* ſolitary, globular, granulated, browniſh, the ſize of a ſmall pea.

S. *ophiogloſſoides.* Fibrous-rooted Club Sphæria. Perſ. n. 5. (Clavaria radicoſa; Bulliard t. 440. f. 2. C. paraſitica; Willden. Berolin. 405. t. 7. f. 17. With. v. 4. 361.)—Stalk ſimple, yellowiſh, with a branched fibrous root. Head oval, turgid, black.—Native of ſandy heaths, or fir woods, in autumn. Mr. Pitchford found it near Norwich, many years ſince, nor can there be any doubt reſpecting the above ſynonyms. His ſpecimens, like thoſe of Willdenow, grew paraſitically, on the *Tuber cervinum*, one or two on each individual, to which they were attached by their long and much-branched fibrous roots. The *ſtalk*, about two inches high, is wavy or curved, roundiſh, of a dirty yellow, as well as the *root*. *Head* an inch long, when full grown, granulated, of a glaucous black, ſolid; pale yellow within.

S. *Hypoxylon.* Horned Black Sphæria. Perſ. n. 7. Obſ. Mycolog. faſc. 1. 20. t. 2. f. 1, *a, f.* Sowerb. Fung. t. 55. (Clavaria Hypoxylon; Linn. Sp. Pl. 1652. Hudſ. 639. With. v. 4. 369. C. cornuta; Bulliard t. 180.)——Cluſtered, branched, compreſſed; black and hairy below; whitiſh and dilated at the ſummits.—Common on rotten ſtumps or poſts, in woods and gardens, making a conſpicuous appearance. Its uſual height is three or four inches. The hairineſs is moſt copious and coarſe on young plants. In winter the ſummits of the branches are plentifully covered with white powder, but deſtitute of the ſpherical ſeed-veſſels. The latter, according to Perſoon, are perfected in ſummer. His obſervations contradict the opinion reported by Withering after Dr. Waller, that the preſent ſpecies is the male of the following. Indeed that opinion is much invalidated by the aſſertion that *Clavaria ophiogloſſoides* of Linnæus, (ſee GEOGLOSSUM,) is only a variety of the *digitata*. Such a miſtake is no otherwiſe accountable, than by ſuppoſing the perſon who made it took the ſpecies laſt deſcribed for the *Geogloſſum*, and even then his accuracy of judgment could not rank high.

S. *digitata.* Finger-ſhaped Black Sphæria. Sowerb. Fung. t. 69. (S. polymorpha; Perſ. n. 10. Clavaria digitata; Linn. Sp. Pl. 1652. Hudſ. 639. With. v. 4. 368. Bulliard t. 220. Lichen-agaricus terreſtris digitatus niger, &c.; Mich. Gen. 104. t. 54. ord. 2. f. 4.)—Cluſtered, club-ſhaped, obtuſe, tumid, coal-black. Frequent on old rotten ſtumps in beech woods, as well as on old poſts of different kinds, into which its long perennial roots deeply inſinuate themſelves, the fungus ſpringing up every autumn, in the ſhape of numerous, ſimple or divided, hard, black, rough, finger-like bodies, whitiſh at the ſummit while young, and tapering below into very ſlender ſtalks. Perhaps *S. digitata*, Perſ. n. 9, may be a variety only; but the Linnæan ſynonym belongs to what we have deſcribed.

Sect. 2. *Roundiſh or diffuſe, without a ſtem.* Thirteen ſpecies.

S. *concentrica.* Concentric Black Sphæria. Perſ. n. 11. Bolt. Fung. t. 180. (S. fraxinea; With. v. 4. 393. Sowerb. Fung. t. 160. Lycoperdon fraxineum; Hudſ. 641; excluding the ſynonym of Micheli.)—Roundiſh, tumid, firm, ſmooth, with numerous concentric internal layers. Frequent on the decayed ſtumps of Aſh, Willow, and other trees. Uſually coal-black, ſomewhat ſhining, in globular maſſes, the ſize of a cheſnut, or larger, and of the ſubſtance and lightneſs of charcoal.

S. *fragiformis.* Orange Sphæria. Perſ. n. 13. (Lycoperdon varioloſum; Linn. Syſt. Nat. ed. 12. v. 3. 234. Hudſ. 645. Sowerb. Fung. t. 271.)—Cluſtered, ſomewhat confluent, of a ruſty red; black and ſhining within. Seed-veſſels minutely papillary, in the deciduous coat.—Frequent on rotten branches and ſtumps in damp woods. Each plant is the ſize of a pea, more or leſs, bright red when young. In an advanced ſtate they become confluent, of a brick colour, and the coat, in which the minute ſeed-veſſels are lodged, ſcales off, leaving a black central maſs, miſtaken by Mr. Sowerby for the ſeed.

Sect. 3. *Shape roundiſh, but various and indeterminate. Capſules ſcattered horizontally, with prominent orifices, often ſpinous.* Twenty-three ſpecies.

S. *poronia.* Dotted Cup Sphæria. Perſ. n. 24. (S. punctata; Sowerb. Fung. t. 54. Peziza punctata; Linn. Sp. Pl. 1650. Bulliard t. 252.)—Stalked; cup-ſhaped, ſhallow, white in the diſk, with black ſcattered ſunk capſules.—Found in ſandy countries, chiefly on horſe-dung, rarely on that of cows. It looks like a ſtalked *Peziza*, ſcarcely half an inch broad, conſpicuous for its white diſk, dotted with the black ſeed-veſſels. The ſubſtance is firm, or leathery.

S. *deuſta.* Large Spreading Sphæria. Perſ. n. 25. (S. maxima; Web. Goett. 286. Dickſ. Crypt. faſc. 1. 23. S. verſipellis; Tode Mecklenb. v. 2. 55. t. 17. f. 129. Hypoxylon uſtulatum; Bulliard t. 487. f. 1. Lichen-agaricus cruſtaceus craſſus, bovinum renem veluti repræſentans, niger et quaſi deuſtus; Mich. Gen. 104. t. 54. f. 1.)—Broad, indeterminate, thick, wavy and tumid; at firſt grey and powdery; finally black and rigid. Capſules ſunk.—Not uncommon on old rotten ſtumps, over which it ſpreads, to the extent of two or three inches, in thick, diffuſe, unequal maſſes, finally coal-black, and of the texture of *S. concentrica*, (ſee the preceding ſection,) with which Hudſon and ſome other botaniſts have confounded it. The ſhape, however, is not globoſe, nor is the internal ſubſtance formed of concentric layers. The *capſules* moreover are larger, and very conſpicuous in a vertical ſection of the plant, being cloſely ranged, in a ſimple ſeries, under the external coat, through which their *ſeeds* are diſcharged by a ſlender tube belonging to each capſule.—Perſoon remarks, that this ſpecies ſometimes acquires a kind of ſtalk, when growing on very rotten wood, or on the ground near an old ſtump.

S. *ceratoſperma.* Horn-ſeeded Sphæria. Perſ. n. 38. (S. Ceratoſpermum; Tode Mecklenb. v. 2. 53. t. 17. f. 131. Ceratoſpermum nigrum minimum diſcoides, e diverſarum arborum ramorum emortuarum corticibus, et præcipuè corylo erumpens; Mich. Gen. 125. t. 56. f. 1.)—Roundiſh, convex, ſcattered, black. Capſules with long prominent beaks.—Found by Micheli in woods near Florence, chiefly on dead branches of hazel, in the winter. Tode obſerved it in July, on the dead bark of *Roſa canina.* Each plant is leſs than a ſplit pea, ſeated on the dead wood or bark, under the cuticle, and ſoon becomes diſtinguiſhed by the protruſion of numerous little black horn-like excreſcences, which appear to be the prominent beaks of the ſunk *capſules.* Tode's figures, however, do not preciſely accord with thoſe of Micheli. We once examined the original ſpecimens of the latter writer, but the horn-like proceſſes had diſappeared; nor have we met with any thing in England anſwerable to this ſpecies, though many which belong to Perſoon's eighth, or laſt, ſection are ſufficiently ſimilar in their mode of growth to explain the nature of that before us.

Sect. 4. *Shape indeterminate. Capſules horizontal; at firſt marginal, and ſeparate; afterwards confluent.* Twenty-four ſpecies.

Perſoon himſelf doubts the certainty of this ſection, ſome of the ſpecies ſeeming rather to belong to that immediately preceding, others perhaps to the eighth.

S. *graminis.* Graſs Sphæria. Perſ. n. 50. Obſ. Mycol. faſc. 1. 18. t. 1. f. 1 and 2.—Linear-oblong, forming ſhining black ſpots upon leaves. Capſules globoſe, without prominent beaks.—Obſerved by Perſoon on the leaves of *Elymus europæus* and *Lolium perenne*, in the ſhape of oblong, black, ſlightly prominent ſpots, various in length, which, when cut vertically, diſplay a ſeries of ſunk globular *capſules*, not projecting above the ſurface.

The reſt of this ſection are ſimilarly paraſitical on the leaves or ſtalks of various plants.

Sect. 5. *Capſules crowded into an elevated tuft, on a common cruſtaceous receptacle; their beaks converging.* Fifteen ſpecies.

S. *ferruginea.* Ruſty-cruſted Sphæria. Perſ. n. 62. Obſ. Mycol. faſc. 1. 66. t. 5. f. 1, 2.—Capſules black, with taper ſtraight beaks; their baſes ſurrounded with ruſty powder.—Gathered by Perſoon, on dry branches of hazel. It burſts from under the cuticle in little oblong tranſverſe prominent maſſes, of which nothing appears but the taper ſpine-like beaks of the little black *capſules.* When laid bare, a powdery ruſty maſs, like a cruſt, is found to accompany the capſules, but Perſoon ſuſpects this may poſſibly originate from the wood. His figure is admirable, as uſual with all that he has publiſhed.

Sect. 6. *Capſules ranged circularly, moſtly decumbent, without a cruſt, lodged under the cuticle of plants, their orifices generally crowded together.* Fourteen ſpecies, which might perhaps have been comprehended in the laſt ſection.

S. *convergens.* Converging Sphæria. Perſ. n. 86. Tode Mecklenb. v. 2. 39. t. 14. f. 111.—Aggregate, ſlightly prominent. Capſules black, ovate, with ſtraight beaks, all meeting in a point.—On the branches of trees, eſpecially between the bark and cuticle of beech when dry. It conſiſts of little black tubercular ſpots, each formed of a few minute *capſules*, ranged circularly, whoſe beaks, about their own length, meet in a conical point. There are no traces of any cruſt, or common baſis.

S. *ſalicina.* Aggregate Willow Sphæria. Perſ. n. 88. Obſ. Mycol. faſc. 1. 64. (S. cancellata; Tode Mecklenb. v. 2. 34. t. 13. f. 107.)—Aggregate, circular. Mouth of the capſules concreted into a rugged perforated diſk.—Not rare on dead dry branches of Willows, according to Tode and Perſoon, giving them the roughneſs of a file when handled. The minute black *capſules* are ſo combined at their orifices, eight or ten in each circular aſſemblage, as to form one body, united by a rugged or reticulated, woody or fungous, ſubſtance, of a grey or dirty white.

Sect. 7. *Capſules diſtinct, forming a roundiſh tuft, on a common receptacle, and burſting through the cuticle of plants.* Eleven ſpecies.

S. *coccinea.* Scarlet Sphæria. Perſ. n. 92. (S. decidua; Tode Mecklenb. v. 2. 31. t. 13. f. 104.)—Tufted, pale red. Capſules ovate, ſmooth.—Said to be not unfrequent on dead branches of beech; conſiſting of ſcattered oval tufts, half the ſize of a pea, bordered by the reflexed torn cuticle of the branch. The *capſules* are minute, half ſunk in the tumid receptacle, each with a ſhort beak. There is a larger and brighter-coloured variety, found by Dr. Roth on the elder.

S. *populina.* Poplar Sphæria. Perſ. n. 94. Obſ. Mycol. faſc. 2. 67. t. 5. f. 10, 11.—Tufted, black. Capſules numerous, ovate, ſmooth, ſomewhat ſpreading, ſeated on a denſe receptacle.—On the branches of poplars, but not common. It forms little black ſcattered tufts, each compoſed of 25 or 30 ovate, pointed, ſeſſile *capſules*, divaricated at the points, and, though crowded, quite unconnected at the baſe.

S. *aucupariæ.* Mountain-aſh Sphæria. Perſ. n. 96. (S. cæſpitoſa; Tode Mecklenb. v. 2. 41. t. 14. f. 113.)—Tufted, black, powdered with white. Receptacles aggregate, palmate, each bearing ſeveral cylindrical capſules.—On dead branches of the mountain-aſh in May. This burſts in round, black, hard maſſes, from under the cuticle of the tree, each the ſize of a vetch-ſeed. When magnified, each tuft appears to conſiſt of many hand-ſhaped erect portions, whoſe finger-like points are ſuppoſed to be the *capſules*; but the whole ſeems a very obſcure production, nor has it ever fallen under our obſervation.

Sect. 8. *Capſules ſolitary, diſtinct, deſtitute of a receptacle.* Eighty-three ſpecies, ſubdivided according to the ſhape or proportion of the mouths, or beaks, of the capſules.

S. *pileata.* Cap Sphæria. Perſ. n. 102. (S. macroſtoma, var. ε, pileata; Tode Mecklenb. v. 2. 13. t. 9. f. 78.)—Simple, globoſe; its mouth inverſely conical, flat at the top, with a linear orifice.—Found ſunk in the bark of dead branches of trees, in the early ſpring. *Tode.* The ſize of poppy-ſeed, black and ſmooth, crowned with a diſcoid dilatation, in which the mouth is ſeated.

S. *dehiſcens.* Wide-mouthed Sphæria. Perſ. n. 106. (S. macroſtoma, var. α, β, γ; Tode Mecklenb. v. 2. 12. t. 9. f. 76.)—Simple, globoſe, immerſed; its mouth compreſſed, with tumid lips.—Found ſunk in the wood itſelf of rotten branches of trees, in the month of April. Very near the laſt, from which Tode conſidered it as not ſpecifically diſtinct. The only difference conſiſts in the leſs prominent, and not conical, form of the lips of the capſule.

S. *roſtrata.* Needle-beaked Sphæria. Perſ. n. 112. Tode Mecklenb. v. 2. 14. t. 9. f. 79.—Simple, naked, globoſe, granulated, with a very long taper-pointed beak.—Found more or leſs immerſed in rotten beech wood. Each plant conſiſts of a globular, rugged, black, thickly coated *capſule*, the ſize of coarſe ſand, with a curved, ſharp, ſlender beak, four or five times its own length.

S. *acuta.* Sharp-mouthed Sphæria. Perſ. n. 122. Obſ. Mycol. faſc. 2. 70. Sowerb. Fung. t. 119.—Scattered, naked, black, ſhining, depreſſed, with a cylindrical ſharp beak.—Found on the dead ſtalks of nettles more eſpecially, in the ſpring. Firſt obſerved in England by the Rev. Mr. Relhan. It grows in a rather ſcattered manner; each plant like a minute bottle, vertically flattened.

S. *Peziza.* Scarlet-cup Sphæria. Perſ. n. 129. Tode Mecklenb. v. 2. 46. t. 15. f. 122. (S. miniata; Hoffm. Germ. v. 2. t. 12. f. 1. Peziza hydrophora; Bulliard t. 410. f. 2. Lycoperdon hydrophorum; Sowerb. Fung. t. 23.)—Crowded, dull red, globoſe, ſomewhat hairy; at length depreſſed and concave.—Frequent in the hollows of rotten trees in autumn, compoſing broad patches, of a dull ſcarlet hue. Each plant is ſmaller than a muſtard-ſeed, externally roughiſh or hairy. If Mr. Sowerby be right, the *ſeeds* appear to form a white ball, which is protruded out of the *capſule*, after which the latter becomes depreſſed and hollow, as all authors deſcribe it when advanced. See ſomewhat ſimilar in the character of SPHÆROBOLUS in its proper place.

S. *hiſpida.* Briſtly Sphæria. Perſ. n. 144. Tode Mecklenb. v. 2. 17. t. 10. f. 84.—Simple, ſcattered, pear-ſhaped, black, clothed with ſcattered ſpreading briſtles.—Found by Tode on oak branches, ſtripped of their bark, in September. Each individual is about half a line long, erect, ovate, tapering into a ſhort thick mouth; the outſide beſet with ſpreading briſtles, which well mark the ſpecies.

S. *herbarum*. Flat Common Sphæria. Perſ. n. 153. (S. complanata; Tode Mecklenb. v. 2. 21. t. 11. f. 88.)—Simple, ſcattered, orbicular, more or leſs depreſſed, ſmooth, brown, with a nipple-ſhaped mouth.—Copious on the dried ſtalks of various herbaceous plants. Each ſpecimen is about the ſize of the ſmalleſt pin's head. See *S. Saturnus*, Sowerb. Fung. t. 218.

S. *moriformis*. Mulberry-ſhaped Sphæria. Perſ. n. 168. Tode Mecklenb. v. 2. 22. t. 11. f. 90, 91.—Simple, ſcattered, elliptical or roundiſh, cloſed, tuberculated, black.—Said to be not unfrequent on dead branches, eſpecially of firs. This, like all the following, belongs to a tribe of ſpecies deſtitute of a beak, or any perceptible orifice. Its ſize is about equal to muſtard-ſeed. The whole ſurface is tuberculated. The ſhape elliptical, or globular. Perhaps this may be *S. claviformis*, Sowerb. Fung. t. 337.

S. *comata*. Tufted Sphæria. Perſ. n. 170. Tode Mecklenb. v. 2. 15. t. 10. f. 81.—Simple, crowded, globoſe, crowned with a converging tuft of capillary fibres, twice its own length.—Obſerved by Tode on the dead ſtems and ſtalks of plants after rain. This is a very remarkable ſpecies, on account of the denſe tuft of fibres, invariably found to crown the ſummit of each ſpecimen, and which, therefore, has no appearance of being of an extraneous or paraſitical nature. Indeed there are inſtances of briſtles or hairs, either generally or partially clothing ſome other ſpecies. The general colour is black, but a brown variety has been noticed, though rarely, on rotten wood of willows.

S. *cylindrica*. Cylindrical Ball-bearing Sphæria. Perſ. n. 180. Tode Mecklenb. v. 2. 42. t. 15. f. 114.—Simple, ſcattered, cylindrical, black, bearing a globe of white ſeeds.—Found by Tode on rotten willows, protruding from the wood in the form of minute, ſcattered, black points, hardly viſible to a caſual obſerver, each crowned by a little white ball of *ſeeds*, which betrays ſome analogy to that of *S. Peziza;* inſomuch that one might almoſt think ſuch a character, if well aſcertained in ſome other ſpecies, might form a generic diſtinction. We know, however, too little of the different changes, which the fructification of many of the reſt undergo, to draw a line between them, and theſe powdery balls, being doubtleſs liquid in an early ſtate, come under the eſſential definition of *Sphæria*. The character of *Næmaſpora* of authors, conſiſting in the permanently gelatinous nature of what its capſules diſcharge, ſeems to keep that genus ſufficiently diſtinct from the preſent.

SPHÆRISTERIUM, σφαιριστηριον, in *Antiquity*, the ſeventh part of the ancient gymnaſium; being that in which the youth practiſed tennis-playing.

The ſphæriſterium, or tennis-court, was between the place named *palæſtra*, and that where they ran races, which was between the porticoes and the outer wall, though Vitruvius does not make mention of it in the deſcription he gives of the ancient gymnaſium.

The exerciſe here performed was called σφαιριστικη, *ſphæriſtica*, and σφαιρομαχια, *ſphæromachia*, which ſome will have to have differed from the modern tennis; but it is not known in what the difference conſiſted.

The Mileſians were particularly averſe from this exerciſe; and the Athenians were as remarkably fond of it. Theſe latter frequently gave the freedom of their city to the ſphæriſtæ, or maſters in this art, by way of compliment.

SPHÆROBOLUS, in *Botany*, ſo named by Tode, from σφαιρα, *a globe*, and βολος, *a caſt*, or *throw;* becauſe the ſeeds are forcibly ejected, in the form of a little round ball.—Tode Mecklenb. v. 1. 43. Perſ. Syn. 115. (Carpobolus; Mich. Gen. 221. t. 101. Willd. Berol. 414.)—Claſs and order, *Cryptogamia Fungi*. Nat. Ord. *Fungi, angiocarpi*.

Eſſ. Ch. Receptacle nearly globoſe, at length ſplitting into rays, and diſcharging elaſtically the globoſe ſeed-veſſel.

1. S. *ſtellatus*. Starry Projectile Puff-ball. Perſ. n. 1. (Lycoperdon Carpobolus; Linn. Sp. Pl. 1654. Hudſ. 644. Sowerb. Fung. t. 22.)—Found in various parts of Europe, in autumn, upon rotten wood or branches of trees, heaps of ſaw-duſt, or in the tan-pits of hot-houſes. In an early ſtate each plant conſiſts of a pale yellow globe, larger than a muſtard-ſeed. Several ſuch grow crowded together in patches, bound down, as it were, with a fine cottony web. After a while, each plant burſts into ſeveral ſtarry rays, and, by a momentary exploſion, projects, to the diſtance of ſix or eight inches, a whitiſh globular maſs of powdery *ſeeds* from its internal cavity. Sometimes this ball of *ſeeds* remains ſticking to the points of the rays. When fallen to a diſtance, the ſkin of the ball is found empty, the *ſeeds* having flown out in its paſſage through a hole at the baſe, which is uſually bordered by an inner layer of the outer ſtarry caſe, or *volva*, torn away by the ball.

We do not perceive the neceſſity of changing the original generic name, given by Micheli, whoſe figures and deſcription of this curious little fungus long excited the curioſity of botaniſts, before the plant was known to be ſo frequent as it is. Mr. Sowerby gives the beſt repreſentation of it. Tode deſcribes a ſecond ſpecies, which can ſcarcely belong to the ſame genus, and which is figured under the name of *Peziza marginata*, in Sowerby's Fungi, t. 16, and under that of *Patellaria excavata*, in Hoffmann's Plantæ Lichenoſæ, t. 23. t. 3. Albertini and Schweiniz mention this production with doubt, in their learned work on the Niſkian Fungi, p. 346. n. 1034; but it ſeems not as yet well underſtood.

SPHÆROCARPUS, ſo named by Micheli, from σφαιρα, *a globe*, and καρπος, *fruit*, in alluſion to its ſpherical ſeed-veſſel.—Mich. Gen. 4. Sm. Engl. Bot. v. 5. 299. Relh. 441. Mart. Mill. Dict. v. 4.—Claſs and order, *Cryptogamia Algæ?* or perhaps *Hepaticæ?* Nat. Ord. *Hepaticæ?*

Eſſ. Ch. Calyx inferior, of one leaf, inflated, entire. Seeds very numerous, collected into a globe, at the bottom of the calyx.

1. S. *terreſtris*. Reticulated Sphærocarpus. Engl. Bot. t. 299. (S. terreſtris, minima; Mich. Gen. 4. t. 3. Dill. Muſc. 536. t. 78. f. 17. Targionia Sphærocarpus; Dickſ. Crypt. faſc. 1. 8. With. v. 3. 814.)—Micheli firſt obſerved this ſingular little plant in gardens about Florence, in the winter and ſpring, growing in patches on the ground. The Rev. H. Bryant, Mr. Crowe, and Mr. Woodward, found it, ſince the publication of Hudſon's 2d edition, chiefly in the clover and turnip fields of Norfolk, eſpecially on ſtrong land, covering the earth copiouſly in the winter months, in patches of a pale glaucous green. The whole habit is delicate and membranous. *Fronds* ſimple, roundiſh or ovate, crowded, wavy, each attached by a fibrous, probably annual, *root*. The diſk of each frond is nearly covered by an aſſemblage of pear-ſhaped, reticulated, pellucid, bottle-like *calyces*, each a line long, contracted at the mouth, and lodging a little ball of green *ſeeds* at the bottom of its cavity, clothed with a fine ſkin. This plant ſeems to us eſſentially diſtinct in genus from TARGIONIA, (ſee that article,) and more allied to *Blaſia* and *Jungermannia*.

Sphærocarpus is alſo applied by ſome authors to deſignate a genus of *Fungi*, the Trichia of others. See that article.

Sphærocarpus of Gmelin, in his faulty edition of Linn. Syſt. Nat., is a ſcitamineous genus, the *Hura* of Koenig, now conſidered as a *Globba*.

SPHÆROLOBIUM, was ſo named by the writer of this article, from σφαιρα, *a globe*, and λοβιον, *the diminutive of* λοβος, *a pod*, to expreſs the roundiſh form of its very ſmall legume.—Sm. in Sims and Konig's Ann. of Bot. v. 1. 509. Brown in Ait. Hort. Kew. v. 3. 13.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, bell-ſhaped, two-lipped; tube angular; upper lip in two abrupt oblique ſegments, united about half way up; lower in three deep, lanceolate, equal ones; without any lateral appendages. *Cor.* Papilionaceous, of five petals, with claws which are ſhorter than the calyx; ſtandard kidney-ſhaped, emarginate, aſcending; wings two, half obovate, rather ſhorter than the ſtandard, converging at the upper margin; keel equal to the wings, of two oblong cohering petals. *Stam.* Filaments ten, linear-awl-ſhaped, ſeparate, declining, ſhorter than the keel, the two uppermoſt with a ſpace between them; anthers roundiſh, two-lobed. *Piſt.* Germen ſtalked, roundiſh; ſtyle linear, keeled, rigid, obliquely rolled inward, about equal to the keel; ſtigma ſmooth, with a membranous dilatation at each ſide. *Peric.* on a ſtalk half its own length, obliquely orbicular, turgid, pointed, of one cell and two coriaceous valves. *Seeds* one or two, kidney-ſhaped.

Eſſ. Ch. Calyx five-cleft, two-lipped. Corolla papilionaceous. Stigma keeled, with a membranous border. Legume ſtalked, ſpherical, turgid, oblique. Two upper ſtamens diſtant.

1. S. *vimineum.* Yellow-flowered Sphærolobium. Sm. Tr. of Linn. Soc. v. 9. 261. Sims in Curt. Mag. t. 969. Ait. n. 1.—"Tube of the calyx rather ſhorter than the lips. Style curved from the very baſe, included in the keel." *Brown.*—Native of New Holland and Van Diemen's iſland. Our ſpecimens were originally ſent, in 1793, from Port Jackſon by Dr. White. Sir Joſeph Banks is ſaid to have introduced the plant at Kew in 1802. It flowers during ſummer, requiring the ſhelter of a greenhouſe in winter. The *ſtem* is erect, ſhrubby, branched, round, ſmooth, moſtly naked, the youngeſt branches only bearing a few ſcattered, ſmall, lanceolate *leaves*. *Flowers* numerous, in long ſtraight cluſters, rather ſmall. *Calyx* ſmooth, a little glaucous. *Corolla* yellow, the diſk of the *ſtandard* marked with a tranſverſe row of red dots. *Legume* the ſize of a vetch-ſeed.

2. S. *medium.* Small Red-flowered Sphærolobium. Ait. n. 2.—"Tube of the calyx half the length of the lips. Corolla red." *Brown.*—Obſerved by Mr. Brown, on the ſouth-weſt coaſt of New Holland, from whence it was ſent to Kew, by Mr. Peter Good, in 1803. We know nothing of this plant, except the above particulars, borrowed from the *Hortus Kewenſis*. The name ſeems to imply the exiſtence of a third ſpecies, of which we have no account.

SPHÆROMACHIA, σφαιρομαχια, in *Antiquity*, a particular kind of boxing, in which the combatants had balls of ſtone or lead in their hands, which were called σφαιραι.

SPHÆROPHORON, in *Botany*, from σφαιρα, *a globe*, and φερω, *to bear*, becauſe of the globular fructification.—Ach. Meth. 134. Lichenogr. 116. t. 12. f. 5, 6. Syn. 286. (Sphærophorus; Perſ. in Uſt. Annal. faſc. 7. 23.)—Claſs and order, *Cryptogamia Algæ*. Nat. Ord. *Algæ*, *Lichenes*.

Eſſ. Ch. *Receptacle* nearly globular, without a border, cartilaginous, with a torn orifice. *Seeds* compoſing a black powdery ball.

This moſt elegant genus of the natural family of Lichens, is at once known by its branched, buſhy, ſmooth habit, like that of a coral or coralline. Three ſpecies are known.

1. S. *coralloides.* Coral-branched Globe-Lichen. Ach. Syn. n. 1. (Lichen globiferus; Linn. Mant. 133. Engl. Bot. t. 115. L. fruticoſus coralloides, non tubuloſus, cinereus ramoſiſſimus, receptaculis florum ſphæricis concoloribus; Mich. Gen. 103. t. 39. f. 6. Coralloides cupreſſiforme, capitulis globoſis; Dill. Muſc. 117. t. 17. f. 35. C. globiferum; Hoffm. Pl. Lich. v. 2. 25. t. 31. f. 2.)—Stem pale brown, cylindrical; its lateral branches elongated, divaricated, forked, with ſlender white tips. Receptacles globoſe, ſmooth.—Native of mountainous rocky heaths, and fir woods, in the cooler parts of Europe. Abundant in Scotland, Wales, Derbyſhire, &c. The ſmooth poliſhed browniſh *ſtems* compoſe lax tufts, an inch or two high, ſoft and pliant when wet, very brittle when dry, reſembling little groves of coral. The flowering *ſtems* are ſtouter, more ſimple, and rather taller than the reſt, their ſtrongeſt branches each terminating in a ſmooth ball of their own ſubſtance and colour, ſmaller than a pea, opening by a torn mouth at the ſummit, and containing a denſe ball of very black powdery *ſeeds*.

2. S. *fragile.* Brittle Globe-Lichen. Ach. Syn. n. 2. Meth. 135. t. 3. f. 5. Engl. Bot. t. 2474. (Lichen fragilis; Linn. Fl. Suec. ed. 2. 425. Fl. Lap. ed. 2. 351. t. 11. f. 4. Ehrh. Crypt. 128. Coralloides fragile; Hoffm. Pl. Lich. v. 2. 34. t. 33. f. 3.)—Stem greyiſh; its branches crowded, forked, round. Receptacles obovate, rugoſe. Native of moſſy rocks and mountains in the north of Europe. We have found it on the Pentland hills, near Edinburgh, but without fructification. In this ſtate it forms broad patches of denſe, pale grey, branching *ſtems*, whoſe branches are round, ſomewhat annular, obtuſe, level-topped. In ſome German and Swediſh ſpecimens, larger and ſtouter branches bear obovate or pear-ſhaped *receptacles*, or *ſeed-veſſels*, of a dark brown, whoſe ſurface is cracked or corrugated, their ſize about equal to the preceding.

3. S. *compreſſum.* Compreſſed Globe-Lichen. Ach. n. 3. (Lichen fragilis; Linn. Sp. Pl. 1621. Jacq. Miſc. v. 2. 92. t. 9. f. 6, c. Engl. Bot. t. 114. L. melanocarpus; Swartz Prodr. 147. Coralloides alpinum, corallinæ minoris facie; Dill. Muſc. 116. t. 17. f. 34.)—Stem white; its branches compreſſed. Receptacles ſomewhat lateral, depreſſed, ſmooth.—Found in moiſt places, under the ſhade of rocks, on the mountains of Germany, Switzerland, and England, as well as in the Weſt Indies, and at the Cape of Good Hope. This beautiful ſpecies, in the poliſhed white of its ſurface, and its flat palmate ramifications, exceeds the elegance of the foregoing, and ſtill more reſembles a coralline. The height of the branching fan-like *ſtem* is two or three inches, and the fructification, when preſent, is copious, uſually turned to one ſide, flattened, often bordered with granulations or ſhoots; the powder intenſely black, mixed with fibres of the ſame colour.—In the account given in Engliſh Botany, the idea of the laſt ſpecies, in a barren ſtate, was comprehended under this.

SPHAGITIDES, a name given by ſome authors to the jugular veins.

SPHAGNUM, in *Botany*, a name uſed by Pliny for ſome ſort of moſs that grows upon trees, adopted by Dillenius and Linnæus, for the genus now called Bog-moſs.—Dill. Muſc. 240. Linn. Gen. 562. Schreb. 758. Mart. Mill. Dict. v. 4. Hedw. Fund. v. 2. 85. Theor. t. 12. Sp. Muſc. 27. Sm. Fl. Brit. 1145. Juſſ. 12. Lamarck Illuſtr. t. 872.—Claſs and order, *Cryptogamia Muſci.* Nat. Ord. *Muſci.*

Eſſ. Ch. Capſule ſeſſile, without a fringe. Veil cut round, its baſe remaining on the baſe of the capſule. Anthers each ſurrounded with a ring.

Obſ. Weber and Mohr have juſtly remarked, that this is the only known genus of moſſes in which the germen and capſule are truly ſeſſile, not at any ſtage of growth elevated on a *pedicellus*, or partial ſtalk, above the baſe of the flower. The whole flower indeed, and conſequently the ripe capſule, is ſtalked, which being rarely the caſe with other moſſes, whoſe *pedicelli* are very long, the two different kinds of ſtalk have been confounded together.

1. S. *latifolium.* Broad-leaved Bog-moſs. Hedw. Sp. Muſc. 27. Fl. Brit. n. 1. Engl. Bot. t. 1405. Turn. Muſc. Hib. 5. (S. paluſtre α; Linn. Sp. Pl. 1569. Fl. Dan. t. 474. S. paluſtre molle deflexum, ſquamis cymbiformibus; Dill. Muſc. 240. t. 32. f. 1.)—Branches tumid, deflexed. Leaves ovate, obtuſe, concave. This moſs occupies the ſurface of watery turfy bogs throughout Europe, bearing capſules in ſummer. Its pale whitiſh-green hue, often tinged with red, makes the plant conſpicuous. The large maſſes it compoſes are moſtly filled with water, like a ſponge, and are not firm enough to be walked upon. *Droſeræ*, *Erica tetralix*, and the Cranberry, are the chief plants that grow amongſt it, often without being rooted in the ground. The *ſtems* are various in height, ſoft and flexible, beſet with numerous, ſhort, tumid, tapering branches, ſlightly bent downward; the uppermoſt crowded. *Leaves* imbricated, pellucid, broad, obtuſe, entire, incurved, reticulated, without rib or veins. *Capſules* about the tops of the ſtems, erect, brown, ſmooth, on flower-ſtalks not an inch long. *Lid* almoſt flat. *Veil* thin, more or leſs of its circular baſe remaining round the capſule. The ſoftneſs and elaſticity of this moſs render it very fit for packing.

2. S. *ſquarroſum.* Prominent-leaved Bog-moſs. Mohr Ind. 2. Sm. Compend. ed. 2. 159. Engl. Bot. t. 1498.—Branches deflexed, tapering. Leaves ovate, acute, with recurved, prominent, keeled points.—Native of Germany, Sweden, and England. Mr. Turner gathered this ſpecies, which the late Mr. Mohr only had previouſly mentioned, not deſcribed, on bogs at Belton, near Yarmouth, bearing fruit in June and July. It differs from the foregoing in the more taper terminations of the *branches*, and eſpecially in the ſpreading recurved points of its *leaves*, which have a central fold like a keel, and give the ſquarroſe character of the plant. The *capſules* have a prominent beaked lid.

3. S. *capillifolium.* Slender Bog-moſs. Hedw. Sp. Muſc. 28. Fl. Brit. n. 2. Engl. Bot. t. 1406. Turn. Muſc. Hib. 6. (S. paluſtre β; Linn. Sp. Pl. 1569. S. paluſtre molle deflexum, ſquamis capillaceis; Dill. Muſc. 243. t. 32. f. 2, A.)—Branches ſlender, deflexed. Leaves ovato-lanceolate, pointed, flattiſh, cloſe-preſſed, with ſtraight points.—Abundant on bogs, eſpecially in rather mountainous ſituations, bearing capſules in ſummer, and often tinged with red. Its much ſmaller ſize, and narrower flatter *leaves*, diſtinguiſh this from both the preceding. The reticulations of the foliage are obſerved by Mr. I. D. Sowerby to be peculiar, the little tranſverſe veins running in pairs. Sometimes a fold, or keel, reſembling a mid-rib, is diſcernible.

4. S. *cuſpidatum.* Long-leaved Floating Bog-moſs. Hoffm. Germ. v. 2. 22. Fl. Brit. n. 3. Engl. Bot. t. 2092. Ehrh. Crypt. 251. Turn. Muſc. Hib. 6. (S. paluſtris mollis deflexi, ſquamis capillaceis, varietas fluitans; Dill. Muſc. 244. t. 32. f. 2, B.)—Branches ſpreading, rather downwards. Leaves lanceolate, long-pointed, wavy, lax.—Moſt frequent, in pools or rivulets, among bogs in mountainous countries, but Mr. Turner found it near Yarmouth, bearing fruit in ſummer. This reſembles the common *latifolium* in colour, but the more elongated floating *ſtems*, diſtinguiſh the ſpecies before us. The *branches* are looſely directed downward, pointed, often very ſlender. The reticulations of the *leaves* moſt accord with thoſe of our laſt ſpecies; but their points are more elongated, and edges wavy. *Capſule* ſhort, and rather bell-ſhaped when fully ripe.

We have thus brought together four ſpecies of the preſent genus. Hedwig has but two, beſides the *S. alpinum* of Linnæus, figured in Dillenius, t. 32. f. 3, which is founded in an error of the laſt-mentioned author. What he deſcribed and delineated, prove to be nothing more than luxuriant bog ſpecimens of *Dicranum flexuoſum* of Hedwig and Fl. Brit., Engl. Bot. t. 1491, among which ſome extraneous bodies had fallen, and theſe were miſtaken for capſules.

SPHENE, in *Mineralogy*, a mineral compoſed of nearly equal parts of oxyd of titanium, ſilex, and lime. Its colours are generally a dark brown, inclining to red or yellow. It occurs cryſtallized in various forms, and alſo ſometimes in maſſes. The cryſtals are more frequently four-ſided priſms, either oblique or rectangular, or ſix-ſided priſms, with two oppoſite ſides broader than the reſt, or elongated octohedrons. The edges of the cryſtals are frequently bevelled, and the apices of the octohedrons are ſometimes ſo flattened as to preſent a lenticular form.

The fracture of ſphene is imperfectly conchoidal; it ſcratches glaſs, and is brittle. The internal luſtre is ſhining, inclining to reſinous. The ſpecific gravity is from 3.480 to 3.510. It is fuſible by the blowpipe into a blackiſh-brown enamel. This mineral is found imbedded in ſienite and granite in various parts of Scotland, and alſo in Sweden, Norway, France, Switzerland, and in North America. The name ſphene was given to this mineral by Haüy, from the wedge-like ſhape of ſome of the cryſtals.

Foliated ſphene differs from the above in colour, which is various ſhades of yellow, inclining to a ſtraw or cream colour, and in the ſtructure, which is foliated, with a double cleavage parallel to the ſide of an oblique four-ſided priſm. The croſs fracture is foliated. Both theſe varieties of ſphene paſs from different degrees of tranſlucency to opacity.

SPHENOCLEA, in *Botany*, ſo denominated by Gærtner, from σφην, *a wedge*, and κλειω, *to ſhut up*, becauſe of the wedge-ſhaped ſeed-veſſel.—Gærtn. v. 1. 113. t. 24. f. 5. Willd. Sp. Pl. v. 1. 927. (Gærtnera; Retz. Obſ. faſc. 6. 24. Rapinia; Loureir. Cochinch. 127. Pongatium; Juſſ. 423.)—Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Lyſimachiæ*, Juſſ.?

Gen. Ch. *Cal.* Perianth ſuperior, of five roundiſh, permanent leaves, broad at the baſe. *Cor.* of one petal, ſhorter than the calyx; tube very ſhort; limb in five lanceolate, equal, erect ſegments. *Stam.* Filaments five, capillary, very ſhort, inſerted into the tube of the corolla; anthers roundiſh, two-lobed. *Piſt.* Germen inferior, compreſſed at the baſe; ſtyle very ſhort; ſtigma capitate, permanent.

manent. *Peric.* Capſule compreſſed, wedge-ſhaped, quadrangular, obtuſe, of two cells, burſting all round near the top. *Seeds* very numerous, minute, oblong, affixed to a pendulous receptacle in each cell.

Eſſ. Ch. Corolla five-cleft, ſmaller than the calyx. Capſule compreſſed, of two cells, burſting all round. Seeds numerous. Receptacles curved downwards. Stigma capitate, permanent.

1. S. *zeylanica.* Willd. n. 1. (Pongati; Rheede Hort. Malab. v. 11. 47. t. 24.)—Native of moiſt ſituations in the Eaſt Indies, Cochinchina, Ceylon and Guinea. The *root* is fibrous and annual. *Stem* erect, one or two feet high, ſimple or branched, leafy. *Leaves* ſcattered, ſtalked, lanceolate, entire, ſmooth, ſomewhat fleſhy, about two inches long, of a pale rather glaucous green. *Flowers* greeniſh-white, in denſe, terminal, erect, cylindrical ſpikes, of no beauty, nor do we know that the plant has any valuable properties. Its general aſpect is that of ſome kind of *Reſeda,* particularly the *R. Luteola.* It was originally choſen by ſir Joſeph Banks to commemorate the eminent botanical merits of Gærtner, for which the ſtriking peculiarities of its ſeed-veſſel made it very eligible; but there is now another GÆRTNERA, of equal ſingularity and more beauty. See that article.

SPHENOGYNE, apparently from σφην, *a wedge,* and γυνη, *a female,* in alluſion to the wedge-ſhaped ſtigmas.—Brown in Ait. Hort. Kew. v. 5. 142.—Claſs and order, *Syngeneſia Polygamia-fruſtranea.* Nat. Ord. *Compoſitæ diſcoideæ,* Linn. *Corymbiferæ,* Juſſ.

Gen. Ch. *Common Calyx* roundiſh, imbricated; its ſcales rounded or awl-ſhaped, concave, with a membranous dilated border, moſt conſpicuous on the inner ones. *Cor.* compound, radiated; florets of the diſk numerous, funnel-ſhaped, five-cleft, equal, all perfect; thoſe of the radius about twenty, ligulate, longer than the diameter of the diſk, toothed at the end imperfectly, female. *Stam.* in the florets of the diſk, filaments five, capillary, ſhort; anthers united into a tube, nearly as long as the corolla. *Piſt.* Germen ſcarcely diſcernible in the florets of the radius; in thoſe of the diſk oblong, quadrangular; ſtyle thread-ſhaped in both; ſtigmas in the florets of the radius obſolete; in thoſe of the diſk dilated upwards, rather abrupt at the ſummit. *Peric.* none, except the permanent dry calyx. *Seeds* in the diſk only, angular. Down of five rounded, membranous, horizontal ſcales. *Recept.* chaffy, flattiſh.

Eſſ. Ch. Scales of the receptacle diſtinct. Seed-down of five ſimple membranous leaves. Stigma dilated upwards, abrupt. Calyx imbricated; its inner ſcales with a membranous border.

1. S. *anthemoides.* White-crowned Sphenogyne. Ait. n. 1. (Arctotis anthemoides; Linn. Sp. Pl. 1307. Willd. Sp. Pl. v. 3. 2361. Curt. Mag. t. 544. Chamæmelum pumilum, foliis anguſtis pinnatis; Burm. Afr. 174. t. 63. f. 2.)—Herbaceous, ſmooth. Leaves ſimply or doubly pinnatifid, linear-thread-ſhaped. Seed-down white, with brown awl-ſhaped ribs.—A native of the Cape of Good Hope, which proves a hardy annual in our gardens, flowering from July to September. Mr. Maſſon introduced it in 1774. The *root* is fibrous. *Stem* branched. *Leaves* ſomewhat like chamomile. *Flowers* terminal, ſolitary, ſtalked, an inch and half or more in diameter; yellow above; their rays purple underneath. The pure white chaffy *ſeed-crown,* radiated with brown, forms the moſt ſtriking part of the plant, and may be preſerved with everlaſting flowers through winter.

2. S. *crithmifolia.* Samphire-leaved Sphenogyne. Ait. n. 2. (Arctotis paleacea; Linn. Sp. Pl. 1307. Willd. Sp. Pl. v. 3. 2359. Aſter foliis integris anguſtis, flore magno luteo; Burm. Afr. 176. t. 65. f. 1.)—Shrubby, ſmooth. Leaves pinnatifid, linear-thread-ſhaped. Outer ſcales of the calyx awl-ſhaped.—Native of the Cape of Good Hope. A greenhouſe ſhrub, cultivated by Miller, flowering throughout the ſummer. The *ſtem* is buſhy. *Flowers* large, yellow. Inner ſcales of the calyx very broad and rounded, while the outer are awl-ſhaped, and ſcarcely membranous.

3. S. *ſcarioſa.* Scaly-cupped Sphenogyne. Ait. n. 3. (Arctotis ſcarioſa; Ait. ed. 1. v. 3. 274. Willd. Sp. Pl. v. 3. 2360.)—"Leaves ſimply or doubly pinnatifid, linear-thread-ſhaped, ſmooth. All the ſcales of the calyx membranous, obtuſe, ſhining; the outermoſt ſeſſile."—Sent by Mr. Maſſon from the Cape in 1774. A greenhouſe ſhrub, flowering from April to Auguſt. Differs from the laſt in having all its *calyx-ſcales* dilated and membranous.

4. S. *abrotanifolia.* Southernwood-leaved Sphenogyne. Brown MSS. Ait. n. 4.—"Shrubby. Leaves twice or thrice pinnatifid, downy as well as the calyx."—A greenhouſe ſhrub, ſent by Mr. Maſſon from the Cape in 1789, and flowering all ſummer long.

5. S. *dentata.* Small-leaved Sphenogyne. Ait. n. 5. (Arctotis dentata; Linn. Sp. Pl. 1307. Willd. Sp. Pl. v. 5. 2359. Chryſanthemum foliorum pinnis breviſſimis, dentatis; Burm. Afr. 175. t. 64.)—Shrubby. Leaves pinnatifid, nearly ſmooth; each ſegment with two or three divaricated hair-pointed teeth. Outer ſcales of the calyx ovato-lanceolate.—From the ſame country. A greenhouſe ſhrub, flowering in June and July, introduced in 1787, by Mr. John Hunnemann. The *leaves* are copious, ſhort, and criſped. *Flowers* hardly an inch broad, yellow. Points of the *calyx-ſcales* downy; the inner ones bearing a very thin, pellucid, orbicular appendage.

6. S. *odorata.* Smooth-ſeeded Sphenogyne. Ait. n. 6. (Anthemis odorata; Ait. ed. 1. v. 3. 238. Willd. Sp. Pl. v. 3. 2186.)—"Shrubby. Leaves flat, ſmooth; cut or pinnatifid at the extremity. Outer calyx-ſcales membranous at the point. Seeds ſmooth, with a ſlight crown."—Sent by Mr. Maſſon from the Cape in 1774. A greenhouſe ſhrub, flowering from April to June. The *branches* are downy. *Leaves* ſmall, half an inch long. *Flowers* on very long, almoſt naked, ſtalks.

SPHENOID, in *Anatomy,* one of the bones of the head. See CRANIUM.

SPHENO-MAXILLARY FISSURE, a large interval, in the lower and outer part of the orbit, between the ſphenoid and upper jaw-bones. See CRANIUM.

SPHENO-PALATINE FORAMEN, an opening between the ſphenoid and palate bones, leading into the noſe. The ſame epithet is alſo given to certain nerves which go through that opening, and to the levator palati muſcle.

SPHENO-PHARYNGEUS, a name applied to a part of the conſtrictor pharyngis ſuperior muſcle. See DEGLUTITION.

SPHENO-PTERYGO-PALATINUS, a name given by Cowper to the circumflexus palati muſcle. See DEGLUTITION.

SPHENO-SALPINGO-PHARYNGEUS, a ſmall portion of the ſuperior conſtrictor of the pharynx, deſcribed under this name by Winſlow.

SPHENO-SALPINGO-STAPHYLINUS, a name given by Winſlow to a portion of the circumflexus palati.

SPHENO-STAPHYLINUS, the levator palati mollis, according to Drake and Cowper.

SPHERE, SPHÆRA, σφαιρα, in *Geometry,* a ſolid body contained under one ſingle ſurface, and having a point in the middle, called the *centre,* whence all lines, drawn to the ſurface, are equal.

The ſphere is ſuppoſed to be generated by the revolution of a ſemicircle A B C (*Plate* XIV. *Geometry, fig.* 2.) about its diameter A C, which is alſo called the *axis of the ſphere;* and the extreme points of the axis, A and C, are called the *poles of the ſphere.*

SPHERE, *Properties of the.* 1. A ſphere is equal to a pyramid, whoſe baſe is equal to the ſurface, and its height to the radius of the ſphere.

Hence, a ſphere being eſteemed ſuch a pyramid, its cube, or ſolid content, is found like that of a pyramid.

2. A ſphere is to a cylinder, ſtanding on an equal baſis, and of the ſame height, as 2 to 3. Hence, alſo, may the cube, or content of the ſphere, be found.

3. A ſphere is equal to four times the cone, the baſe of which is equal to the generating circle, and the height of which is equal to the radius. Or, a hemiſphere is equal to twice the cone of the ſame baſe and height. And a cylinder, of the ſame height and baſe, being a triple of the cone, it follows, that the hemiſphere is two-thirds of the cylinder, and conſequently the whole ſphere two-thirds of the circumſcribing cylinder. Archim. de Sph. et Cycl. Apud Opera per Rivaltum, p. 67.

4. The cube of the diameter of a ſphere is to the ſolid content of the ſphere, nearly as 300 to 157: and thus, alſo, may the content of the ſphere be meaſured.

5. The ſurface of a ſphere is quadruple the area of a circle deſcribed with the radius of the ſphere. For ſince a ſphere is equal to a pyramid, whoſe baſe is the ſurface, and its altitude the radius of the ſphere; the ſurface of the ſphere is had, by dividing its ſolidity by a third part of its ſemi-diameter, or one-ſixth of the whole diameter.

But the ſolidity of the ſphere is the product of $\frac{2}{3}$ds of the greateſt circle by the diameter; and if this product be divided by $\frac{1}{6}$th of the diameter, the quotient, or $\frac{12}{3}$ of the greateſt circle, *i. e.* four times the greateſt circle, will be the ſurface of the ſphere.

Otherwiſe: the ſurface of a ſphere is equal to the product of its diameter, and the periphery of its generating circle; but the area of this circle is equal to the product of the ſemi-diameter and half the periphery, or one-fourth of the product of the diameter and periphery; and, therefore, the ſurface of the ſphere is equal to four times the area of its generating circle.

Hence, 6. The ſurfaces of ſpheres are to one another as the ſquares of their diameters; becauſe theſe ſurfaces, being four times their generating circles, are as theſe circles, *i. e.* as the ſquares of their diameters.

7. Spheres being $\frac{2}{3}$d parts of cylinders of equal baſe and altitude, and cylinders being as the cubes of their altitudes, are as the cubes, or in the triplicate ratio of their diameters.

8. The ſurface of any portion of a ſphere, greater or leſs than the hemiſphere, is equal to the area of a circle, whoſe radius is a line drawn from the vertex of that portion to the circumference of the circle which is its baſe. Archimedes, *ubi ſupra,* pp. 84, 85.

SPHERE, *the diameter of a, being given, to find its ſurface and ſolidity.* Find the periphery of the circle deſcribed by the radius of the ſphere, or of the generating circle.

Multiply this, found, into the diameter, or the ſquare of the diameter, by 3.1416, the product is the ſurface of the ſphere. Multiply the ſurface by a ſixth part of the diameter, or the area of the generating circle by $\frac{2}{3}$ds of its diameter; or, again (becauſe the area of ſuch circle is to the ſquare of the diameter as .7854 to 1), the cube of the diameter by .5236 ($= \frac{2}{3}$ of .7854); and the product is the ſolidity of the ſphere.

Thus, ſuppoſing the diameter of the ſphere 56, the periphery will be found 175.9, which multiplied by the diameter, the product 9852 is the ſurface of the ſphere; which multiplied by $\frac{1}{6}$th part of the diameter, gives the ſolidity 91623.6. Or thus:

Find the cube of the diameter 175616; then to 300,157, and the cube found, find a fourth proportional. This is the ſolidity of the ſphere required.

For finding the ſurface and ſolidity of the ſphere by the method of fluxions, ſee SUPERFICIES and SOLIDITY. For ſegments and ſectors of ſpheres, ſee FRUSTUM, SEGMENT, and SECTOR.

SPHERE, *Doctrine of the.* See SPHERICS.

SPHERE, *Projection of the.* See PROJECTION.

SPHERE *of Activity.* See ACTIVITY.

SPHERE, in *Aſtronomy,* that concave orb or expanſe which inveſts our globe, and in which the heavenly bodies, *viz.* ſun, ſtars, planets, and comets, appear to be fixed at an equal diſtance from the eye.

This is alſo called the *ſphere of the world;* and is the ſubject of the ſpherical aſtronomy.

This ſphere, as it includes the fixed ſtars, whence we alſo occaſionally call it the *ſphere of the fixed ſtars,* is immenſely great. The diameter of the earth's orbit is ſo ſmall, in reſpect to the diameter of this, that the centre of the ſphere is not ſenſibly changed by any alteration of the ſpectator's place in the ſeveral parts of the orbit; but ſtill, in all the points of the earth's ſurface, and at all times, the inhabitants have the ſame appearance of the ſphere; that is, the fixed ſtars ſeem to poſſeſs the ſame points in the ſurface of the ſphere. For our way of judging of the places, &c. of the ſtars, is to conceive right lines drawn from the eye, or the centre of the earth, through the centre of the ſtars, and continued thence till they cut the foreſaid ſphere; the points where theſe lines terminate in it are the apparent places of thoſe ſtars.

The better to determine the places of the heavenly bodies in the ſphere, ſeveral circles are imagined to be deſcribed in the ſurface thereof, hence called *circles of the ſphere.*

SPHERE, in *Geography,* &c. denotes a certain diſpoſition of the circles on the ſurface of the earth, with regard to one another, which varies in various parts of it.

The circles originally conceived on the ſurface of the ſphere of the world, are almoſt all transferred, by analogy, to the ſurface of the earth, where they are conceived to be drawn directly underneath thoſe of the ſphere, or in the ſame planes with them; ſo that, if the planes of thoſe of the earth were continued to the ſphere, they would coincide with the reſpective circles upon it. Thus we have an horizon, meridian, equator, &c. on the earth.

As the equator in the heavens divides the ſphere into two equal parts, the one north, and the other ſouth, ſo does the equator on the ſurface of the earth divide the globe in the ſame manner.

And as the meridians in the heavens paſs through the poles of the horizon, ſo do thoſe of the earth, &c.

With regard, then, to the poſition of ſome of the circles in reſpect of others, we have a right, a parallel, and an oblique ſphere.

SPHERE, *Armillary,* or *Artificial,* is an aſtronomical inſtrument, repreſenting the ſeveral circles of the ſphere in their natural order; ſerving to give an idea of the office and poſition of each of them, and to ſolve various problems relating to them.

It is thus called, as conſiſting of a number of faſciæ or rings of braſs, or other matter, called by the Latins *armillæ*, from their reſemblance to bracelets, or rings for the arm.

By this it is diſtinguiſhed from the globe, which, though it hath all the circles of the ſphere on its ſurface; yet is not cut into armillæ or rings, to repreſent the circles ſimply and alone; but exhibits alſo the intermediate ſpaces between the circles.

Sphere, *The Armillary*, of Mr. Ferguſon, conſtructed after the model of the glaſs ſphere of Dr. Long, is repreſented *Plate* XX. *Aſtronomy*, *fig*. 5.

The exterior parts of this machine are a compages of braſs rings, which repreſent the principal circles of the heavens, *viz.* 1. The equinoctial A A, which is divided into 360 degrees (beginning at its interſection with the ecliptic in Aries), for ſhewing the ſun's right aſcenſion in degrees; and alſo into twenty-four hours, for ſhewing his right aſcenſion in time. 2. The ecliptic B B, which is divided into 12 ſigns, and each ſign into 30 degrees, and alſo into the months and days of the year, in ſuch a manner, that the degree or point of the ecliptic in which the ſun is, on any given day, ſtands over that day in the circle of months. 3. The tropic of Cancer C C, touching the ecliptic at the beginning of Cancer in *e*; and the tropic of Capricorn D D, touching the ecliptic at the beginning of Capricorn in *f*; each 23½ degrees from the equinoctial circle. 4. The arctic circle E, and the antarctic circle F, each 23½ degrees from its reſpective pole at N and S. 5. The equinoctial colure G G, paſſing through the north and ſouth poles of the heaven at N and S, and through the equinoctial points Aries and Libra, in the ecliptic. 6. The ſolſtitial colure H H, paſſing through the poles of the heaven, and through the ſolſtitial points Cancer and Capricorn, in the ecliptic. Each quarter of the former of theſe colures is divided into 90 degrees, from the equinoctial to the poles of the world, for ſhewing the declination of the ſun, moon, and ſtars: and each quarter of the latter, from the ecliptic at *e* and *f*, to its poles *b* and *d*, for ſhewing the latitudes of the ſtars.

In the north pole of the ecliptic is a nut *b*, to which is fixed one end of a quadrantal wire, and to the other end a ſmall ſun Y, which is carried round the ecliptic B B, by turning the nut: and in the ſouth pole of the ecliptic is a pin at *d*, on which is another quadrantal wire, with a ſmall moon, Z, upon it, which may be moved round by hand: but there is a particular contrivance for cauſing the moon to move in an orbit which croſſes the ecliptic at an angle of 5⅓ degrees, in two oppoſite points, called the *moon's nodes*; and alſo for ſhifting thoſe points backward in the ecliptic, as the moon's nodes ſhift in the heaven.

Within theſe circular rings is a ſmall terreſtrial globe I, fixt on an axis K K, which extends from the north and ſouth poles of the globe at *n* and *s*, to thoſe of the celeſtial ſphere at N and S. On this axis is fixt the flat celeſtial meridian L L, which may be ſet directly over the meridian of any place on the globe, and then turned round with the globe, ſo as to keep over the ſame meridian upon it. This flat meridian is graduated the ſame way as the braſs meridian of the common globe, and its uſe is much the ſame. To this globe is fitted the moveable horizon M M, ſo as to turn upon two ſtrong wires proceeding from its eaſt and weſt points to the globe, and entering the globe at oppoſite points of its equator, which is a moveable braſs ring let into the globe in a groove all round its equator. The globe may be turned by hand within this ring, ſo as to place any given meridian upon it, directly under the celeſtial meridian L L. The horizon is divided into 360 degrees all round its outermoſt edge, within which are the points of the compaſs, for ſhewing the amplitude of the ſun and moon, both in degrees and points. The celeſtial meridian L L paſſes through two notches in the north and ſouth points of the horizon, as in a common globe: but here, if the globe be turned round, the horizon and meridian turn with it. At the ſouth pole of the ſphere is a circle of 24 hours, fixt to the rings, and on the axis is an index which goes round that circle, if the globe be turned round its axis.

The whole fabric is ſupported on a pedeſtal N, and may be elevated or depreſſed upon the joint O, to any number of degrees from 0 to 90, by means of the arc P, which is fixed into the ſtrong braſs arm Q, and ſlides into the upright piece R, in which is a ſcrew at *r*, to fix it at any proper elevation.

In the box T are two wheels (as in Dr. Long's ſphere), and two pinions, whoſe axes come out at V and U; either of which may be turned by the ſmall winch W. When the winch is put upon the axis V, and turned backward, the terreſtrial globe, with its horizon and celeſtial meridian, keep at reſt; and the whole ſphere of circles turns round from eaſt, by ſouth, to weſt, carrying the ſun Y, and the moon Z, round the ſame way, and cauſing them to riſe above and ſet below the horizon. But when the winch is put upon the axis U, and turned forward, the ſphere with the ſun and moon keep at reſt; and the earth, with its horizon and meridian, turn round from weſt, by ſouth, to eaſt; and bring the ſame points of the horizon to the ſun and moon, to which theſe bodies came when the earth kept at reſt, and they were carried round it; ſhewing that they riſe and ſet in the ſame points of the horizon, and at the ſame times in the hour-circle, whether the motion be in the earth or in the heaven. If the earthly globe be turned, the hour-index goes round its hour-circle; but if the ſphere be turned, the hour-circle goes round below the index.

And ſo, by this conſtruction, the machine is equally fitted to ſhew either the real motion of the earth, or the apparent motion of the heaven.

To rectify the ſphere for uſe, firſt ſlacken the ſcrew *r* in the upright ſtem R, and taking hold of the arm Q, move it up or down until the given degree of latitude for any place be at the ſide of the ſtem R; and then the axis of the ſphere will be properly elevated, ſo as to ſtand parallel to the axis of the world, if the machine be ſet north and ſouth by a ſmall compaſs: this done, count the latitude from the north pole, upon the celeſtial meridian L L, down towards the north notch of the horizon, and ſet the horizon to that latitude; then turn the nut *b* until the ſun Y comes to the given day of the year in the ecliptic, and the ſun will be at its proper place for that day: find the place of the moon's aſcending node, and alſo the place of the moon, by an Ephemeris, and ſet them right accordingly: laſtly, turn the winch W, until either the ſun comes to the meridian L L, or until the meridian comes to the ſun (according as you want the ſphere or earth to move), and ſet the hour-index to the XII, marked noon, and the whole machine will be rectified. Then turn the winch, and obſerve when the ſun or moon riſe and ſet in the horizon, and the hour-index will ſhew the times of them for the given day. See Ferguſon's Lectures, p. 194, &c.

Armillary ſpheres are of different kinds with regard to the poſition of the earth in them; whence they become diſtinguiſhed into *Ptolemaic* and *Copernican* ſpheres: in the firſt of which the earth is in the centre, and in the latter near the circumference, according to the poſition which that planet obtains in thoſe ſyſtems.

Sphere, *The Ptolemaic*, is that commonly in uſe, and is repreſented (*Plate* XX. *Aſtronomy*, *fig*. 6.) with the names of the ſeveral circles, lines, &c. of the ſphere, inſcribed on them. In the middle, upon the axis of the ſphere, is a ball, T, repreſenting the earth, on whoſe ſurface are the circles, &c. of the earth. The ſphere is made to revolve about the ſaid axis, which remains at reſt; by which means the ſun's diurnal and annual courſe about the earth are repreſented according to the Ptolemaic hypotheſis; and even by means of it, all problems relating to the phenomena of the ſun and earth are ſolved, as upon the celeſtial globe, and after the ſame manner, which ſee deſcribed under Globe.

Sphere, *The Copernican*, (repreſented *Plate* XX. *Aſtronomy*, *fig.* 7.) is very different from the Ptolemaic, both in its conſtitution and uſe; and is more intricate in both. Indeed, the inſtrument is in the hands of ſo few people, and its uſe ſo inconſiderable, except what we have in the other more common inſtruments, particularly the globe and Ptolemaic ſphere, that we ſhall be eaſily excuſed the not taking up room with any deſcription of it.

Spheres, *Harmony of the.* See Harmony.

Spheres, *Obliquity of the.* See Obliquity.

Sphere, *Rectifying of the.* See Rectifying.

Sphere, *Dialling.* See Dialling.

Spheres, poliſhed ſpherical maſſes of a mixed metalline compoſition, uſed in optics. The manner of making them is as follows.

Take of pure tin, three pounds; copper, one pound; melt theſe two metals together, and when in fuſion caſt upon the maſs ſix ounces of burnt tartar, and an ounce and half of ſaltpetre; and laſtly, a quarter of an ounce of alum, and two ounces of arſenic: let all theſe matters evaporate and burn away, and then caſt the pure metal into the figure of a ſphere, and it will be capable of a high and elegant poliſh. Neri's Art of Glaſs, p. 166. See Steel-*Glaſſes*.

SPHERICAL Angle, is the mutual inclination of two planes, by which a ſphere is cut.

Thus, the inclination of the two planes C A F and C E F, (*Plate* II. *Trigonometry*, *fig.* 1.) forms the ſpherical angle A C E.

The meaſure of a ſpherical angle, A C E, is an arc of a great circle A E, deſcribed from the vertex C, as from a pole, and intercepted between the legs C A and C E.

Hence, 1. Since the inclination of the plane C E F to the plane C A F is every where the ſame, the angles in the oppoſite interſections, C and F, are equal.

2. Hence the meaſure of a ſpherical angle A C E is deſcribed by the interval of a quadrant A C or E C from the vertex C, between the legs C A, C E.

If a circle of the ſphere A E B F (*fig.* 2.) cut another, C E D F, the adjacent angles, A E C and A E D, are equal to two right ones; and the vertical angles, A E C and D E B, are equal to one another. The former likewiſe holds of ſeveral angles formed on the ſame arc C E D, at the ſame point E. Hence, any number of ſpherical angles, as A E C, A E D, D E B, B E C, &c. made on the ſame point E, are equal to four right angles. See Spherical *Triangle*.

Spherical *Triangle*, a triangle comprehended between three arcs of great circles of a ſphere, interſecting each other in its ſurface.

Spherical *Triangles*, *Properties of.* 1. If in two ſpherical triangles (*Plate* II. *Trigonometry*, *fig.* 3.) A B C and abc, $A = a$, $BA = ba$, and $CA = ca$; then will B, b, and the ſides including the angles, be reſpectively equal; the whole triangles are equal: that is, $BC = bc$, $B = b$, and $C = c$.

Again, if in two ſpherical triangles $A = a$, $C = c$, and $AC = ac$; then will $B = b$, $AB = ab$, and $BC = bc$.

Laſtly, if in two ſpherical triangles $AB = ab$, $AC = ac$, and $BC = bc$; then will $A = a$, $B = b$, and $C = c$: the demonſtrations of which coincide with thoſe of the like properties in plain triangles; the theorems of the congruency of rectilinear triangles extending to all other curvilinear, circular, parabolical, &c. provided their ſides be ſimilar. See Triangle.

2. In an equicrural triangle A B C (*fig.* 4.) the angles at the baſe, B and C, are equal; and if in any triangle, the angles B and C, at the baſe B C, are equal, the triangle is equicrural.

3. In every ſpherical triangle, each ſide is leſs than a ſemicircle: any two ſides taken together are greater than the third; and all the three ſides together are leſs than the periphery of a great circle; and a greater ſide is always oppoſed to a greater angle, and a leſs ſide to a leſs angle.

4. If in a ſpherical triangle B A C (*fig.* 5.) two legs, A B and B C, taken together, be equal to a ſemicircle; the baſe A C being continued to D; the external angle B C D will be equal to the internal oppoſite one B A C. If the two legs together be leſs than a ſemicircle, the external angle B C D will be greater than the internal oppoſite one A; and if the legs be greater than a ſemicircle, the external angle B C D will be leſs than the internal oppoſite one A; and the reverſe of all theſe holds, *viz.* if the angle B C D be equal to, greater, or leſs, than A, the ſides A B and B C are equal to, greater, or leſs, than a ſemicircle.

5. If in a ſpherical triangle A B C, two ſides, A B and B C, be equal to a ſemicircle, the angles at the baſe, A and C, are equal to two right ones: if the ſides be greater than a ſemicircle, the angles are greater than two right ones; and if leſs, leſs; and converſely.

6. In every ſpherical triangle, each angle is leſs than two right ones; and the three together are leſs than ſix right angles, and greater than two.

7. If in a ſpherical triangle B A C (*fig.* 5.) the ſides A B and A C be quadrants, the angles at the baſe, B and C, will be right angles. And if the intercepted angle A be a right angle, B C will be a quadrant: if A be obtuſe, B C will be greater than a quadrant; and if acute, leſs; and converſely.

8. If in a ſpherical rectangular triangle, the ſide B C (*fig.* 6.) adjacent to the right angle B, be a quadrant, the angle A will be a right angle; if B E be greater than a quadrant, the angle A will be obtuſe; and if B D be leſs than a quadrant, the angle A will be acute; and converſely.

9. If in a ſpherical rectangular triangle, each leg be either greater or leſs than a quadrant, the hypothenuſe will be leſs than a quadrant; and converſely.

10. If in a ſpherical triangle A B C (*fig.* 7.) rectangular only at B, one ſide, C B, be greater than a quadrant, and the other ſide, A B, leſs, the hypothenuſe, A C, will be greater than a quadrant; and converſely.

11. If in a ſpherical oblique-angular triangle A C B (*fig.* 8.) both angles at the baſe, A and B, be either obtuſe or acute; the perpendicular C D, let fall from the third angle C, to the oppoſite ſide A B, falls within the triangle: if one of them, A, be obtuſe, and the other, B, acute, the perpendicular falls without the triangle.

12. If in a ſpherical triangle A C, all the angles, A, B, and C, be acute, the ſides are each leſs than a quadrant. Hence, if in an oblique-angular ſpherical triangle, one ſide be greater than a quadrant, one angle is obtuſe, *viz.* that oppoſite to this ſide.

13. If in a ſpherical triangle A C B, two angles, A and B, be obtuſe, and the third, C, acute; the ſides, A C and C B, oppoſite to the obtuſe angles are greater than a quadrant; and that oppoſite to the acute angle, A B, is leſs than a qua-

a quadrant. Hence, if the two ſides be leſs than a quadrant, the two angles are acute.

14. If in a ſpherical triangle the ſeveral ſides be each greater than a quadrant; or only two of them greater, and the third be equal to a quadrant, the ſeveral angles are obtuſe.

15. If in an oblique-angular ſpherical triangle two ſides be leſs than a quadrant, and the third greater; the angle oppoſite to the greateſt will be obtuſe, and the reſt acute.

SPHERICAL *Triangles*, *Reſolution of.* See TRIANGLE.

SPHERICAL *Aſtronomy*, that part of aſtronomy which conſiders the univerſe ſuch as it appears to the eye. See ASTRONOMY.

Under ſpherical aſtronomy, then, are comprehended all the phenomena and appearances of the heavens and heavenly bodies, ſuch as we perceive them, without any enquiry into the reaſon, the theory, or the truth of them. By which it is diſtinguiſhed from *theorical* aſtronomy, which conſiders the real ſtructure of the univerſe, and the cauſes of thoſe phenomena.

In the ſpherical aſtronomy, the world is conceived to be a concave ſpherical ſurface, in whoſe centre is the earth, or rather the eye, about which the viſible frame revolves, with ſtars and planets fixed in its circumference. And on this ſuppoſition all the other phenomena are determined.

The theorical aſtronomy teaches us, from the laws of optics, &c. to correct this ſcheme, and reduce the whole to a juſter ſyſtem.

SPHERICAL *Compaſſes*. See COMPASSES.

SPHERICAL *Exceſs*, in *Trigonometry*, is the exceſs of the ſum of the three angles of any ſpherical triangle above three right angles; which exceſs in ſeconds, multiplied by the radius of the ſphere, is equal to the area of the triangle, as was firſt ſhewn by Albert Girard.

It is extremely deſirable, in geodetic operations, to be able to aſcertain the ſpherical exceſs from other principles than thoſe of the obſerved angles; theſe being very ſubject to ſmall inaccuracies, from the effect of refraction near the horizon: and nothing ſeems bettter calculated for this purpoſe, than the foregoing property of the area of the triangle; for this being, as we have ſtated above, equal to the exceſs multiplied by the radius of the ſphere, therefore, converſely, the area being known or computed on other principles, the exceſs may thence be determined, and the accuracy of the obſerved angles ſubmitted to the teſt thence obtained. Now as ſuch triangles as occur, even in the moſt extenſive ſurveys, differ but little from rectilinear ones, their areas may be computed as if they really were ſuch, with ſcarcely any perceptible error; and hence this important object is at once obtained.

The application of Albert Girard's theorem was firſt made by general Roy, or rather by Mr. Dalby, his aſſiſtant, and publiſhed in the Philoſophical Tranſactions for 1790, p. 171, where we have the following rule: "From the area of the logarithms of the triangle, computed as a plane one, in feet, ſubtract the conſtant logarithm 9.3267737, and the remainder is the logarithm of the exceſs above 180° in ſeconds nearly." This rule is very general, and, being the firſt application of this principle to geodetic computations, is highly creditable to its inventor; but it is not always the moſt conciſe; and other rules have ſince been given by different authors, which are applicable to every variety of data. We can, however, in this place only enumerate ſome of the principal ones, and muſt refer the reader for their inveſtigations to the works from which they have been ſelected.

1. The ſpherical exceſs may be found in ſeconds by the expreſſion $E = \frac{R''S}{r}$; where E is the exceſs; S is the ſurface of the triangle $= \frac{1}{2} b c \,.\, \text{ſin. } A = \frac{1}{2} a b \,.\, \text{ſin. } C = \frac{1}{2} a c \,.\, \text{ſin. } B = \frac{1}{2} a^2 \frac{\text{ſin. } B \,.\, \text{ſin. } C}{\text{ſin. } (B + C)}$; r is the radius of the earth, in the ſame meaſure as a, b, c, the ſides of the triangle; and $R'' = 206264''.8$, the ſeconds in an arc equal in length to the radius.

If this rule be applied logarithmically, then $\log. R'' = \log. \frac{1}{\text{arc } 1''} = 5.3144251$.

2. Hence is readily deduced general Roy's rule, as above given, *viz.*

$$\log. E'' = \log. (\text{area in feet}) - 9.3267737.$$

3. Since $S = \frac{1}{2} b c \,.\, \text{ſin. } A$, we ſhall manifeſtly have $E = \frac{R''}{2 r^2} b c \,.\, \text{ſin. } A$. Hence, if from the vertical angle B, of a ſpherical triangle A B C, we demit the perpendicular B D, upon the baſe A C, dividing it into two ſegments α and β, we ſhall have $b = \alpha + \beta$; and hence,

$$E = \frac{R''}{2 r^2} c \; (\alpha + \beta) \; \text{ſin. } A$$

$$= \frac{R''}{2 r^2} \alpha c \; \text{ſin. } A + \beta c \; \text{ſin. } A.$$

But the two right-angled triangles being in all practical caſes nearly rectilinear, gives $\alpha = a \; \text{coſ. } C$, and $\beta = c \; \text{coſ. } A$; whence we have

$$E = \frac{R''}{2 r^2} a c \; \text{ſin. } A \,.\, \text{coſ. } C + \frac{R''}{2 r^2} c^2 \; \text{ſin. } A \; \text{coſ. } A.$$

In like manner, the triangle A B C, which is itſelf ſo ſmall as to differ but a little from a plane triangle, gives $c \; \text{ſin. } A = a \; \text{ſin. } C$, alſo $\text{ſin. } A \,.\, \text{coſ. } A = \frac{1}{2} \text{ſin. } 2 A$, and $\text{ſin. } C \,.\, \text{coſ. } C = \frac{1}{2} \text{ſin. } 2 C$; therefore, finally,

$$E = \frac{R''}{4 r^2} a^2 \,.\, \text{ſin. } 2 C + \frac{R''}{4 r^2} c^2 \; \text{ſin. } 2 A.$$

From which theorem a table may be formed, whence the ſpherical exceſs may be found; entering the table with each of the ſides above the baſe and its adjacent angle as arguments.

4. If the baſe b, and height h, of the triangle be given, then we have evidently $E = \frac{1}{2} b h \frac{R''}{r^2}$. Hence reſults the following ſimple logarithmic rule: Add the logarithm of the baſe of the triangle, taken in feet, to the logarithm of the perpendicular, taken in the ſame meaſure, and deduct from the ſum the conſtant log. 9.6278037; and the remainder will be the common logarithm of the ſpherical exceſs in ſeconds and decimals.

5. Again, when the three ſides of the triangle are given, then

$$\log. E = \tfrac{1}{2} \left(\log. s + \log. (s - a) + \log. (s - b) + \log. (s - c) \right) - 9.3267737;$$

where $s = \frac{1}{2}$ ſum of the ſides, or $s = (a + b + c) \div 2$.

The two latter formulæ are in fact only particular caſes of Roy's general theorem.

6. When any two ſides, a, b, and their contained angle C, are given, then we have

$$\text{cot.}\ \tfrac{1}{2}\,\text{E} = \frac{\text{cot.}\ \frac{1}{2}a\ .\ \text{cot.}\ \frac{1}{2}b + \text{coſ. C}}{\text{ſin. C}}.$$

7. When the three ſides are given, we may alſo, inſtead of the formula in art. 5, make uſe of the following elegant theorem, diſcovered by Simon L'Hullier, *viz.*

$$\text{tan.}\ \tfrac{1}{4}\,\text{E} = \surd\left(\text{tan.}\ \frac{a+b+c}{4}\ .\ \text{tan.}\ \frac{a+b-c}{4}\ .\ \text{tan.}\ \frac{a-b+c}{4}\ .\ \text{tan.}\ \frac{-a+b+c}{4}\right).$$

One or other of theſe rules will apply to all caſes in which the ſpherical exceſs will be required.

We ſhall conclude this ſhort article with one or two examples of its application, as given by general Roy, Phil. Tranſ. 1790, p. 172.

Names of Stations.		*Obſerved Angles.*
Hanger-hill Tower	(a)	42° 2′ 32″
Hampton Poor-houſe	(b)	67 55 39
King's Arbour	(c)	70 1 48
		179 59 59

Diſtance in Feet.

(a) from (b) = 38461.12
(a) from (c) = 27404.7

Hence, making the diſtance from (a) to (c) the baſe of the triangle, the perpendicular on that baſe will be equal to 38461.12 × ſin. 42° 2′ 32″; and, therefore, the area of the triangle =

$$\frac{\text{baſe} \times \text{perp.}}{2} = 24704.7 \times 19230.56 \times \text{ſin.}\ 42^\circ\ 2'\ 32''.$$

Computation.

Log. ſin. 42° 2′ 32″ = 9.8258661
Log. 24704.7 = 4.3927761
Log. 19230.56 = 4.2839906
18.5026328

Taking away 10 for radius, we have 8.5026328 for the log. of the area in feet.

Whence from - - 8.5026328
Take conſt. log. - - 9.3267737
Correſp. numb. .14992 = 1.7158591

Whence the ſpherical exceſs in ſeconds is .14992″, or 0″.15 *nearly.*

Again, as a ſecond example.

Names of Stations.		*Obſerved Angles.*
Hundred Acres	(d)	53° 58′ 35″.75
Hanger-hill Tower	(e)	68 24 44
St. Anne's Hill	(f)	57 36 39.5
		179 59 59.25

Diſtance in Feet.

(d) from (e) = 71934.2
(d) from (f) = 79211.22

Log. ſin. 53° 58′ 35″.75 = 9.9078237
Log. 35967.1 = 4.5559054
Log. 79211.22 = 4.8987866
Sum minus radius = 9.3625207
Subtract conſt. log. = 9.3267737
Correſp. numb. 1.0858 = 0.0357470

Whence the ſpherical exceſs is 1″.0858.

In this manner the computed ſpherical exceſs will enable the obſerver to examine the accuracy of his obſervations, and in ſome degree to correct them; after which he may proceed to calculate the ſides of the triangles by the rules of ſpherical trigonometry, or by Legendre's theorem, *viz.* "a ſpherical triangle being propoſed, of which the ſides are very ſmall, relatively to the radius of the ſphere; if, from each of the angles, one-third of the exceſs of the ſum above two right angles be ſubtracted, the angles ſo diminiſhed may be taken for the angles of a rectilinear triangle, the ſides of which are equal in length to thoſe of the propoſed ſpherical triangle."

SPHERICAL *Geometry*, the doctrine of the ſphere; particularly of the circles deſcribed on the ſurface thereof, with the method of projecting the ſame on a plane; and meaſuring their arcs and angles when projected.

SPHERICAL *Numbers.* See CIRCULAR *Numbers.*

SPHERICAL *Trigonometry.* See *Spherical* TRIGONOMETRY.

SPHERICITY, the quality of a ſphere; or that by which a thing becomes ſpherical or round.

The ſphericity of pebbles, fruits, berries, &c. as alſo of drops of water, quickſilver, &c. and of bubbles of air under water, &c. Dr. Hook takes to ariſe from the incongruity of their particles with thoſe of the ambient fluid, which prevents their coaleſcing; and by preſſing on them, and encompaſſing them all round equally, turns them into a round form.

This, he thinks, appears evidently from the manner of making ſmall round ſhot of ſeveral ſizes, without caſting the lead into any moulds; from drops of rain being formed, in their fall, into round hail-ſtones; and from drops of water falling on ſmall duſt, ſand, &c. which ſoon produce an artificial round maſs; and from the ſmall, round, red-hot balls, formed by the colliſion or fuſion of flint and ſteel, in ſtriking fire.

But all theſe caſes of ſphericity ſeem better accounted for from the great principle of attraction; by which the parts of the ſame fluid drop, &c. are all naturally ranged as near the centre as poſſible, which neceſſarily induces a ſpherical figure; and, perhaps, a repelling force between the particles of the drop, and of the medium, contributes alſo not a little thereto. See ATTRACTION and COHESION.

SPHERICS, the *doctrine of the ſphere*, particularly of the ſeveral circles deſcribed on its ſurface; with the method of projecting the ſame in plano.

The principal matters ſhewn here are as follow:

1. If a ſphere be cut in any manner, the plane of the ſection will be a circle, whoſe centre is in the diameter of the ſphere.

Hence, 1. The diameter H I (*Plate* II. *Trigonometry*, *fig.* 9.) of a circle, paſſing through the centre C, is equal to the diameter A B of the generating circle; and the diameter of a circle, as F E, that does not paſs through the centre, is equal to ſome chord of the generating circle.

Hence, 2. As the diameter is the greateſt of all chords, a circle paſſing through the centre is the greateſt circle of the ſphere; and all the reſt are leſs than the ſame.

Hence alſo, 3. All great circles of the ſphere are equal to one another.

Hence alſo, 4. If a great circle of the ſphere paſs through any given point of the ſphere, as A, it muſt alſo paſs through the point diametrically oppoſite to it, as B.

Hence alſo, 5. If two great circles mutually interſect each other, the line of ſection is the diameter of the ſphere; and therefore two great circles interſect each other in points diametrically oppoſite.

Hence alſo, 6. A great circle of the ſphere divides it into two equal parts or hemiſpheres.

2. All great circles of the ſphere cut each other into two equal parts; and, converſely, all circles that thus cut each other are great circles of the ſphere.

3. An arc of a great circle of the ſphere, intercepted between another arc H I L (*fig.* 10.), and its poles A and B, is a quadrant. That intercepted between a leſs circle D E F, and one of its poles A, is greater than a quadrant; and that between the ſame, and the other pole B, leſs than a quadrant; and converſely.

4. If a great circle of the ſphere paſs through the poles of another, that other paſſes through the poles of this. And if a great circle paſs through the poles of another, the two cut each other at right angles; and converſely.

5. If a great circle, as A F B D, paſs through the poles A and B of a leſſer circle D E F, it cuts it into equal parts, and at right angles.

6. If two great circles, A E B F and C E D F, (*fig.* 11.) interſect each other in the poles E and F of another great circle A C B D; that other will paſs through the poles I and *i*, H and *h*, of the circles A E B F and C E D F.

7. If two great circles, A E B F and C E D F, cut each other mutually; the angle of obliquity, A E C, will be equal to the diſtance of the poles H, I.

8. All circles of the ſphere, as G F and L K (*fig.* 12.) equally diſtant from its centre C, are equal; and the farther they are removed from the centre, the leſs they are. Hence, ſince of all parallel chords, only two, G F and L K, are equally diſtant from the centre; of all the circles parallel to the ſame great circle, only two are equal.

9. If the arcs F H and K H, and G I and I L, intercepted between a great circle I M H, and the leſſer circles G N F and L O K, be equal, the circles are equal.

10. If the arcs F H and G I, of the ſame great circle A I B H, intercepted between two circles G N F and I M H, be equal, the circles are parallel.

11. An arc of a parallel circle, I G, (*fig.* 1.) is ſimilar to an arc of a great circle, A E; if each be intercepted between the ſame great circles C A F and C E F.

Hence, the arcs A E and I G have the ſame ratio to their peripheries; and, conſequently, contain the ſame number of degrees. And hence the arc I G is leſs than the arc A E.

12. The arc of a great circle is the ſhorteſt line which can be drawn from one point of the ſurface of the ſphere to another; and the lines between any two points on the ſame ſurface are the greater, as the circles of which they are arcs are the leſs.

Hence, the proper meaſure, or diſtance, of two places on the ſurface of the ſphere, is an arc of a great circle intercepted between the ſame. See more on this ſubject in Theodoſii Elem. Sphær. apud Dechales Curſus Mathematicus, tom. i. p. 145, &c.

SPHEROID, Sphæroides, Σφαιροειδης, formed from σφαιρα, *ſphæra*, and ειδος, *ſhape*, in *Geometry*, a ſolid approaching to the figure of a ſphere, though not exactly round, but oblong; as having one of its diameters bigger than the other; and generated by the revolution of a ſemi-ellipſis about its axis.

When it is generated by the revolution of the ſemi-ellipſis about its greater or tranſverſe axis, it is called an *oblong* or *prolate* ſpheroid: and when generated by the revolution of an ellipſis about its leſs or conjugate axis, an *oblate* ſpheroid.

The contour of a dome, Daviler obſerves, ſhould be half a ſpheroid. Half a ſphere, he ſays, is too low to have a good effect below.

For the ſolid dimenſion of a ſpheroid, multiply continually together the fixed axis, the ſquare of the revolving axis, and the number .52359877, or $\frac{1}{6}$ of 3.14159, and the laſt product will be the ſolidity: *i. e.* $\frac{1}{6}pttc =$ the oblate, and $\frac{1}{6}ptcc =$ the oblong ſpheroid, where $p = 3.14159$, $t =$ the tranſverſe, and $c =$ the conjugate axis of the generating ellipſis. Or, multiply the area of the generating ellipſe by $\frac{2}{3}$ of the revolving axis, and the product will be the content of the ſpheroid: *i. e.* $\frac{2}{3}t\text{A} =$ the oblate, and $\frac{2}{3}c\text{A} =$ the oblong ſpheroid; where A is the area of the ellipſe. *E. g.* Required the content of an oblate, and of an oblong ſpheroid, the axes being 50 and 30. Thus, $50 \times 30 \times .78539816 = 1178.09724 =$ the area of the ellipſe. And $1178.09724 \times \frac{2}{3} \times 30 = 23561.9448 =$ the oblong ſpheroid: and $1178.09724 \times \frac{2}{3} \times 50 = 39269.908 =$ the oblate one.

Dr. Hutton has demonſtrated the rule above given in the following manner. Put $f = \text{BI}$ the fixed ſemi-axis, (*Plate* XIV. *Geometry*, *fig.* 3.) $r = \text{IM}$ the revolving ſemi-axis of the ſpheroid, $a = \text{SI}$ any ſemi-diameter of the ſection N B M, $b = \text{IK}$ its ſemi-conjugate, $y = \text{AE}$ an ordinate to the diameter S I, or a ſemi-axis of the elliptic ſection A F C parallel to K L, and $z = \text{EF}$ its other ſemi-axis, alſo $x = \text{EI}$, $s =$ the ſine of the angle A E S, or of the angle K I S, to the radius 1, and $p = 3.14159$.

Then, by the property of the ellipſe K S L, $aa : bb :: aa - xx : bb \times \frac{aa - xx}{aa} = yy$; and $b : r :: y : \frac{ry}{b} = z$. But the fluxion of the ſolid K A C L is $psyz\dot{x} = \frac{psryy\dot{x}}{b}$, by writing for z its value $\frac{ry}{b}$, $= pbsr\dot{x} \times \frac{aa - xx}{aa}$, by ſubſtituting for yy its value $bb \times \frac{aa - xx}{aa}$, $= pfrr\dot{x} \times \frac{aa - xx}{aaa}$, by putting for abs its value rf; and hence the fluent $pfrrx \times \frac{aa - \frac{1}{3}xx}{aaa}$, or $\frac{1}{3}pfrr \times \frac{3aa - xx}{aaa}$, will be the value of the fruſtum K A C L; which, when E I or x becomes S I or a, gives $\frac{2}{3}pfrr$ for the value of the ſemi-ſpheroid K S L; or the whole ſpheroid $= \frac{1}{6}p\,\text{FRR}$, putting F and R for the whole fixed and revolving axes. Q.E.D.

Corol. 1.—From the foregoing demonſtration it appears that the value of the general fruſtum KAECL is expreſſed by $\frac{1}{3}pfrrx \times \frac{3aa - xx}{aaa}$.

And if for fr be ſubſtituted its value abs, the ſame fruſtum will alſo be expreſſed by $\frac{1}{3}pbrsx \times \frac{3aa - xx}{aa}$.

Alſo, if for aa be put its value $\frac{bbxx}{bb - yy}$, the laſt expreſſion will become $\frac{1}{3}prsx \times \frac{2bb + yy}{b}$, or $\frac{1}{3}psx \times \left(2br + \frac{ryy}{b}\right)$; which, by writing z inſtead of its value $\frac{ry}{b}$, gives $\frac{1}{3}psx \times (2br + yz)$ for the value of the fruſtum, *viz.* the ſum of the area of the leſs end, and twice that of the greater, drawn into one-third of the altitude or diſtance of the ends.

And out of this laſt expreſſion may be expunged any one of the four quantities b, r, y, z, by means of the proportion $b : r :: y : z$.

When the ends of the fruſtum are perpendicular to the fixed axis, then a is $= f$, and the value of the fruſtum becomes $\frac{1}{3}prrx \times \frac{3ff - xx}{ff}$ for the value of the fruſtum whoſe ends are perpendicular to the fixed axis, its altitude being x.

And when the ends of the fruſtum are parallel to the fixed axis, a is $= r$, and the expreſſion for ſuch a fruſtum becomes $\frac{1}{3}pfx \times \frac{3rr - xx}{r}$.

Corol. 2.—If to or from $\frac{2}{3}pfrr$, the value of the ſemi-ſpheroid, be added or ſubtracted $\frac{1}{3}pfrrx \times \frac{3aa - xx}{aaa}$, the value of the general fruſtum KACL, there will reſult $\frac{1}{3}pfrrhh \times \frac{3a - h}{aaa}$ for the value of a general ſegment, either greater or leſs than the ſemi-ſpheroid, whoſe height, taken upon the diameter paſſing through its vertex and centre of its baſe, is $h = a \pm x$.

When a coincides with f, the above expreſſion becomes $\frac{1}{3}prrhh \times \frac{3f - h}{ff}$ for the value of a ſegment whoſe baſe is perpendicular to the fixed axis.—And here, if we put R for the radius of the ſegment's baſe, and for rr its value $\frac{RRff}{2fh - hh}$, the ſaid ſegment will become $\frac{1}{3}pRRh \times \frac{3f - h}{2f - h}$.

And when a coincides with r, the general expreſſion will become $\frac{1}{3}pfhh \times \frac{3r - h}{r}$ for the value of the ſegment whoſe baſe is parallel to the fixed axis. And if we put F, R, for the two ſemi-axes of the elliptic baſe of this ſegment, reſpectively correſponding or parallel to f, r, the ſemi-axes of the generating ellipſe, when parallel to the baſe of the ſegment, and for $\frac{f}{r}$ and r ſubſtitute their values $\frac{F}{R}$ and $\frac{RR + hh}{2h}$, the ſaid fruſtum will be expreſſed by $\frac{1}{3}pFh \times \frac{3RR + hh}{2R}$, in which the dimenſions of itſelf only are concerned.

Corol. 3.—A ſemi-ſpheroid is equal to $\frac{2}{3}$ds of a cylinder, or to double a cone of the ſame baſe and height; or they are in proportion as the numbers 3, 2, 1. For the cylinder is $= 4nfrr = \frac{12}{3}nfrr$, the ſemi-ſpheroid $= \frac{8}{3}nfrr$, and the cone $= \frac{4}{3}nfrr$.

Corol. 4.—When $f = r$, the ſpheroid becomes a ſphere, and the expreſſion $\frac{8}{3}fnrr$ for the ſemi-ſpheroid becomes $\frac{8}{3}nr^3$ for the ſemi-ſphere. And in like manner, f and r being ſuppoſed equal to each other in the values of the fruſtums and ſegments of a ſpheroid, in the preceding corollaries, will give the values of the like parts of a ſphere.

Corol. 5.—All ſpheres and ſpheroids are to each other as the fixed axes drawn into the ſquares of the revolving axes.

Corol. 6.—Any ſpheroids and ſpheres, of the ſame revolving axis, as alſo their like or correſponding parts cut off by planes perpendicular to the ſaid common axis, are to one another as their other or fixed axes. This follows from the foregoing corollaries.

Corol. 7.—But if their fixed axes be equal, and their revolving axes unequal, the ſpheroids and ſpheres, with their like parts terminated by planes perpendicular to the common fixed axis, will be to each other as the ſquares of their revolving axes.

Corol. 8.—An oblate ſpheroid is to an oblong ſpheroid, generated from the ſame ellipſe, as the longer axis of the ellipſe is to the ſhorter. For, if T be the tranſverſe axis, and C the conjugate; the oblate ſpheroid will be $= \frac{2}{3}nT^2C$, and the oblong $= \frac{2}{3}nC^2T$; and theſe quantities are in the ratio of T to C.

Corol. 9.—And if about the two axes of an ellipſe, be generated two ſpheres and two ſpheroids, the four ſolids will be continual proportionals, and the common ratio will be that of the two axes of the ellipſe; that is, as the greater ſphere, or the ſphere upon the greater axis, is to the oblate ſpheroid, ſo is the oblate ſpheroid to the oblong ſpheroid, ſo is the oblong ſpheroid to the leſs ſphere, and ſo is the tranſverſe axis to the conjugate. For theſe four bodies will be as T^3, T^2C, TC^2, C^3, where each term is to the conſequent one as T to C.

To find the content of an univerſal ſpheroid, or a ſolid conceived to be generated by the revolution of a ſemi-ellipſe about its diameter, whether that diameter be one of the axes of the ellipſe or not. 1. Divide the ſquare of the product of the axes of the ellipſe by the axis of the ſolid, or the diameter about which the ſemi-ellipſe is conceived to revolve: multiply the quotient by .5236, and the product will be the content required. That is, $\frac{T^2C^2}{d} \times .5236 =$ the content; T and C being the tranſverſe and conjugate axes of the ellipſe, and d the axis of the ſolid.

Or, 2. The continual product of .5236, the diameter about which the revolution is made, the ſquare of its conjugate diameter, and the ſquare of the ſine of the angle made by thoſe diameters, the radius being 1, will be the content. That is, $dccss \times .5236 =$ the content; c being the conjugate diameter to d, and s the ſine of the angle made by the diameters. For the demonſtration of this rule, ſee Hutton, ubi infra.

Hence, if $d = T$, the rule becomes $\frac{1}{6}pTC^2$ for the oblong ſpheroid: and if $d = C$, it will be $\frac{1}{6}pCT^2$ for the oblate ſpheroid: and if T, C, and d, be all equal, the rule will be $\frac{1}{6}pd^3$ for the ſphere. See MENSURATION. Hutton's Menſuration.

For the method of finding the ſuperficies of a ſpheroid, ſee SUPERFICIES; and for the ſolidity, ſee SOLIDITY, and the preceding article.

Dr. Halley has demonſtrated, that in a ſphere, Mercator's nautical meridian line is a ſcale of logarithmic tangents of the half complements of the latitudes. But as the earth has been found to be a ſpheroid, this figure will make ſome alteration in the numbers reſulting from Dr. Halley's theorem. Mr. Maclaurin has therefore given us a rule, by which the meridional parts to any ſpheroid may be found with the ſame exactneſs as in a ſphere. We have alſo an ingenious treatiſe of Mr. Murdoch's on the ſame ſubject. See Phil. Tranſ. N° 219.

Mr. Cotes has alſo demonſtrated the ſame propoſition, Harm. Menſ. p. 20, 21. See MERIDIONAL *Parts*.

SPHEX, in *Entomology*, a genus of inſects of the order Hymenoptera, of which the generic character is as follows. The mouth is formed with an entire jaw; the mandibles are horny, incurved, and toothed; the lip is horny and membranaceous at the tip; it has four feelers; the antennæ have about ten articulations; the wings in each ſex are plane, incumbent, and not folded; the ſting is pungent, and concealed within the abdomen. The inſects of this genus are ſaid to be the moſt ſavage and rapacious of this claſs of beings: they attack whatever comes in their way, and by means of a poiſonous ſting, overcome and devour others far beyond their own ſize. Thoſe of diviſion B, hereafter to be deſcribed, are found chiefly on umbellate plants; the larvæ are without feet, ſoft, and inhabit the body of ſome inſect, on whoſe juices they exiſt; the pupa has rudiments of wings.

"As the inſects," ſays Dr. Shaw, "of the genus Ichneumon depoſit their eggs in the bodies of other *living* inſects, ſo thoſe of the genus Sphex depoſit their's in *dead* ones, in order that the young larvæ, when hatched, may find their proper food." There are more than a hundred ſpecies of the genus Sphex, which are ſeparated into diviſions.

Species.

A. *Antennæ ſetaceous; Lip entire; and no Tongue.*

APPENDIGASTER. This ſpecies is black; the abdomen is petiole, very ſhort, and placed on the back of the thorax; the hind-legs are very long. This is found in divers parts of Europe, Africa, and New Holland.

* MACULATA. Thorax ſpotted; firſt ſegment of the abdomen with a white dot on each ſide; the ſecond is edged with white. It is, as the aſteriſk denotes, an Engliſh inſect. There is a ſpecimen of it in ſir Joſeph Banks's muſeum.

FASCIATA. Black; abdomen with two white bands, the firſt interrupted; and the tail is white. It is found in different parts of Italy. The thorax is black, covered with ſilvery down on the fore-part; the fore-margin is marked with a white line; the wings are white, but tipped with brown.

SESSILIS, ſo named on account of its ſhort, cylindrical, ſeſſile abdomen. The inſect is black. It inhabits France; is very like the S. appendigaſter.

PUNCTUM. This is black; but the tail is marked with a white dot. It is an Italian inſect.

NIGRITIA. This alſo is black; the upper wings are marked with a brown band.

B. *Antennæ filiform; Lip emarginate; with a Briſtle on each ſide; the Tongue is inflected and trifid.*

Of this ſection there are two ſubdiviſions; the one has a petiolate abdomen, that of the other is ſeſſile.

a. *Abdomen petiolate.*

LUTARIA. Black; ſecond and third ſegments of the abdomen rufous; the lip is ſilvery. It inhabits Kiel.

THOMÆ. Black; abdomen rufous; the petiole, and ſpot on the back, black. It inhabits St. Thomas's iſland.

FERVENS. This is likewiſe black; the abdomen is ferruginous; the wings are brown. It inhabits India.

CYANIPENNIS. Villous, blue; fore-part of the thorax and abdomen grey; the wings are blue. It inhabits Cayenne, and is large. This is a very beautiful inſect; the head is blue; the mandibles and antennæ are black; the abdomen blueiſh-grey; the petiole black; legs black; the joints yellowiſh.

HÆMORRHOIDALIS. Black; lip, tail, and legs, ferruginous. Inhabits Africa. A ſpecimen is preſerved in the muſeum of ſir Joſeph Banks.

ARGENTEA. Gloſſy-black; front villous, ſilvery; the wings are white, but tipt with brown. It inhabits Coromandel, and is a large inſect.

RUFIPENNIS. Black; wings ferruginous, tipt with brown. It inhabits Tranquebar, and is large.

FLAVIPENNIS. Black; front golden; abdomen rufous; the petiole and tips are black. It inhabits Italy.

PENNSYLVANICA. This is of a blackiſh hue; the abdomen is of a full black; but the wings are inclining to a violet. It inhabits America and New Holland.

VIOLACEA. Blue; wings white, tipt with brown; the antennæ are black. It is found at the Cape of Good Hope.

CYANEA. Blue; wings azure, tipt with brown; the antennæ are black. It inhabits North America.

AURULEATA. Head and thorax covered with gold down; the abdomen is black; the baſe and legs rufous. It is an inhabitant of Tranquebar.

TOMENTOSA. The head and thorax of the inſects of this ſpecies are covered with a gold down; the abdomen is black; the baſe and legs are rufous. It inhabits Sierra Leone.

FEMORATA. This is blue; the abdomen is black; the hind-thighs are rufous. It inhabits Italy.

TIBIALIS. Hairy, black-blue; hind-ſhanks ferruginous; wings black. It inhabits the Cape of Good Hope. A ſpecimen is preſerved in the muſeum of ſir Joſeph Banks.

FLAVIPES. Villous, black, with a yellow dot before the wings; the legs are yellow; the thighs black. It inhabits America.

ATRA. This is quite black, excepting the lip, which is ſilvery villous; wings as long as the abdomen. It inhabits Italy.

FIGULUS. Smooth, black; ſegments of the abdomen at the edges and lip lucid. It inhabits Upſal, in the holes and crevices of wooden partitions, abandoned by all other inſects. According to Dr. Shaw, this inſect, when it has found a convenient cavity for the purpoſe, ſeizes on a ſpider, which it kills, and depoſits it at the bottom; then laying her egg in it, ſhe cloſes up the orifice of the cavity with clay; the larva, which reſembles the maggot of a bee, having devoured the ſpider, ſpins itſelf up a duſky ſilken web, and changes into a chryſalis, out of which, within a certain number of days, proceeds a complete inſect, which is black, with a ſlightly foot-ſtalked abdomen, the edges of the ſeveral ſegments being of a brighter appearance than the reſt of the body. The female of this ſpecies prepares ſeveral ſeparate holes, or nets, in each of which ſhe places a dead inſect and an egg; each cell coſting her the labour of about two days.

Lunata. The abdomen of this inſect is black; the firſt ſegment is marked with a yellow lunule. It inhabits America, as does the next.

Affinis. Villous, black; the firſt joint of the antennæ, ſcutel, and ſhanks, are yellow.

Jamaicensis. This, as its name implies, is found in Jamaica. The abdomen is black; the firſt ſegment, and edge of the others, are yellow.

Erythrocephala. Black; head, baſe of the petiole, and legs, ferruginous. It inhabits Malabar. A ſpecimen is kept in the muſeum of ſir Joſeph Banks.

* Spirifex. Black; thorax hairy, and immaculate; petiole of one joint, yellow; as long as the abdomen. There is a variety, of which the petiole and joints of the legs are half yellow. It is found in this country, in divers parts of Europe, and alſo in Africa, particularly in Egypt, in cylindrical cavities wrought within like a honeycomb, on the ſides of cliffs, and in the mud walls of cottages.

Madraspatana. Black; thorax hairy, and ſpotted with yellow; the petiole is yellow, and as long as the abdomen. It inhabits Malabar.

Clavus. Black; thorax ſpotted; abdomen blueiſh; the petiole long, rufous, with a black band. This is an inhabitant of New Holland.

Holosericea. Black, with a ſilvery down; abdomen ferruginous; the petiole is black, and the tail blue. It is found in Barbary.

Pubescens. Black, with ſilvery down; the abdomen is ferruginous, with a black petiole. It inhabits Guinea, and is found among the graſs.

Cincta. Black, with ſilvery down; the ſegments of the abdomen are edged with white. This, like the laſt, is found in Guinea.

Lobata. Green-blue; thorax with a diſtinct fore-lobe; the wings are ſub-ferruginous. It is an inhabitant of Africa.

Ciliata. Teſtaceous; abdomen blue; mandibles elongated and ciliate. This is an Indian inſect.

Compressa. Shining green; the hind-thighs are compreſſed, ferruginous. It inhabits Malabar.

Sibirica. Poliſhed braſſy-green; the abdomen is blue, An inhabitant of Siberia.

Ichneumonea. Fulvous; abdomen black, with a ferruginous baſe. It is found in divers parts of America.

Hirtipes. Hairy, duſky; abdomen ſhining black; wings teſtaceous. It inhabits Guinea.

Albifrons. Glabrous, black; front covered with a ſilvery brown; wings white, with a black baſe. This alſo is found in Guinea.

Maxillosa. Black, with ſilvery down; abdomen ferruginous at the baſe; the mandibles are projected, curved, and toothed. It is a large inſect, and is found in Barbary.

Unicolor. Duſky-brown, with cinereous down. It is found in Spain, on umbellate flowers,

Indostanee. Black; wings blueiſh-black, with a hyaline thinner margin. Found in Europe and India.

Clavipes. Black; petiole ferruginous, clavate, of one joint; legs clavate. This is a ſmall inſect, and is found in ſeveral parts of Europe.

Austriaca. Black; baſe of the abdomen with a ſulphur-coloured band and two dots; the legs are varied with ſulphur; the hind-thighs are thickened. It inhabits, as its name denotes, Auſtria.

Bidens. Black; head and antennæ ferruginous; the abdomen is marked with four yellow ſpots; the thorax is two-ſpined. It inhabits Mauritania, and is a large inſect.

Insubrica. Black; front, mouth, ſcutel, and two bands on the abdomen, of a pale yellow. It inhabits Padua; breeds in chimneys and windows, in the ſame neſt with the Ichneumon ſeductor.

b. *Abdomen ſeſſile.*

Morio. Black, immaculate; wings dark brown. It inhabits New Holland.

Collaris. Black-blue; fore-lobe of the thorax fulvous. It inhabits New Holland.

Frontalis. Black; front and fore-lobe of the thorax yellow. It inhabits New Holland.

Analis. Glabrous, black; abdomen ferruginous at the tip; wings white. It inhabits India.

Similis. This inſect is glabrous, black, abdomen ferruginous at the tip; the wings are white.

Assimilis. Black; antennæ, tail, and legs, rufous; wings blue; the baſe and tip white. This is found at Tranquebar.

Dimidiata. Black; the head and fore-part of the thorax dull ferruginous; the wings are black. This is an inhabitant of Barbary.

* Fusca. Black, glabrous; baſe of the abdomen ferruginous. This inhabits gravelly places in Europe: after having deſtroyed the larva of a moth, it depoſits its eggs in its carcaſe, and then digs a hole and buries it.

Viatica. Black, downy; fore-part of the abdomen ferruginous, with black belts; wings brown.

Ursus. Black, hairy; ſecond ſegment of the abdomen ferruginous; wings black.

Amethystina. Blue; antennæ and legs black. It inhabits Santa Cruz.

Cingulata. Black; front ſtreak on the fore-part of the thorax, and edges of the abdominal ſegments, cinereous. It inhabits New Holland.

Nigra. Black; ſegments of the abdomen with lucid margins.

Labiata. Black; ſegments of the abdomen edged with cinereous; the wings are teſtaceous, tipt with brown. It inhabits the South American iſlands.

Variegata. Black, ſpotted with white; thorax rufous under the ſcutel; the wings are tipt with brown. This is found in Saxony.

Sanguinolenta. Black; thorax rufous before and behind; ſegments of the abdomen lucid at the margin. This is a very ſmall inſect, and is found in ſeveral parts of Germany.

Mixta. Black, varied with yellow; abdomen yellow, with three black bands. This is an American inſect.

Maura. Black; hind-thighs rufous; inhabits Tranquebar.

Hyalinata. Black; four hind-thighs rufous; wings hyaline. Found in Saxony.

Fuscata. Black; abdomen with a white tranſverſe dot on each ſide; hind-thighs rufous; wings tipt with brown. It inhabits Saxony.

Sex-punctata. Black, with two white dots under the ſcutel, and four on the abdomen; wings tipt with brown.

Bi-fasciata. Black, immaculate; wings with two black bands. This is an inhabitant of Paris.

Gibba. Black; abdomen ferruginous, tipt with brown; upper wings brown at the tip. This is found in divers parts of Europe.

Fasciata. Black; antennæ rufous; wings white, with two brown bands. This is found in New Holland, as is the next.

Cinerea. Cinereous; ſegments of the abdomen black at the baſe, and brown at the tip.

Tropica. Black; ſecond ſegment of the abdomen ferruginous. This is found in different parts of America.

Fugax. Thorax covered with gold down; abdomen ferruginous; wings yellowiſh, with a brown band.

Aurata. Head and thorax with gold down; abdomen black, the edges of the ſegments cinereous. This is found in the Eaſt Indies.

Nitida. Ferruginous; thorax golden behind; wings yellowiſh. It inhabits New Holland.

* **Rufipes.** Black; the ſegments of the abdomen are marked with a white dot on each ſide; the wings are tipt with brown. Found in England, and on divers parts of the European continent.

Bi-punctata. Black, glabrous; abdomen marked with two white dots and a band behind; the wings are tipt with brown. This is an European inſect.

Nigricornis. Black; head and thorax rufous. It is found in New Holland.

Exaltata. Black; abdomen rufous, tipt with black; wings brown at the tip, with a white dot.

Maculata. Black; thorax ſpotted with white; firſt ſegment of the abdomen rufous, the reſt with a tranſverſe white line on each ſide. It inhabits Kiel.

Tricolorata. Black; abdomen with ſilver lunules on each ſide, the baſe is rufous, the tip black. This is a Barbary inſect.

Guttata. Black, glabrous; thorax ſpotted with white; abdomen rufous, with tranſverſe dots, and black before the tip. This is very like the S. maculata, and is found in Italy.

Abdominalis. Black; thorax with a cinereous band before; abdomen rufous; wings tipt with brown. It inhabits Braſil.

Capensis. Black; antennæ, ſhanks, and wings teſtaceous, the latter tipt with brown. It inhabits the Cape of Good Hope.

Nigrita. Black; wings blue. Inhabits Malabar.

Turcica. Black; thorax with a cinereous band before; abdomen rufous; wings black. It is an inhabitant of Braſil.

Nigripes. Black; abdomen ferruginous; wings duſky; legs black. It inhabits Africa.

Villosa. Black; abdomen villous, teſtaceous; wings deep black; legs rufous. It is found at Malabar, and is very ſmall.

Discolor. Black, glabrous; wings yellow, tipt with black. It is found in Barbary.

Flava. Black; head, thorax, and tail, ferruginous; wings yellow, tipt with brown. It is found in the Eaſt Indies.

Bicolorata. Black; head, tip of the abdomen, and wings, yellow, the latter tipt with brown. This is a New Holland inſect.

Speciosa. Deep black; wings rufous, tipt with white.

Fulvipennis. Black; head, fore-part of the thorax, tail and legs, rufous; wings fulvous, tipt with blue. This is an inhabitant of India.

Nobilis. This ſpecies is varied with ſilver and black; wings white, with two black bands. It inhabits Cayenne.

Brevicornis. Black; thorax ferruginous; abdomen with ſix white ſpots. It is found in Barbary: in a variety the abdomen is immaculate.

Ocellata. Black; legs teſtaceous; wings black, with an ocellar ferruginous ſpot on the upper pair. Found in Africa.

Ruficornis. Blue; antennæ rufous; legs black.

Quadri-punctata. Black; antennæ, ſtreaks on the fore-part of the thorax and ſcutel; there are four dots on the abdomen, and the wings are ferruginous. It is found in Spain.

Cærulea. Blue; wings ferruginous, upper pair whitiſh at the tip. It inhabits South America, as does the next.

Stellata. Blue; wings black, upper pair with a rufous ſpot in the middle, and whitiſh at the tip.

Plumbea. Lead-colour; antennæ black; upper wings tipt with brown. It is found in Spain, and is very ſmall.

Pectinipes. Black, glabrous; fore-part of the abdomen ferruginous; fore-legs ciliate.

Variegata. Entirely black; wings ſpotted with white. Seen in divers parts of Europe.

Antarctica. Black; antennæ and legs ferruginous; is about the ſize of a waſp, and is found at the Cape of Good Hope.

Palmipes. Black; thorax with two yellow dots at the tip, and one at the baſe; the fore-legs are palmate. It inhabits Sweden.

Ephippica. Black; front blueiſh; abdomen with a double ferruginous band. It is the ſize of a gnat, and inhabits Sweden.

Stigma. Wings angular, grey-brown and reddiſh beneath, with white ſpots. It is an inhabitant of the Cape.

Indica. Black; antennæ and legs ferruginous; wings blueiſh-black. It is found in South America.

Colon. Black; antennæ and legs rufous; thorax green; wings with two black ſpots. It inhabits Sweden.

Mauritanica. Black; head, antennæ, and legs, ferruginous, with a black border. It inhabits Mauritania, and is reckoned among the large inſects of this genus.

Collaris. Black; wings brown, with a white band in the middle and at the end; antennæ and legs teſtaceous. Inhabits Spain, and is the ſize of a common ant. Its neck is yellow.

Coronata. Abdomen black, with two yellow belts and dots; head and thorax ſpotted with yellow. It inhabits Switzerland.

* **Xanthocephalus.** Black; front yellow; abdomen and legs ſpotted with yellow. It inhabits England.

* **Spinosa.** Black; thorax with a ſpine on each ſide behind; the lip and breaſt are ſilvery. It inhabits England.

Albomaculata. Black; abdomen ferruginous at the baſe; wings brown, with a white ſpot at the tip.

Tricolor. Black; ſegments of the abdomen very varied in number, ſome of them are teſtaceous, and others dotted with white.

Boops. Black; three ſegments of the abdomen and tarſi teſtaceous. It is an Auſtrian inſect.

Tomentosa. Black, downy; antennæ thick at the baſe; the three firſt ſegments of the abdomen are ferruginous; the baſe and tip are black.

COCCINEA. Black; antennæ, jaws, tip of the abdomen, and ſhanks, ſcarlet; thorax with a tooth on each ſide behind; wings yellow, the hind margin brown.

SPINIPES. Black, hairy; wings yellow; the hind margin brown, with a black ſpot at the baſe of the upper pair; ſegments of the abdomen vary from two to four, which are yellow on the hind margin of each ſide. Its abode is not known.

GUTTATA. Black; with white lines and dots; wings pale yellow; legs rufous.

LEUCOMELLIS. Black; wings white towards the hind margin; firſt ſegment of the abdomen white on each ſide; the third with an ovate white ſpot on the back; the four hind-legs are rufous.

MELANOCHLORA. Black; abdomen ferruginous at the baſe. This is an European inſect.

TESTACEA. Black; legs and abdomen teſtaceous, the latter brown at the tip.

CASPA. The abdomen of this is black, with four yellow elevated bands; the three upper ones interſected by a triangular black ſpot. It inhabits near the Caſpian ſea.

SPHINCTER, in *Anatomy*, a name given to muſcles which ſurround, and have the office of cloſing, certain openings.

SPHINCTER *Ani*, the muſcle ſurrounding the extremity of the large inteſtine. See INTESTINE.

SPHINCTER *Labiorum*, the ſame as the orbicularis oris. See DEGLUTITION.

SPHINCTER *Iridis*. See EYE.

SPHINCTER *Œſophagi*. See DEGLUTITION.

SPHINCTER *Vaginæ*. See the deſcription of that canal under GENERATION.

SPHINCTER *Veſicæ*. See the deſcription of the urinary bladder under KIDNEY.

SPHINX, σφιγξ, in *Sculpture*, &c. a figure or repreſentation of a monſter of that name, famed among the ancients, now moſtly uſed as an ornament in gardens, terraces, &c.

It is repreſented with the head and breaſts of a woman, the wings of a bird, the claws of a lion, and the reſt of the body like a dog or lion.

It is ſuppoſed to have been engendered by Typhon, and ſent by Juno to be revenged on the Thebans. Its office, they ſay, was to propoſe dark enigmatical queſtions to all paſſers by; and, if they did not give the explication of them, to devour them.

It made horrible ravages, as the ſtory goes, on a mountain near Thebes, and could not by any means be deſtroyed, till after Œdipus had ſolved the following riddle: What animal is it that in the morning walks on four legs, at noon on two, and at night on three? The anſwer was, Man.

Among the Egyptians, the ſphinx was the ſymbol of religion, by reaſon of the obſcurity of its myſteries. And, on the ſame account, the Romans placed a ſphinx in the pronaos or porch of their temples.

Sphinxes were uſed by the Egyptians to ſhew the beginning of the water's riſing in the Nile: with this view, as it had the head of a woman and body of a lion, it ſignified that the Nile began to ſwell in the months of July and Auguſt, when the ſun paſſes through the ſigns of Leo and Virgo. Accordingly it was a hieroglyphic, which taught the people the period of the moſt important event in the year, as the ſwelling and overflowing of the Nile gave fertility to Egypt. Accordingly they were multiplied without end, ſo that they were to be ſeen before all their temples, and before all their remarkable monuments.

There are ſeveral of theſe ſtill to be ſeen; one in particular, near the pyramids, facing the ſecond pyramid on the eaſtern ſide, much ſpoken of by the ancients, being of a prodigious ſize, and cut out of the rock; the head and neck only appear at preſent, the reſt of the body being hid in the ſand. The top of its back only is viſible, which is more than 100 feet long. It is of one ſingle ſtone, making part of the rock on which the pyramids are placed. Its head riſes about twenty-nine feet above the ſand. This, according to Thevenot, is twenty-ſix feet high, and fifteen feet from the ear to the chin; but Pliny aſſures us, the head was no leſs than one hundred and two feet in circumference, and ſixty-two feet high from the belly, and that the body was one hundred and forty-three feet long, and was thought to be the ſepulchre of king Amaſis.

Some have ſuggeſted, that the well of the great pyramid led to this monſter, and that the prieſts reſorted thither at certain times to pronounce their oracles; alleging, that a hole placed at the top of the ſphinx's head anſwered their purpoſe; but this hole is only five feet deep, and communicates neither with the mouth nor with the inſide of the monſter. The Arabs, inſpired by Mahomet with a horror for all repreſentations of men and animals, have disfigured its face with arrows and lances. Some have urged, without ſufficient reaſon, that the ſphinx countenances the opinion that the Egyptians were black, the face of that ſtatue having been ſaid to reſemble the negro. The ſtatues of the Nile, it is ſaid, were made of black marble, in alluſion to his coming from Ethiopia. If the ſphinx was a ſymbol that had any relation to this ſubject, might not the negro face be given to it for a ſimilar reaſon? It would hardly have been thought neceſſary to explain why the figure of the Nile was black, if the complexion of the natives had been generally acknowledged of the ſame tinge.

The ſmall ſtatues of Iſis, &c. frequently found among the ruins of Egypt, are far from reſembling thoſe of the negro: the ſame obſervation is applicable to the figures in alto relievo and baſſo relievo, on the walls of Thebes, in the caverns of Gebel-el-Silſili, &c. Of the coloſſal ſtatues at Thebes, the features are too much damaged to be adduced in proof of the pretended fact.

The learned Mr. Bryant (Anc. Mythol. vol. iii. p. 532.) obſerves, that the ſphinx ſeems to have been originally a vaſt rock of different ſtrata; which, from a ſhapeleſs maſs, the Egyptians faſhioned into an object of beauty and veneration.

The Egyptians uſed this figure in their building; from them the Greeks derived it, and afterwards improved it into an elegant ornament.

SPHINX, the *Hawk-moth*, in *Entomology*, a genus of inſects of the order Lepidoptera, of which the generic character is as follows: Antennæ ſomewhat priſmatic, tapering at each end; the tongue is exſerted; feelers two, reflected; the wings are deflected.

The inſects of this genus, of which there are nearly two hundred ſpecies, fly abroad only in the morning and evening; they are very ſlow on the wing, and often make a humming kind of noiſe: they extract the nectar of flowers with the tongue. The generic name, ſphinx, is applied on account of the poſture aſſumed by the larvæ of ſeveral of the larger ſpecies, which are often ſeen in an attitude much reſembling that of the Egyptian ſphinx, *viz.* with the fore-parts elevated, and the reſt of the body applied flat to the ſurface.

The larva has ſixteen feet, and is pretty active; that of the *Zygæna*, a diviſion of this genus, is thick and flat, and covered with ſhort hairs; that of the *Seſiæ* is generally naked, unarmed, and thinner towards the head; the others have a ſharp, erect, ſtiff horn behind; the pupa is quieſcent: that of the zygænæ folliculate, and a little tapering forwards, the reſt naked and ſmooth; that of the ſeſiæ pointed at each end, of the others very obtuſe behind.

There are three diviſions of this genus; *viz.* A, of which the antennæ are ſcaly; feelers hairy; tongue ſpiral; B, in which the antennæ are cylindrical; the tongue is exſerted, truncate, and the wings entire; and C, in which the antennæ are thicker in the middle; tongue exſerted, ſetaceous. Of the principal ſpecies of theſe diviſions we ſhall proceed to give a brief account.

Species.

A. *Antennæ ſcaly; Feelers hairy; Tongue ſpiral.*

* **Ocellata.** Wings angular, lower ones rufous, with a blue eye. This is reckoned a very beautiful inſect; its upper wings and body are brown, the former finely clouded with different ſhades, while the lower wings are of a bright roſe-colour, each marked with a large ocellated black ſpot, with a blue interior circle and a black centre. This inſect proceeds from a green caterpillar of a rough or ſhagreen-like ſurface, marked on each ſide by ſeven oblique yellowiſh-white ſtreaks, and furniſhed, like the preceding, with a horn at the tail. It is chiefly found on the willow; retires under ground, in order to undergo its change into the chryſalis ſtate, in the month of Auguſt or September, and in the following June apppears the complete inſect.

Myops. Wings angular; upper pair with a yellow ſpot at the tip and poſterior angle; lower ones yellow, with a blue eye.

Quercus. Wings angular, indented, cinereous, with dark ſtreaks; lower ones ferruginous, white at the angle of the tail. This inhabits Germany. The larva is ſolitary and of a green colour, with oblique lateral ſtripes and rufous ſtigmata; pupa cheſnut, with rufous margin.

Lusca. Wings angular, duſky, with a black dot; lower ones black, with a fulvous band. It inhabits the South American iſlands. The upper wings are cinereous, with brown flexuous bands; lower wings cinereous at the angle of the tail, with a fulvous blotch; beneath it is a dull grey, and immaculate.

* **Populi.** Wings indented, reverſed, grey; upper pair with a white central ſpot; lower ones ferruginous at the baſe. This is found in England and many parts of Europe. It is figured by Donovan, and other writers on natural hiſtory. The larva is ſolitary, rough, green, with oblique white ſtripes on the ſides; the pupa is of a dull brown, but ferruginous behind.

* **Tiliæ.** Wings angular, with greeniſh clouds and darker bands; lower ones beneath yellow, teſtaceous. The larva is ſolitary, rough, green, with oblique red and yellow ſtripes on the ſides; the pupa is brown.

Pylas. Wings ſcalloped, indented, variegated; lower ones fulvous, yellow at the baſe, and black at the tip. It inhabits Surinam. Lower wings with a marginal black band, and contiguous ſmaller one; the edge itſelf is yellowiſh.

Cacus. Wings indented, black, with three approximate pale ſtreaks; lower ones are yellow, ſtriate with black. The abdomen is marked with cinereous and black belts.

Dentata. Wings indented; lower ones brown, with a white ſtreak; the abdomen is annulate with white. It is an Indian inſect. The head and thorax are blueiſh, ſpeckled with brown; the upper wings are blueiſh, with brown ſpecks and bands.

Alope. Wings indented, brown; lower ones yellow, tipt with black; abdomen black, with interrupted pale belts. This is found in divers parts of America. The larva of this ſpecies is tailed and glabrous, cinereous on the back, with a broad brown ſtreak before; ocellate in the middle, and ending in a black ſpot; pupa brown, with rufous rings and ſtreaks.

Jatrophæ. Wings ſlightly indented; lower one black, with a rufous baſe and hyaline band; the head is two-horned. The larva is green, with a moniliform tail; the pupa is brown, with an inflected cylindrical tail.

* **Atropos.** The wings of the inſects of this ſpecies are entire; the lower ones are yellow, with two brown bands; the abdomen is yellow, with belts. This is ſaid to be the largeſt and moſt remarkable, if not the moſt beautiful, European inſect of this genus. It is thus deſcribed by Dr. Shaw: the upper wings are of a fine dark grey colour, with a few ſlight variations of dull orange and white; the under wings are of a bright orange colour, marked by a pair of tranſverſe black bands; the body is alſo orange-coloured, with the ſides marked by black bars, while along the top of the back, from the thorax to the tail, runs a broad blue-grey ſtripe; on the top of the thorax is a very large patch of a moſt ſingular appearance, exactly repreſenting the uſual figure of a ſkull, or death's head, and is of a pale grey, varied with dull ochre and black. When in the leaſt diſturbed or irritated, this inſect emits a ſtridulous ſound, ſomething like the ſqueaking of a mouſe; and from this circumſtance, as well as from the mark above-mentioned on the thorax, it is held in much dread by the vulgar in ſeveral parts of Europe, its appearance being regarded as a kind of ill omen or harbinger of approaching fate. Reaumur mentions, that the members of a female convent in France were thrown into great conſternation at the appearance of one of theſe inſects, which happened to fly in during the evening at one of the windows of the dormitory. The caterpillar from which this curious ſphinx proceeds, is in the higheſt degree beautiful, and far ſurpaſſes in ſize every other European inſect of the kind, meaſuring ſometimes nearly five inches in length, and being of a proportional thickneſs; its colour is a bright yellow; the ſides are marked with a row of ſeven moſt elegant broad ſtripes or bands, of a mixed violet and ſky-blue colour; the tops of theſe bands meet on the back in ſo many angles, and are varied on that part with jet black ſpecks; on the laſt joint of the body is a horn or proceſs, not in an erect poſition, but hanging or curving over the joint in the manner of a tail, having a rough ſurface and a yellow colour. This caterpillar is principally found on the potatoe and the jeſſamine, which are its favourite food. It changes into a chryſalis in the month of September, retiring for that purpoſe deep in the earth; the perfect inſect emerging in the following June or July. Individuals have been obſerved to change into the chryſalis in July or Auguſt, and then produce the complete inſect in November, ſo that there appear to be two broods or races in a year.

The S. atropos is generally conſidered as a rare inſect, and as the caterpillar feeds chiefly by night, concealing itſelf during the day under leaves, &c. it is not often detected; yet from ſome ſingular circumſtances favourable to its breed, there are ſeaſons in which it is even plentiful, as was the caſe in the autumn of 1804, in which the caterpillar was ſo common in ſome counties, as to be prejudicial to the potatoe-plants, particularly in ſome parts of Cornwall and Surry.

"The alteration of form which the whole of the papilionaceous tribe undergo, and in a particular manner the changes of the ſphinx genus, afford a ſubject of the moſt pleaſing contemplation to the mind of the naturaliſt, and though a deeply philoſophical ſurvey demonſtrates that there is no real change produced in the identity of the creature itſelf, or that it is in reality no other than the gradual and progreſſive evolution of parts before concealed, and which lay maſked under the form of an inſect of a widely different appearance, yet it is juſtly viewed with the higheſt admiration, and even generally acknowledged as in the moſt lively manner typical of the laſt eventful changes."

Chionanthi. Wings variegated, with a white dot in the middle; abdomen with three pair of fulvous eyes. This is an American inſect. The antennæ are hooked, ferruginous, with a white ſhaft; lower wings blackiſh, ſpotted with white. Larva tailed, with yellow and black bands; the head and tail are red; the pupa is brown.

* Pinastri. Wings entire, grey, with three ſhort black lines in the middle of the upper pair; the abdomen is white, with black bands. The larva is tailed, and greeniſh, with a ferruginous dorſal line, a lateral yellow one, and ferruginous ſubocellar ſtigmata: the pupa is reddiſh-brown, with white eyes.

* Euphorbiæ. Wings entire, with two dark olive bands; lower ones with a black baſe, and marginal ſtreak; the antennæ are ſnowy. It is found in this country, and divers parts of Europe. Donovan has given a figure of it. The larva is black, dotted with white; it has a red line down the back, and lateral yellow ſpots; the pupa is brown, with black ſtigmata.

* Lineata. Wings greeniſh-olive, with a white band, croſſed with white ſtreaks; the lower ones are black, with a red band. It is generally deſcribed as having a greeniſh head, with a lateral white line; the thorax is marked with three double white ſtreaks; abdomen with a white line down the middle, and lateral black and white dots; the hind margin of the upper wings is of a purple colour. Beneath it is cinereous, ſpeckled with green.

* Celario. Wings entire, grey, with ſilvery-white ſtreaks; the lower ones are brown, with ſix red ſpots. The larva is tailed, brown, with two lateral pale lines, and two eyes on the neck, on each ſide; the pupa is brown before and reddiſh behind.

* Elpenor. Wings entire, with tranſverſe greeniſh-brown and red bands; the lower ones are red, with a black baſe. The larva is tailed, with brown ſpots and two blue eyes on each ſide of the neck; the pupa is grey before, behind brown, with darker ſtigmata.

* Porcellus. Wings entire, varied with yellow and purple; the abdomen is beneath ſanguineous, dotted with white. The larva is without a tail, brown, with three blue eyes on each ſide of the neck; the pupa is blackiſh.

* Convolvuli. Wings entire, clouded; lower ones ſlightly barred; abdomen with red, black, and white belts. This is found in our own country, and other parts of Europe. The larva is tailed, with oblique white lines on the ſides; the pupa is brown, with a reflected involute horn. The eyes of this inſect are ſaid to be ſlightly phoſphoreſcent.

* Ligustri, or Privet Hawk-moth. Wings entire; lower ones rufous, with three black bands; the abdomen is red, with black belts. The larva is tailed; in colour it is green, with oblique lateral ſtreaks, which are of a fleſh-colour before, and white behind; the pupa is brown; the tail is four-toothed.

Crantor. Wings entire, brown, ſpotted with black; lower ones red, edged with black. It inhabits India. The upper wings are marked with a pale ſpot at the baſe; the lower wings are ſpotted with black at the angle of the tail.

Labruscæ. Wings greeniſh, with a white dot on the lower ſurface of the upper pair; the abdomen is marked with five white dots at the ſides. This is an American inſect. The lower wings are marked with a black diſk, barred with a blue rufous ſpot at the angle of the tail. The larva is tailed, varied with brown and black; on the tail is a white poliſhed moveable dot.

B. *Antennæ cylindrical; tongue exſerted, truncate; wings entire. This diviſion is named*

Sesia.

Tantalus. Abdomen bearded, the third ſegment ſnowy. It inhabits Europe and India. The abdomen is marked with a white and rufous ſtreak; upper wings variegated with three white dots.

Hylas. Wings ſemi-tranſparent; abdomen bearded, green, with a purple belt. It inhabits China. The tail is marked with a white dot at the baſe; the ſides of the baſe are black.

* Stellatarum. Abdomen bearded, the ſides are varied with black and white; the lower wings are ferruginous. The larva is pale roſy, dotted with white; the tail blue, ferruginous at the tip; the pupa is pale, with a brown tip.

Pandora. Abdomen bearded, with fulvous ſpots on the ſides; the lower wings are ferruginous at the baſe, and tipt with black.

Fuciformis. Abdomen bearded, blackiſh, with a yellow band near the tail; wings diaphanous, with a darker brown border; beard of the abdomen black on each ſide. The larva is green, with a yellow lateral line; the horn is erect; pupa folliculate, black, with yellow ſtreaks before.

* Bombyliformis. Abdomen bearded, greeniſh, fulvous, with a black band; the wings are tranſparent, with a fine black edge.

* Apiformis. This ſpecies is of an aſpect at firſt ſight more reſembling that of a waſp, or hornet, than of a ſphinx, the wings being tranſparent, with merely a ſlight edging of brown, and the thorax and abdomen varied with black and yellow. The caterpillar inhabits the hollows of poplar, ſallow, willow, and lime-trees, feeding on the ſubſtance of the bark; changing to a chryſalis in April, and the fly appearing in the month of June.

* Crabroniformis. Wings tranſparent; abdomen yellow, with black belts; thorax black, with obſolete yellow ſpots; the head is black, with a yellow ring at the baſe. The larva is yellow; the pupa is reddiſh-brown. The male has two black bands near the baſe of the abdomen; the female is marked with irregular black lines.

* Culiciformis. Wings hyaline, with a black band and margin; the abdomen is bearded, with a fulvous belt; the antennæ are white before the tip.

* Tipuliformis. Wings tranſparent, with a black band and margin; the abdomen is bearded, black; the alternate inciſures are edged with yellow. This is figured by Donovan. The thorax has a yellow line on each ſide; tip of the upper wings marked with a brown ſpot. The larva is ſolitary, a little hairy, whitiſh, with yellow head and legs, and a darker dorſal line; the pupa is brown.

* Zonata. Wings tranſparent, with a black band and margin; the abdomen is bearded, black, with a ſingle belt. It is found in divers parts of Europe, as well as in this country. The head is marked with a thin red margin; on the thorax are two oblique lateral red lines.

Ichneumoniformis. Wings tranſparent, with a black margin and band, in which is a fulvous dot; the abdomen is marked with alternate black and white belts. It inhabits Auſtria.

* VESPIFORMIS. Wings tranſparent, with a black margin and band; abdomen bearded, black, the ſecond and laſt ſegments edged with yellow. It is found in this country, and many parts of Europe.

* CHRYSORRHÆA. Wings tranſparent, with a black margin and band; abdomen black, with four yellow belts; the beard is yellow, with a black line in the middle. This is an Engliſh inſect, and is figured by Donovan.

C. *Antennæ thicker in the middle; tongue exſerted, ſetaceous.*

ZYGÆNA.

* FILIPENDULÆ. Upper wings blue-green, with ſix red ſpots in pairs; the lower ones are red, with a greeniſh border. It is found in England, and other parts of Europe. The larva is flat, tailed, ſulphur-coloured, with four lines of black dots; the pupa is brown, but in the middle it is of a ſulphur-colour.

SEDI. Blue; upper wings with three connected red ſpots; the lower ones are entirely red. It inhabits ſouthern Ruſſia. The ſpots on the wings are ſurrounded with a yellow ring, and the lower wings with a fine black edge.

PHEGEA. Green-black; the upper wings are marked with ſix tranſparent dots, the lower ones with two; the abdomen with a yellow belt. It is found in many parts of Germany. The larva is brown; the head and legs are reddiſh; the back is marked with faſciculate white plumes.

CAFFRA. Black; wings brown, with five red dots; the lower ones are red, edged with brown. It is found in many parts of Africa. The head is black; feelers and orbits red; thorax black, with two red dots on each ſide; dots on the wings ſurrounded with a black ring.

CASSANDRA. Brown; abdomen with five blue ſpots on each ſide; tail, mouth, baſe of the thighs, and abdomen, ſcarlet.

ANDROMACHA. Black; wings hyaline, with a black margin and band; the tail is red. It inhabits America.

LETHE. Wings black, with two yellow ſpots; abdomen with red, black, and blue belts, and a white one. This is an African inſect.

PECTICORNIS. Browniſh; wings violet, with two white bands a little interrupted; the collar is red. It is found in South America.

SYPILUS. Wings black; upper pair with an interrupted teſtaceous band; lower ones teſtaceous at the baſe; the abdomen is dotted with blue. It inhabits different parts of America. The abdomen is black, with teſtaceous belts at the baſe; the tip is dotted with blue.

CAPISTRATA. Wings black, with two tranſparent bands on the upper pair; the lower ones have a tranſparent diſk; the abdomen is red and black on the back. It inhabits America.

COLUMBINA. Wings tranſparent, with a black ſpot, and border marked with red. It inhabits South America. The antennæ are pectinate; the head is black, with two red dots; the thorax is marked with white lines; the abdomen is black, the firſt ſegment is red, the others are marked with white and red belts.

CAUDATA. Wings yellow, hyaline, tipt with brown; body ſpotted with gold. This inhabits South America.

DIPTERA. Wings brown; upper pair with five tranſparent ſpots; lower ones very ſhort, with a yellow ſpot. This inhabits the Eaſt Indies.

TIBIALIS. Upper wings brown, lower ones hyaline; hind-legs long and very hairy. It inhabits Africa.

CAPYS. Black; upper wings tipt with white. Inhabits Surinam.

* STATICES. Upper wings green-blue; lower ones brown. Inhabits divers parts of Europe, as well as this country.

ACHARON. Blue; wings brown; tail rufous. It inhabits New Holland.

STYX. Body and wings blue; thorax rufous. It is found in Africa.

THOAS. Upper wings brown; lower ones black, with ſemitranſparent diſk; collar red.

SPHINX, a name given by Reaumur to a very ſingular ſpecies of caterpillar, deſcribed in the ſecond volume of his Hiſtory of Inſects.

The reaſon of the author's having given it that name is, that when it is not eating it erects its head, and with it more than a third part of its body, into a perpendicular ſituation upon the leaf on which it was before laid all along; it keeps itſelf a long time in this ſituation, looking around it with a ſeeming air of fierceneſs. There is alſo a ſeries of broad belts upon the body, which contribute ſomething towards its reſemblance to the figure of that imaginary monſter.

This caterpillar has a horn on the hinder part of its body, which ſeems to be of no ſort of uſe, but merely a trouble to the creature. It is hollow, and incloſes, in the manner of a ſheath, the new horn which is to appear when the creature changes its ſkin. This the author found to be the caſe, by cutting it ſeveral times, and always finding within it the new horn cut off alſo at the ſame place, and had often obſerved the great difficulty the animal had in changing its ſkin, when it came to the horn.

SPHINX, *Simia*. See SIMIA.

SPHONDYLIUM, in *Botany*, σφονδυλιον of Dioſcorides, the Cow-parſnip. See HERACLEUM.

SPHONDYLOCOCCUS, ſo called, by Mitchell, from the whorled appearance of the berries, is the Linnæan CALLICARPA. See that article.

SPHONDYLUS, in *Ichthyology*, a name given by Pliny, and others of the old authors, to a peculiar ſpecies of the ſyngnathus, or *acus Ariſtotelis*. It is the ſpecies, called by Artedi *ſyngnathus corpore medio hexagono cauda pinnata;* and by other authors the *acus ſecundæ ſpecies;* and by Bellonius and Geſner *typhle marina*.

SPHONDYLUS is alſo uſed by ſome authors, for the ſtones or bones found in the head of a mullet.

SPHRAGIDE, or *Lemnian Earth*, in *Mineralogy*, a name given by Werner to a ſubſtance nearly reſembling fullers'-earth, found in the iſland of Lemnos, in the Mediterranean. It is of a greyiſh or yellowiſh-white colour; it has a dull aſpect and a meagre feel, in which reſpect it differs from fullers'-earth; it adheres ſlightly to the tongue, and falls to pieces when immerſed in water. The conſtituent parts of this mineral, as given by Klaproth, are,

Silex	66
Alumine	14.50
Magneſia	0.25
Lime	0.25
Soda	3.50
Oxyd of iron	6
Water	8

This earth is dug but once a year, on the 15th of Auguſt, in the preſence of the clergy and magiſtrates of the iſland, after the reading of prayers. The clay is cut into long pieces of an ounce weight, and each of them is afterwards ſtamped with a ſeal, having on it the Turkiſh name of the mineral. It is in great repute in the Eaſt, as an antidote againſt poiſon and the plague; and even in the time of Homer was valued on the ſame account. It was then ſtamped as at preſent, and none but prieſts were allowed to handle it. Severe puniſhments were alſo inflicted on thoſe who preſumed to dig for it at any other but the ſtated period. The geological poſition of this mineral is unknown. See Fullers'-*Earth*, and Lemnian *Earth*.

SPHRAGIS, the ſeal-ſtone, a name given by ſome authors to the ſingle joints of the aſteriæ, when found looſe, not joined into a column. See Star-*Stone*.

Sphragis is alſo uſed by ſome of the old Greek naturaliſts, to expreſs the ſpots on the back and ſides of a panther.

The ſkin of this creature is of a pale colour, and theſe ſpots are all dark and round, and look like ſo many regular impreſſions of a ſeal, whence the name ſphragis.

The Romans called any thing that was variegated in this manner *pantherina;* and we meet with the phraſe *menſæ pantherinæ*, uſed to expreſs tables found of ſome wood, which was variegated with round ſpots, in the manner of thoſe ſphrages on the back of the panther.

SPHYGMICA, in *Medicine*, a term uſed by ſome for that part of the judgment of a phyſician, which regards the differences of the σφυγμος, or *pulſe.*

SPHYRÆNA, in *Ichthyology*, a name by which ſome authors have called the *ſudis*, or *lucius marinus*, the ſea-pike.

Sphyræna *Altera*, a name given by Appian, and ſome other of the old Greek writers, to the *eſox*, or common pike.

SPICA, in *Botany* and *Vegetable Phyſiology*, a ſpike, is a mode of inflorеſcence, very general in the natural order of *Orchideæ*, and frequent among many other tribes of plants. It is compoſed of ſeveral flowers, ranged along a common flower-ſtalk, without any partial ones, each individual flower being ſeſſile. The ſpike is generally erect at the time the flowers expand, and the latter are leſs crowded than in a Racemus. See that article, and Inflorescence.

Spica *Bandage*, in *Surgery*, is a kind of bandage thus called from its interſections, which are ſuppoſed to reſemble an ear of corn. It is either ſimple or double. The ſimple ſpica, applied to the clavicle, when fractured near the ſhoulder, conſiſts of a ſimple band, about five ells long, and three fingers breadth, rolled up either with one or with two heads. The double ſpica, which is uſed when the oſſa humeri of each arm are diſlocated, is a band about ſeven or eight ells long, and three or four fingers breadth, rolled up with two heads: the middle is fixed under the axilla, and the two heads croſs each other upon the ſhoulder, and go over the breaſt and back to the oppoſite axilla; here they croſs again, and then riſe up over the other ſhoulder as before, from whence they go acroſs the breaſt, and back again to the left axilla, where they began, forming an X, by traverſing each other upon the ſternum and back. See Bandage.

Spica *Virginis*, a ſtar of the firſt magnitude in the conſtellation Virgo.

SPICCATO, Ital., diſtinct, detached, ſeparated, in *Muſic*, as if half the note were cut off by a reſt. This term is nearly of the ſame ſignification as *ſciolto* and *ſtaccato;* except that, on the violin, when ſpiccato is written over or under a group of notes, they are to be touched lightly with the vibration of one bow; and ſciolto and ſtaccato paſſages and movements require a ſtrong bow to every note.

SPICE, any kind of aromatic drug, that has hot and pungent qualities: ſuch are pepper, nutmeg, ginger, cinnamon, and cloves. Some alſo apply the word to divers other medicinal drugs brought from the Eaſt; as ſenna, caſſia, frankincenſe, &c. See each under its proper article.

Spice, *All*. See Pimento.

Spice-*Wood*, in *Botany*, a ſpecies of *Laurus;* which ſee.

Spices, *Garbler of*. See Garbler.

SPICHEROEG, in *Geography*, a ſmall iſland in the German ſea, near the coaſt of Frieſland. S. lat. 53° 43'. E. long. 7° 32'.

SPICULUM, in *Roman Antiquity*, a kind of weapon which ſome will have to be the ſame with the haſta, or ſparus.

SPIDER, in *Entomology*, is the trivial name by which the large genus Aranea is generally known: under that term we promiſed to give an account of the ſpecies in their alphabetical order; this, from a change in the plan, having been neglected, we ſhall take the opportunity which the word *ſpider* affords, of enumerating thoſe ſpecies in as brief a manner as the ſubject will allow. We ſhall, however, be under the neceſſity of giving in this place the generic character, which is as follows: Mouth with ſhort horny jaws, the lip rounded at the tip; two feelers, incurved, jointed and very ſharp at the end; thoſe of the male are clavate; they have no antennæ, generally eight eyes, but ſometimes only ſix. Eight legs; the abdomen is ovate, villous, furniſhed at the tip with textorial papillæ.

Much intereſting matter on the ſubject of ſpiders will be found in the article Aranea; here it may be obſerved, that in every ſtage of their exiſtence, theſe animals prey with the utmoſt ferocity upon all other inſects that they can overcome, and even upon one another: from the papillæ at the end of the abdomen, they throw out at pleaſure a number of fine threads, which they unite in various ways, for the purpoſe of entangling their prey. They every year caſt off their old ſkin, which is performed by ſuſpending themſelves in ſome ſolitary corner, and creeping out of it. The younger ones have the power of flight, and in the autumn mount in the air to a great height; to perform which, they probably aſcend ſome lofty eminence, and are wafted about by the winds, filling the atmoſphere with their fine threads. The ſpider is infeſted by the *ſphex* and *ichneumon;* which ſee reſpectively.

Gmelin has enumerated more than a hundred and twenty ſpecies of this genus, which are ſeparated into diſtinct ſections, according to the number and poſition of their eyes.

Species.

A. *Eyes placed* ∷∷

* Extensa. Abdomen long, ſilvery-greeniſh; legs longitudinally extended. This ſpecies is found chiefly in the woods of this country, and other parts of Europe. The head, thorax, and legs, are reddiſh; the abdomen is greeniſh down the back; the firſt pair of legs very long; the third very ſhort.

Pallens. Pale teſtaceous; mandibles ferruginous, with black claws. It inhabits the American iſlands.

Lobata. Abdomen ovate, lobed, white, with double brown lines at the tip. It inhabits the Cape of Good Hope.

Longimana. Ferruginous; abdomen long, cylindrical, brown. It inhabits Jamaica. The fore-legs very long, hence its ſpecific name; third pair very ſhort.

Regia. Villous, cinereous, with a yellow band on the front; the legs are ſpinous. It inhabits Tranquebar, and is large.

Virescens. Green, with a black cylindrical abdomen; the fore-legs very long. It inhabits Zealand.

CANCRIFORMIS. Abdomen globular, gibbous, with ſix ſpines round the margin. This is found in Jamaica.

VENATORIA. Gloſſy-black, with a blackiſh hairy abdomen. This is an American inſect, which ſpins a large cylindrical web under ground, which is covered with a lid; its bite is very painful, and frequently occaſions fever, and even delirium, which are however quickly removed by ſudorifics.

13-GUTTATA. Black; abdomen rounded, and ſpotted with red. This is an Italian inſect. Its bite is ſaid to be very pernicious; it preys on crickets, which it encompaſſes and entangles in a web.

* LATENS. Black; abdomen greyiſh, with a black interrupted dorſal line. It inhabits England, and ſecretes itſelf under a ſmall web on the under ſurface of the leaves of plants, and is a ſmall inſect.

SIGNATA. Greeniſh; ſides of the thorax black; abdomen with two black lines. It inhabits Kiel, in Germany.

MACTANS. Abdomen ovate, black, with a ſcarlet dorſal line. This is an American inſect. There is a variety whoſe abdomen is diſtinguiſhed with two pair of ſcarlet dots, and a tail.

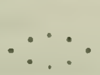
CICUREA. Pale red, with a cinereous ovate abdomen. This inhabits Germany, and is found in houſes.

BICORNIS. The inſects of this ſpecies are yellowiſh; the abdomen is depreſſed, with ſix impreſſed dots; the head is two-horned. It inhabits Tranquebar.

NIGRITA. Black; abdomen with two teſtaceous dots beneath. It inhabits Saxony, and is middle-ſized.

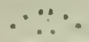
CORNUTA. Brown; abdomen oval, cylindrical, above yellowiſh-white, with four pair of impreſſed dots and four parallel grey lines behind. This is found in America. It is about the ſize of a man's finger; the legs are long; the thorax truncate on each ſide, and ending in two ſmall horns behind.

B. *Eyes placed*



* GLOBOSA. Black; abdomen globular, with crimſon ſides. It is found in the woods of England and other European countries. The body is very ſmall: the abdomen with an interrupted white band in the middle; the legs are black; the hind ones are the longer.

C. *Eyes placed*



HORRIDA. Abdomen nearly triangular, the tip truncate and obtuſe, the four front legs are the longer. It inhabits Germany, under the leaves of plants, and has a retrograde motion; it is of a ſingular formation.

MAXILLOSA. Ferruginous, with a greeniſh abdomen; the legs are pale; the mandibles large and projecting. It inhabits the iſland of Santa Cruz.

SMARAGDULA. Green; abdomen paler, with a green dorſal line at the baſe. It inhabits France.

LATRO. Thorax villous, cinereous; abdomen acute, black, with ferruginous ſpots. It inhabits America.

* VIATICA. Brown, with a roundiſh flat obtuſe abdomen; four hind-legs very ſhort. It inhabits Europe, in gardens and meadows, and is ſmall.

* DOMESTICA. Abdomen ovate, brown, with five black and nearly contiguous ſpots, the anterior ones larger. It inhabits Europe, is very common in houſes and about windows; it preys chiefly on flies.

DORSATA. Green; abdomen brown on the back. It inhabits Kiel.

TESTACEA. This is teſtaceous; the abdomen is ſubglobular, dull greeniſh. It is found in divers of the South American iſlands.

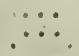
* TRILINEATA. Abdomen ovate, whitiſh, with three longitudinal lines of blackiſh dots.

IMPRESSA. Black; abdomen ovate, with ſix impreſſed dots, and two yellow dots beneath. It inhabits Norway, on rocks.

* LÆVIPES. Abdomen rhomboid, depreſſed, and ſpotted with black; the legs are extended and variegated. It is found on walls in this country, and other parts of Europe.

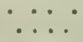
TRICUSPIDATA. Greeniſh; abdomen white, with a reddiſh tail. It inhabits Saxony. Head, thorax, and legs, greeniſh; eyes, eſpecially the latter ones, elevated.

D. *Eyes placed*



ARGENTATA. Abdomen white, and brown behind; the margin ſix-toothed. It inhabits America and the Eaſt Indies. Thorax ſilvery, the margin of the abdomen is armed with three ſtrong ſpines on each ſide.

E. *Eyes placed*



FASCIATA. Silvery; abdomen with a yellowiſh band; legs annulate with brown. It inhabits Madeira.

* ANGULATA. Abdomen ovate, the ſides angular and acute on the fore-part; the thorax has an excavated centre. It inhabits our own country, and divers other parts of Europe, in trees, and ſpins a web, which is perpendicular in its poſition, and which varies very much in colour.

* DIADEMA. Reddiſh-brown; abdomen gibbous, and marked with white drop-ſhaped ſpots in the form of a croſs. This is found in our own country in trees, and is reckoned a very beautiful inſect. The body varies much in colour from a darker to a lighter reddiſh-brown; the legs are annulate with brown.

MARMOREA. Brown; abdomen ovate, varied with white and brown; found chiefly on the European continent. Spins its web on the ground; the legs are yellow, annulate with brown.

RETICULATA. Abdomen globular, reticulate, above purpliſh, clouded with brown, found chiefly in the gardens in Europe.

* CUCURBITINA. Abdomen ſubglobular, yellow, with a few black dots. It belongs to this and other European countries, is found in trees, and ſpins a lax web.

CALYCINA. Abdomen globular, pale yellowiſh. This is an European inſect, and is found in the calyces of flowers from which the coral has fallen, and faſtens on bees and flies that come to extract the nectar.

8-PUNCTATA. Abdomen roundiſh, yellow, with four black raiſed dots on each ſide; tail rufous. It inhabits Sweden, and is thought by ſome writers not to belong to this diviſion.

BI-PUNCTATA. Abdomen globular, black, with two hollow dots. It is found chiefly in windows in European countries.

RIPARIA. Abdomen ovate, black-bronze; tail pale yellow, and two-horned. It inhabits Sweden, on gravelly ſhores.

* QUADRATA. Abdomen ſubglobular, yellowiſh-rufous, with a white line at the baſe and four ſpots. It inhabits the woods of Europe. It is ſomewhat leſs than the diadema, and perhaps only a variety of it.

LITURATA. Teſtaceous; abdomen pale black, with a white margin and marks. Inhabits France.

QUADRI-PUNCTATA. Abdomen oblong; the back black and flat, with four excavated dots. It inhabits Europe, in houſes.

Militaris. Black; with four ſpines, the hind ones longer and ſpreading. This is an American inſect, as are the three following.

Spinosa. Back with eight ſpines, the two hind ones ſpreading; abdomen beneath conic. The body is brown, and of a triangular ſhape.

Aculeata. Back with ſix ſpines, the hind ones ſpreading.

Tetracantha. Abdomen globular, with four ſpines round the margin. The head and thorax are ferruginous; abdomen with impreſſed dots at the baſe.

Hexacantha. Abdomen tranſverſe, with ſix ſpines round the abdomen. This inhabits Jamaica, and is ſuppoſed to be the ſame, or at moſt a variety of the cancriformis.

Fornicata. Sides of the abdomen a little vaulted, with two ſpines, the poſterior one longer. It is found in New Holland. A ſpecimen exiſts in the muſeum of ſir Joſeph Banks.

* **Labariuthica.** Abdomen ovate, brown, with a whitiſh pinnate line. It ſpins an horizontal web on the ground, with a cylindrical cavity.

Quadri-lineata. Abdomen roundiſh, yellow, with a purpliſh line on each ſide, and four dots. It inhabits Sweden. It is hyaline, with a yellow front.

* **Rediusita.** Abdomen oval, pale yellow, with a crimſon oval crown or ring on the back. It is found in gardens. The legs are long, white, and tranſparent.

Corollata. Abdomen oval, black, with a white oval ring on the back. It inhabits Europe, on plants.

* **Montana.** Abdomen oval, white, with grey ſpots. It inhabits Europe, on trees. The thorax and legs are pale; the fore-legs are long and extended.

Sanguinolenta. Abdomen ovate and ſcarlet, with a longitudinal black line. It inhabits Spain.

Nigra. Abdomen ovate, and ſcarlet above. This is an inhabitant of Calabria.

Notata. Abdomen ovate, brown, with white tranſverſe curved lines. Found in divers parts of Europe, as are the three following.

Rufipes. Abdomen brown; legs rufous. Found chiefly on nettles.

Nocturna. Abdomen black, with two white dots, and a white lunule at the baſe.

Sex-punctata. Abdomen oblong, with three pair of excavated dots.

Palustris. Thorax and abdomen with a ſnowy line on each ſide. Found in the reedy marſhes of Germany. The tip of the thorax before the eyes ends in a white line.

* **Aquatica.** Brown; abdomen ovate, cinereous; the back brown, with two impreſſed dots. This is found in our own and other European countries, in freſh-water lakes, where it dives to the bottom in ſearch of food, within a globule of air formed by itſelf. It takes up its winter quarters in a forſaken ſhell, the aperture of which it cloſes up with a web. Its jaws are large, ſtrong, black, with ſcarlet nails.

Obscura. Abdomen ſubconic, duſky, with a whitiſh dorſal line. It inhabits France, in woods, as does the next.

Scalaris. Thorax teſtaceous; abdomen ſnowy on the back, with an oblong indented ſnowy ſpot at the tip.

Trigutta. Yellowiſh; abdomen black, with three white ſpots. Found in Alſace.

Scorpiformis. Black; abdomen whitiſh, with two black lines; fore-legs very long. Found in gardens at Leipſic. It is ſmall and retrograde.

* **Carnifex.** Ferruginous; abdomen grey, with a dorſal line. It inhabits England.

Flavissima. Abdomen oblong, of a fine rich yellow colour, and ſmooth. Found in Egypt.

Bimaculata. Abdomen roundiſh, cheſnut-brown colour, with two white dots. It inhabits Europe, and is leſs than a flea.

Truncorum. Black, with white dots on the back. It ſprings to a great diſtance on its prey. It is an European inſect, and found on walls and the trunks of trees.

Rupestris. Abdomen with a black ſpot, edged with red, and white in the middle. It ſprings on its prey, and is found chiefly on old walls.

Virescens. Abdomen oblong, yellow-green, with lateral white lines.

Spinipes. Pale, with ſpinous legs. A variety has ſpinous legs, with ferruginous joints. Found in divers parts of Europe.

Opilionoides. Grey, with very long and extremely ſlender legs. It inhabits Germany and France; ſpins a very lax irregular web, the threads croſſing each other; and is gregarious.

Osbeckii. Pale yellow; abdomen with impreſſed dots in pairs, with an odd one; the fore-legs are longer. It inhabits Auſtria, as does the next.

Wilkii. Varied with black and grey; legs cinereous, annulate with black; the hinder ones are ſhorter.

Speciosa. Thorax grey, with two brown ſpots; the abdomen is oval-oblong, with tranſverſe black curves; beneath it is reticulate with black, with two yellow bands. It inhabits Calabria and Siberia, and is domeſticated in the houſes of the Coſſacks. It is a very beautiful ſpecies.

F. *Eyes placed* : : . . . .

Clavipes. Abdomen oblong, yellow, dotted with white; all the ſhanks, except the third pair, clavate and hairy. It inhabits South America, in trees and out-houſes; ſpins a ſtrong ſpreading web, and is a beautiful ſpecies.

* **Saccata.** Abdomen ovate, ruſty-brown. This is found in gardens, and it carries its bag of eggs behind it.

Fumigata. Abdomen ovate, brown, with two white dots at the baſe. This is found in Sweden. It lives in meadows, and watches before the neſts of larvæ, which it catches as they come out, one after another, and ſucks out their vitals.

G. *Eyes placed* : . . . :

Fimbriata. Black; abdomen oblong, with a white line on each ſide. It is found in many parts of the continent of Europe, in reedy marſhes.

* **Dorsalis.** Black; thorax compreſſed, with a white dorſal line. It is common in England. The abdomen is ovate, whitiſh at the baſe; the legs are livid.

Sanguinolenta. Black; abdomen red, with a black dorſal line. It is found in divers parts of Europe, and ſprings on its prey.

Pupillata. Teſtaceous; abdomen brown on the back, with ſubocellar fulvous ſpots. It inhabits China.

* **Scenica.** Black; abdomen ſubcylindrical, with three ſemicircular white lines on each ſide. It ſprings on its prey. It inhabits this and other countries of Europe, on old walls and windows. The body is covered with ſilvery hair; the legs are ſhort, hairy, black and white.

Fulvata. Black; hind margin of the thorax fulvous; abdomen with three fulvous bands. It inhabits Cayenne.

Pubescens. Abdomen ovate, brown, with four cinereous ſpots, the hind ones larger. It inhabits Leipſic.

Cinerea. Cinereous; abdomen brown on the back, with eight cinereous dots. It is found on the ſhores of the Baltic.

Trilienata. Brown; thorax with a paler margin, and lateral dorſal line; abdomen ovate, cinereous; beneath brown. It inhabits Naples.

Tarantula. Abdomen with triangular black ſpots on the back; the legs are ſpotted with black. This is found in the ſouthern parts of Europe, but chiefly in Italy, and likewiſe in Barbary, in cool caverns, and is the inſect whoſe bite was long ſuppoſed to be curable by muſic only. It is generally admitted to be partially poiſonous, but never fatal. See Tarantula.

H. *Eyes placed* ˙ ˙ . : : .

Avicularia. Thorax orbicular, convex, with a tranſverſe central excavation. Found among trees in South America, where it preys upon larger inſects, and even upon ſmall birds, dropping into their neſts, and ſucking their blood and eggs. It is ſaid to be of ſo enormous a ſize, that its fangs are equal to the talons of a hawk; and its eyes are capable of being ſet in the manner of glaſſes, and uſed as microſcopes.

I. *Eyes placed* . . : : . .

Pulchra. Oval-oblong; thorax villous, white; abdomen and legs black, with yellow bands. It inhabits Helvetia.

K. *Eyes placed* : : : :

Goezii. Black; abdomen ovate; front white. It ſprings on its prey, and is uſually found in the woods of Vienna. The abdomen is marked with two impreſſed dots.

L. *Eyes placed* : : . . . .

Truncata. Grey, ferruginous, ſlightly clouded; thorax globular, and ſlightly heart-ſhaped; the abdomen is ſomething triangular, and marked with an obſolete longitudinal croſs. It is found in Germany, on oak and other trees.

M. *Eyes placed* ˙ ˙ ˙ : . . . :

Conica. Abdomen ovate, obſcurely conic behind, varied with brown and whitiſh, and black beneath. This, like the laſt, is found in the woods of Germany, and ſpins a labyrinthical web.

N. *Eyes placed* : · · · · · .

Albifrons. Hairy; body ovate, and variegated with black and cheſnut-brown. It inhabits Luſace.

O. *Eyes placed* ˙ ˙ ˙ ˙ . .

Taurus. Abdomen flat, with two very long curved ſpines. Found chiefly at St. Domingo.

Arcuata. Brown; abdomen with ſix ſpines, the middle ones curved, and ſix times as long as the body. This is found in the Eaſt Indies, and is a ſmall inſect.

Maculata. Thorax ſilvery; abdomen cylindrical; legs very long and black. It inhabits China.

Pilipes. Brown; abdomen cylindrical, with ſilvery lines; legs very long and hairy. It inhabits the Eaſt Indies, and is a large inſect.

Myopa. Greeniſh; abdomen red on the back, with a few black dots; the ſides are yellowiſh. It inhabits Kiel. This is a beautiful inſect; the mandibles are tipt with black; the thorax with two darker lines; abdomen ovate, pubeſcent; textorial papillæ tipt with black; legs long, pale greeniſh; the fore-ſhanks tipt with black.

Longipes. Black; abdomen cylindrical, brown, with ſix impreſſed dots; the legs are very long. It inhabits Auſtralaſia.

Rufipes. Ferruginous; abdomen ovate, pale cinereous; legs rufous. It inhabits Morocco.

* Senoculata. Abdomen greeniſh, with black dots, and a yellow line on the ſides. It is found in gardens and on walls.

Scopulorum. Abdomen brown, with a pinnate white dorſal line. It inhabits Norway, and is found on rocks.

Lusea. Pale; abdomen ſilvery, with black branched lines. It inhabits Tranquebar.

Parallela. Brown; ſides of the thorax and abdomen white; mandibles projecting and parallel. It inhabits the American iſlands.

Scrofa. Hairy, brown; abdomen ſemiorbicular; mandibles black, exſerted, and hooked at the tips. It inhabits under ground at Chili, and is about the ſize of a pigeon's egg.

Bicornis. Abdomen two-horned. It inhabits Siberia.

Caspia. Thorax ſubglobular; abdomen oblong, varied with yellow and black bands. This ſpecies inhabits the deſerts of Ural, and is regarded by the Calmucks as venomous.

Argentea. Thorax orbicular, depreſſed, white, with two black fillets; abdomen is ovate, lobed, ſilvery, with two pair of dots in the middle, and four rows behind. It inhabits the deſerts of Ural, and is accounted poiſonous by the Calmucks. It ſpins a perpendicular web.

P. *Number and Poſition of the Eyes unknown.*

Nobilis. Thorax orange, with ſix black ſpots; abdomen yellow, with ſeven black ſpots. It inhabits Sumatra.

Calceata. Hairy, grey; legs with two black ſpots at the tip above; beneath ſilky, with a green gloſs. It inhabits Guinea, and is a very large inſect.

* Holosericea. Abdomen ovate-oblong, ſilky, livid brown, with two yellow tubercles beneath.

Spinimobilis. Abdomen roundiſh, yellowiſh-brown, with four rows of blackiſh dots; thighs with black moveable ſpines. This is found at Surinam.

Cruentata. Black, with a yellow band at the baſe of the abdomen; the breaſt is of a deep red. It inhabits Brazil.

Sex-cuspidata. Brown; back of the thorax ſix-toothed, with a lateral fulvous ſpot. It inhabits the Cape of Good Hope.

Hirtipes. Black; feelers and legs hairy, and pale teſtaceous. It inhabits Cayenne.

Tribulus. Head three-toothed on the fore-part, abdomen covered with numerous ſpines. It inhabits the Cape of Good Hope.

Elegans. Black, with two white curves on the fore-part of the thorax, and a white dorſal line on the abdomen. This is an American inſect.

Ocellata. Pale; abdomen clouded, with a black ring; the thighs are marked with three doubled ocellate ſpots. It inhabits China, and is the ſize of the tarantula.

Alba. White; abdomen with five impreſſed dots; two-horned and depreſſed at the baſe, and globular at the tip. It inhabits Siberia, under the bark of trees.

The eggs of ſome ſpiders are a very pleaſing microſcopic object; they are round at one end, and flattiſh at the other, with a depreſſion in the centre of the flattiſh end, and a yellowiſh circle round it. The colour of theſe eggs is a pearly or blueiſh-white, and when the young ſpiders hatch, they come out in their perfect form, and run about very nimbly.

The female ſpider depoſits her eggs, to the number of five or ſix hundred, in a bag compoſed of her own web, which ſhe either carries under her belly, or hides in ſome very ſafe receſs. Philoſ. Tranſ. N° 272.

The young ſpiders are always very beautiful objects for the microſcope. The current of the blood may be eaſily diſcovered in their legs, and part of their bodies; and many other curious particulars occur in their diſſection. There are two or three ſpecies of this animal particularly worthy the attention of the curious in microſcopic diſcoveries. 1. A little white field ſpider with ſhort legs. This is found plentifully among new hay, and its body appears like white amber with black knobs, out of which grow ſhort but ſharp prickles. The eyes of theſe may be very diſtinctly ſeen, being very briſk and lively, and ſome have ſix, ſome eight of them; each eye has a pupil of a violet blue, which is beautifully clear and tranſparent, and is ſurrounded by a circle of pale yellow. 2. The wandering, or hunting ſpider, that ſpins no webs, but runs and leaps by fits. This has two tufts of feathers fixed to its fore-paws, which make a very beautiful appearance before the microſcope. The variety and beauty of colouring alſo, all over this little creature, afford a very pleaſing ſight. 3. The *long-legs*, or ſhepherd ſpider. This is a moſt wonderful creature: it has two fore-claws at a great diſtance from the head, tipped with black, like thoſe of a crab, and opening and ſhutting like the ſcorpions; theſe are ſerrated or indented on their inſide. When all the legs are cut from this ſpider, and it is examined by the microſcope, it will be ſeen that the protuberance on the top of its back is furniſhed with two fine black eyes. Power's Microſ. Obſ. p. 13. Hook's Micrógr. p. 200.

The venom of many kinds of ſpiders is greater than uſually ſuppoſed: we have, in the Philoſophical Tranſactions, an account of a perſon in New England who was bitten by a ſmall ſpider a little above his ankle; he perceived the creature biting, and cruſhed it to death upon the wound, between his ſtocking and his leg; in half an hour he felt a pain in that leg, which in another half hour extended itſelf to the groin, and at the ſame time he had a creeping pain in the calf of his other leg; and in a quarter of an hour after this it affected his ſtomach, his back, and his head. The pains were not conſtant and fixed, but erratic, and very acute, and his pulſe was extremely low and heavy. He was relieved, by taking internally ſpirit and ſalt of hartſhorn in viper-wine, and applying a cataplaſm of garlic to the part, and in three or four days wholly recovered.

Boccone mentions a ſpecies of large ſpider, common in the iſland of Sardinia, whoſe bite proves mortal within the ſpace of a few hours; the whole body uſually ſwells almoſt immediately, in conſequence of this bite. The cure is performed by oil of olives, in which the creature is infuſed over the heat of a ſtove. This is a medicine they always keep ready in the houſe, and while they uſe this externally, they give large doſes of Venice treacle inwardly, diſſolved in ſtrong wine: but many die of this bite, either from the want of power in the remedies, or from their being uſed too late.

There is hardly any ſubject on which there has been a greater difference of opinion than the ſuppoſed poiſon of ſpiders. To the obſervations that occur in this article and alſo under Aranea, we ſhall here add ſome further remarks, with which we are furniſhed by Dr. Amoureux, jun. a late French writer. Our ſpiders in France, ſays this author, (in his "Notice des Inſectes de la France reputés venimeux,") are in general rather ugly than formidable. If any are ſuſpected of being poiſonous, it ought not to be the domeſtic ſpider with long claws, aranea phalangiodes, Linn., nor the mower of the fields, phalangium opilio, Linn., the only kinds of the phalangia mentioned by Geoffroy; nor the maſon ſpider, nor the orange-coloured ſpider, and that entirely white aranea viatica, and the aranea citrina, Linn., found commonly among vegetables or fruit, and chiefly grapes, nor many others, which we ſee daily, and of which we have no cauſe to complain. Swammerdam did not believe that the ſpider emitted through the ſtings or darts with which it pierces the animals whoſe blood it ſucks, a venomous liquor. Liſter, on the other hand, who ſays that he had certain proofs of ſpiders being venomous, expreſſed the poiſon from theſe inſtruments. Leuwenhoeck alſo advances, that the venom of the ſpiders is contained in the cavity of the ſharp pincers which proceed from the mouth of the inſect. Others have ſaid that theſe forceps are not hollow, but that the venom proceeds from a ſmall trunk which iſſues from the mouth at the moment when the inſect ſeizes its prey. (See Aranea.) Although it be a certain fact, that many ſpiders, and perhaps all of them, throw out from their mouth a certain liquor, with which they moiſten their prey, we may reſt aſſured, ſays Amoureux, that our ſpiders have nothing in them of a venomous nature; and this is proved by their being often touched without danger, and by their being eaten without injury. Redi ſaw people who ate ſpiders, and from the experiments which he made, he does not believe them to be poiſonous. Clark and Roeſel maintain, that ſpiders are not ſo venomous as is ſuppoſed, ſince many perſons ſwallowed them. A perſon is mentioned, who ate all he could find, and who found them to be purgative. He ſpread them on a ſlice of bread, as if they had been excellent marmalade. Moreover, it is maintained, in oppoſition to the popular error, that the ſpider is not able, by its pricking, to kill the toad. It is alſo well known, that chickens, nightingales, and other birds, eat ſpiders without injury; and they have been preſcribed as a remedy chiefly in the tympanis. Liſter, whoſe obſervations on theſe inſects have been numerous, ſays poſitively, that ſeveral ſpiders have a venomous liquor: but the honorable Mr. R. Boyle aſſures us, that he never ſaw any venomous ſpiders in Ireland. Upon the whole, it is obſerved, the different effects of ſpiders are owing partly to a difference in the ſpiders on which experiments have been made, and the different conſtitution of the ſubjects. In ordinary caſes of being bitten or punctured by ſpiders, it will be ſufficient to waſh the wounded part with brine, to apply theriaca, and to preſcribe one or two doſes internally. The freſh leaves of ſage, or thoſe of plantain, have been recommended as topics, and waſhing with vinegar. Recourſe may alſo be had to volatile alkali.

Some think the white matter we often find floating in the air towards the end of ſummer, is produced by ſpiders. See *Air*-Threads.

Spider, *Red*. See Acarus.

The red ſpider is very injurious and deſtructive to different ſorts of plants and fruit-trees, eſpecially in forcing-houſes. It is found particularly ſo to thoſe of the forced French bean, melon, peach, vine, cherry, currant, and ſome other kinds. The generation and production of this inſect are greatly cauſed and promoted by the dry warm heat that is conſtantly kept up in the houſes which contain theſe ſorts of plants and trees, and there are many other circumſtances which combine in bringing it forth. It is an inſect which has no wings, and the female is oviparous.

Several different methods have been attempted in order to the removal and deſtruction of it. Conſtant daily watering, or waſhing the trees, are ſaid to have the power of ſubduing it, but in the execution of the work, care is always to be taken that every part of the leaves be wetted, otherwiſe the inſects ſhelter and ſave themſelves in the dry parts, and are preſerved from the effects of the water.

Moiſture conveyed in ſome way or other is certainly found to be the moſt deſtructive, of any thing yet diſcovered, of theſe pernicious inſects, as well as many others that infeſt hot-houſes. Throwing weak lime-water in a plentiful manner on the under ſides of the leaves, where theſe inſects are commonly found, will, for the moſt part, ſoon deſtroy them.

The following directions have been given for the deſtruction of this ſort of ſpider, when it becomes injurious to melon plants; and the ſame may probably be found uſeful for thoſe of the forced French bean, and ſome other ſimilar kinds.

In caſes of dry weather, and with a dry heat, melon plants are very ſubject to be infeſted with the red ſpider; and the appearances of it may conſtantly be long noticed before the inſects can be ſeen with the naked eye, by the leaves beginning to curl and crack in their middle parts. Whenever they are diſcovered to be in this ſtate or condition, and there is fine warm ſunny weather, the watering of them all over the leaves, both on the under and upper ſides, is adviſed; a watering-pot, with a roſe finely perforated with holes, or a garden-engine, which diſperſes the water in a fine dew-like manner, being employed for the purpoſe. The work ſhould be performed about ſix o'clock in the morning, and the plants be ſhaded with mats about eight, if the ſun ſhine with much power, ſhutting the frames down cloſely until about eleven; and then admitting a ſmall quantity of freſh air, letting the mats remain until about three in the afternoon, when they ſhould be wholly taken away. The ſhade which is thus afforded by the mats prevents the leaves of the plants from being ſcorched or otherwiſe injured by the action of the heat of the ſun while they are in a wet cooled down ſtate. Where a ſoutherly breeze prevails, watering them again about three in the afternoon is recommended, ſhutting them up cloſe as before, to keep the heat in, which cauſes a ſtrong exhalation of the moiſture, and is greatly deſtructive of the ſpiders.

In all theſe waterings, the water is to be thrown as much and as finely as poſſible on the under ſides of the leaves, where the inſects moſtly lodge; the vines or ſtems of the plants being gently turned in that intention, taking great care not to injure them, by which means the water is capable of being eaſily thrown over the whole of the under ſides of the leaves, it being done in a gentle manner, in the modes already ſuggeſted, ſo as not to waſh up the mouldy matters on to the plants: the lights and ſides of the frames which contain the plants, ſhould alſo, at the ſame time, have water plentifully thrown on and againſt them. When theſe waterings are finiſhed, the vines or ſtems of the plants are to be carefully laid down again in their former poſitions. And if the day be ſunny, the mats may be let remain, as already directed, until the leaves of the plants become perfectly dry, air being admitted according to the heat that may be preſent at the time. It is likewiſe further adviſed as a precautionary meaſure, that, before the frames and lights, which are to contain plants of this ſort, are employed, they ſhould be well waſhed, both inſide and out, firſt with clean water, and then with a mixture of ſoap-ſuds and urine; a bruſh or woollen rag being made uſe of in the operation; as by this method the ova or eggs of the ſpiders or other inſects that may have been depoſited and lodged in or on them, in the preceding ſeaſon, may be cleared away and deſtroyed. The exhalations of the water which has been thrown upon the plants, and the frames or boxes that contain them, may alſo be uſeful in killing theſe inſects, in other caſes by keeping them in a cloſe ſtate.

Theſe waſhings ſhould never, however, be performed in cold froſty periods or ſeaſons; and the water made uſe of in ſuch caſes ſhould always be of the rain or ſoft kind.

The mould which has formerly been employed in raiſing theſe plants, where infeſted with the ſpider, ſhould not, on any account, be again had recourſe to for the ſame uſe, as it may contain the ova of theſe inſects. See CUCUMIS.

The waterings, waſhings, and other modes and means of removing and deſtroying this inſect, when it infeſts the fruit-trees and ſhrubs noticed above, are explained under the different proper heads. See AMYGDALUS, PRUNUS, RIBES, and VITIS.

The ſpecies of this genus of inſects are extremely numerous, being more than eighty. This ſort is very common on trees, eſpecially thoſe of the currant kind, being frequently ſeen running on the fruit of it. See ACARUS.

This inſect is injurious and deſtructive to plants and trees, and the production of their fruits, by feeding on their juices; as the ſtems and leaves of them are not unfrequently completely robbed and exhauſted of their moiſture in this way.

SPIDER'*s Silk*. See SILK, and ARANEA.

SPIDER'*s Web*. See WEB.

SPIDER-*Shell*, a name given to ſome ſpecies of the murex.

SPIDER-*Wort*, in *Botany*. See ANTHERICUM.

SPIEGELBERG, in *Geography*, a town and citadel of Weſtphalia, giving name to a ſmall county in the principality of Calenberg; 21 miles S.W. of Hanover.

SPIEI, in the *Glaſs Trade*, an iron inſtrument, hooked at the end, and pointed, with which the workmen take the metal up out of the melting-pots for proofs or aſſays, to ſee whether it be fit to work.

SPIELBERG, in *Geography*, a town of Germany, in the principality of Oettingen, inſulated in the margravate of Anſpach; 8 miles N.E. of Oettingen. N. lat. 49° 3′. E. long. 10° 13′.—Alſo, a town of Germany, in the principality of Culmbach; 3 miles E.S.E. of Kirch Lamitz.

SPIELMANNIA, in *Botany*, named in honour of Dr. John Reinhold Spielmann, profeſſor of medicine and botany at Straſburg, author of a *Prodromus Floræ Argentoratenſis*, and other tracts on botany and pharmacy.—"Medicus Act. Palat. v. 3. 196. t. 10." Schreb. 414. Willd. Sp. Pl. v. 3. 321. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 45. Juſſ. 109. Lamarck Illuſtr. t. 85.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Vitices*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, erect, ſhort, permanent, divided into five, linear-awl-ſhaped, acute, nearly equal ſegments. *Cor.* of one petal, ſalver-ſhaped; tube cylindrical, incurved, globular at the baſe, hairy withinſide, its mouth cloſed with hairs; limb nearly equal, cloven into five oblong, truncated, flat, widely ſpreading ſegments. *Stam.* Filaments four, very ſhort, in the tube of the corolla, two of them ſhorter; anthers oval. *Piſt.* Germen ſuperior, roundiſh; ſtyle ſhort, permanent; ſtigma hooked.

Peric. a globular, one-celled, ſucculent drupa. *Seed.* Nut globularly depreſſed, wrinkled, ſtriated and tuberculated longitudinally, two-celled. Kernels ſolitary, oblong, more gibbous outwardly, tuberculated and ſtriated longitudinally, each affixed to a fleſhy tunic, gibbous on one ſide, hollow on the other, adhering to the partition.

Eſſ. Ch. Calyx five-cleft. Limb five-cleft, its mouth cloſed with hairs. Stigma hooked. Drupa containing a two-celled, tuberculated nut.

1. S. *africana.* Ilex-leaved Spielmannia. Willd. n. 1. Ait. n. 1. (Lantana africana; Linn. Sp. Pl. 875. Jaſminum africanum, ilicis folio, flore ſolitario ex alis foliorum proveniente; Commel. Rar. 6.)—Native of the Cape of Good Hope.—It flowers from February to November.—*Stem* ſhrubby, five or ſix feet high, ſending out numerous irregular *branches.* *Leaves* oval, thin, embracing the ſtem, ſerrated, pointed, viſcid, fragrant; upper ones alternate. *Flowers* ſolitary, one from the boſom of each leaf, white, ſomewhat reſembling thoſe of Jeſſamine. *Fruit* globular, inſipid.

Adanſon long ago formed a new genus of this plant, which he called *Oſtia.*

SPIERINGS, N., in *Biography*, born at Antwerp in 1633, was a painter of landſcape, who formed his ſtyle on the ſtudy of the works of Salvator Roſa, and particularly remarkable as one of thoſe who produced a portion of the numberleſs pictures ſold as his all over Europe.

SPIETZ, in *Geography*, a town of Switzerland, in the canton of Bern, ſituated on the W. coaſt of the lake of Thun; 25 miles S.S.E. of Bern. N. lat. 46° 41′. E. long. 7° 33′.

SPIGELIA, in *Botany*, ſo called by Linnæus in commemoration of an old botaniſt, of conſiderable note, Adrian Spigelius, who was born at Bruſſels in 1578, and who died at Padua, where he was profeſſor of anatomy and ſurgery, in 1625. His work, entitled *Iſagoge in rem herbariam*, appeared at Padua in 1606, and another edition at Leyden in 1633. (See Spigelius.)—Linn. Gen. 84. Schreb. 110. Willd. Sp. Pl. v. 1. 824. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 317. Juſſ. 143. Purſh N. Amer. 123. Lamarck Illuſtr. t. 107.—Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Stellatæ* β, Linn. *Gentianæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply five-cleft, pointed, ſmall, permanent. *Cor.* of one petal, funnel-ſhaped; tube much longer than the calyx, narrowed towards the baſe; limb ſpreading, cloven into five broad, pointed ſegments. *Stam.* Filaments five, ſimple; anthers ſimple. *Piſt.* Germen ſuperior, compoſed of two globes; ſtyle ſolitary, awl-ſhaped, the length of the tube; ſtigma ſimple. *Peric.* Capſule two-lobed, of two cells and four valves. *Seeds* numerous, very minute.

Eſſ. Ch. Corolla funnel-ſhaped. Capſule of two globular cells, with many ſeeds.

1. S. *Anthelmia.* Annual Worm-graſs. Linn. Sp. Pl. 213. (Anthelmenthia quadriphylla; Brown Jam. 156. t. 37. f. 3.)—Stem herbaceous. Upper leaves in fours.—Native of the Weſt Indies and South America. It flowers in July.—*Root* annual, fibrous. *Stem* herbaceous, a foot and half high, channelled, branched. *Leaves* oppoſite, in pairs, thoſe which terminate the branches four together in the form of a croſs, ovate, pointed. *Flowers* in ſhort, herbaceous, cluſtered ſpikes, ranged on one ſide of the footſtalk.

2. S. *marilandica.* Perennial Worm-graſs. Willd. n. 2. "Hope Act. Edin. 1771, v. 3. 151. t. 1." Curt. Mag. t. 80. Woodv. Med. Bot. 288. t. 105.—Stem ſquare. Leaves all oppoſite.—Native of North America, on the edges of woods, in rich moiſt ſituations, flowering in July and Auguſt.—*Root* perennial, fibrous. *Stems* herbaceous, erect, ſix or eight inches high. *Leaves* oppoſite, ſeſſile, entire, ſmooth, ſpreading. *Flowers* large, and extremely handſome, in a terminal ſpike, all on one ſide of the footſtalk, of a bright red or rich ſcarlet on the outſide, yellow or orange-coloured within.

The Engliſh name of this genus, Worm-graſs, is derived from the peculiar efficacy of both the ſpecies as a medicine for perſons afflicted with worms. Dr. Brown, in his Hiſtory of Jamaica, ſays that no other ſimple is equally efficacious with *S. Anthelmia* for this purpoſe, and Mr. Purſh informs us that the roots of *S. marilandica* are in great eſtimation, and ſold under the name of *Pink-root.*

Spigelia, in *Gardening*, compriſes plants of the annual and perennial kind, the cultivated ſpecies of which are, the American worm-graſs (S. anthelmia), and the Maryland worm-graſs (S. marilandica).

Method of Culture.—The firſt ſort, which is annual, and not hardy in its nature, is increaſed by ſowing the ſeeds of it upon a hot-bed, or in ſmall pots plunged into one, in the early ſpring ſeaſon, treating the young plants afterwards in the manner of thoſe of the tender annual ſort.

In the ſecond ſpecies, which is perennial, and ſomewhat hardy, as it does not ripen its ſeeds well in this climate, it muſt be propagated by parting the roots in the autumnal or ſpring months, and putting them in ſeparate pots, or placing them out in warm ſituations.

The latter kind of theſe plants, which have the outſides of their flowers of a bright red colour, and the inſides of a deep orange caſt, produce a fine ornamental effect, as they make an elegant and beautiful appearance during the ſummer months, when placed in collections with others.

Spigelia, in the *Materia Medica*, the root of the ſpigelia marilandica, or worm-graſs root, imparts its bitter taſte to boiling water. It is purgative and anthelmintic; the latter property having been diſcovered by the Cherokee Indians, who call it "Unſtretta," and many opportunities having occurred in this country, as well as America, for evincing its efficacy in worm caſes. In the recent ſtate, and adminiſtered in ſmall doſes, it occaſionally produces giddineſs, dimneſs of ſight, and even convulſions; and theſe effects are aſcribed to its narcotic principle, the action of which its powerful cathartic property prevents, when the doſe is large. It is uſual to adminiſter an emetic previous to the uſe of it; and to aſſiſt its purgative operation by adding two or three grains of calomel, or eight or ten of rhubarb. Its power in expelling lumbrici has been moſt perceptible; and in vinous infuſions of it, it is ſaid to have been beneficial in intermittents. Dr. Barton alſo recommends it in the protracted remitting fever of infants, which often lays the foundation of hydrocephalus. This root may be adminiſtered either in ſubſtance, or in the form of aqueous infuſion. The doſe of the pulverized root may be from grs. x to ʒj, given every night and morning till the worms are expelled. Woodville. Thomſon.

SPIGELIUS, (or Vanden Spieghel,) Adrian, in *Biography*, an eminent phyſician, was born at Bruſſels in 1578. He ſtudied philoſophy and medicine firſt at Louvain, and afterwards at Padua, where he received the degree of M.D. He became thoroughly ſkilled in every branch of his profeſſion, and particularly in anatomy and ſurgery; and after travelling for ſome time to the different ſchools of Germany, he ſettled in Moravia, where he was ſoon appointed phyſician to the ſtates of the province. He had there attained to the higheſt reputation, when he was invited, in 1616, by the ſenate of Venice, to occupy the principal profeſſorſhip of anatomy and ſurgery in the univerſity of Padua, which had become vacant by the death of Caſſerius. He accepted the appointment, and acquitted himſelf with ſo much ſucceſs, that he contributed to render the ſchools of Padua more flouriſhing than they had ever been; and the ſenate recompenſed his ſervices by creating him a knight of St. Mark, and preſenting him with a collar of gold. The apparent vigour of his conſtitution, his vivacity of diſpoſition, and his years, promiſed a continuance of life, and an increaſing reputation; but he was cut off at the age of 47, in April 1625; according to one account, in conſequence of a puncture of his finger by a piece of glaſs, at the marriage-feaſt of his daughter, which was followed by a ſuppurating tumour in the axilla; but according to another, in conſequence of an attack of ſlow fever, brought on by his indefatigable exertions in the performance of his duties. His writings evince that he was a man poſſeſſed of very extenſive medical knowledge. The firſt work which he publiſhed was entitled "Iſagoges in Rem Herbariam Libri duo," printed at Padua in 1606. This work, though not very ſyſtematic, contains ſome intereſting matter. It treats copiouſly on the virtues of plants, reſpecting which he is ſaid to have learned much from the Italian peaſantry, in a tour which he made in the dreſs of a ruſtic. He publiſhed alſo "De Lumbrico lato Liber, cum notis et ejuſdem Lumbrici icone," to which was ſubjoined a letter "De incerto tempore Partûs," 1618. "De Semitertianâ Libri quatuor," Francf. 1624. But the moſt valuable of his writings are thoſe which he compoſed on anatomical ſubjects, and which were publiſhed after his death by his ſon-in-law, Crema. Theſe were entitled "De Humani Corporis Fabricâ Libri X, cum Tabulis 98 ære inciſis," 1625, folio; and "De formato Fœtu Liber ſingularis, æneis figuris ornatus;" to which was annexed "Tractatus de Arthritide," 1626, folio. The firſt of theſe, relating to the ſtructure of the human body, is one of the beſt anatomical works of the time, written with purity, and arranged with great perſpicuity and preciſion, and containing uſeful phyſiological and practical obſervations. There is an edition of this work publiſhed by Bucretius, 1627, who has been cenſured for intermixing his own obſervations with the text of the author. The whole works of Spigelius were collected by Vander Linden, and publiſhed in three volumes folio, at Amſterdam, in 1645. See Eloy Dict. Hiſt. de la Med. Gen. Biog.

SPIGNEL, in *Botany*. See ATHAMANTA.

SPIGNEL, *Meu*. See ÆTHUSA.

SPIGNEL, *Wild*. See SERMOUNTAIN and SESELI *Seed*.

SPIGNO, or SPINA, in *Geography*, a town of France, in the department of the Stura, late a marquiſate belonging to Piedmont, on the Belbo; 9 miles S.S.W. of Acqui.

SPIGOLA, in *Ichthyology*, a name given by Paulus Jovius, and ſome others, to that ſpecies of perch which is generally called the *lupus marinus*.

It is a genuine perch, and is diſtinguiſhed from the others by Artedi, by the name of the perch with thirteen rays in the ſecond back fin, and fourteen in the pinna ani.

Authors have called two different fiſh by this name *lupus marinus*, which, conveying no diſtinct idea of the characters of the fiſh, was applicable to one as much as the other: but this name of Artedi admits of no equivocation, and muſt always diſtinguiſh the fiſh.

SPIKE, in *Geography*, an iſland in the harbour of Cork, Ireland, which commands the entrance in ſuch a manner, that it has been regularly fortified at a great expence, and is one of the moſt complete and unaſſailable fortreſſes in his majeſty's dominions. The works, now (1815) nearly completed, have given employment to a great number of men for ſeveral years. Spike iſland is immediately oppoſite to the town of Cove, and about ten miles from Cork.

SPIKE, or *Oil of Spike*, a name given by our druggiſts to an eſſential oil, much uſed by the varniſh-makers and the painters in enamel; and of ſome uſe in medicine.

This oil, when genuine, is brought from Provenoe, and ſome other parts of France, and is there made of lavender. This plant is called in Provence *aſpic*, and thence came the name *oil of aſpic*, which afterwards degenerated into *oil of ſpike*. See LAVANDULA, and OIL.

The manner of making the oil upon the ſpot is this: when the flowers are perfectly ripe, they put them into an alembic with a great quantity of water, and this they diſtil: after ſeveral days' maceration, there ariſes with the water a large quantity of an oil of a fine pale amber colour, and this, ſeparated from the water, is the true and genuine oil of ſpike.

The flower of this plant is the part which yields the largeſt quantity of oil; as is the caſe with all the plants with galeated flowers, of which the huſk, or flower-cup, uſually contains almoſt all the oil of the plant. The aromatic plants, in general, yield indeed but a ſmall quantity of oil, but the vaſt abundance of this plant, in theſe places, makes the expence of gathering it ſo ſmall, that the oil is very cheap. The quantity required on ſeveral occaſions, is, however, much greater than what all the lavender of the country can yield; and the price it is expected to be ſold at is ſo ſmall, that it is not to be wondered that there are ſeveral common adulterations of it.

The moſt uſeful ways of ſophiſticating it, however, are two; the one with the ſpirit of wine, which is eſteemed the leaſt hurtful, and the oil thus ſophiſticated is often called the very beſt of the country. The method Mr. Geoffroy took to diſcover the cheat was this: he procured a long and narrow phial, of an equal diameter all the way up; into this he firſt put an ounce of fair water, and to this he added an ounce of the oil; he marked the height of the water in the phial, then ſhook the two liquors together, and they became milky, and heated on the mixture, which alone would have been a ſufficient proof that there was ſpirit of wine in the oil. After ſome ſtanding the liquor became clear, and the oil floated at the top, but in a much ſmaller quantity than might have been expected, there being not more than a quarter of an ounce of it, the reſt having been ſpirit of wine, which mixed with the water, and thus left all the true oil, which was only one-fourth of the quantity, to float alone on the water, which was greatly increaſed in height in the phial. A pint of this oil of ſpike, therefore, contains only four ounces of the genuine oil, and twelve ounces of plain ſpirit of wine.

The ſecond method of adulterating this oil, which the ſame gentleman had ſuſpected, was eaſily diſcovered next; for on mixing this quarter of an ounce of pure oil of ſpike with three quarters of an ounce of oil of turpentine, there was produced an ounce of liquor, which appeared wholly the ſame with the oil of ſpike commonly ſold in the druggiſts' ſhops. And indeed, much of what is uſually ſold is worſe than this, being no other than oil of turpentine ſcented with a ſmall quantity of true oil of ſpike.

The ready way of diſcovering the oil counterfeited with oil of turpentine, is to wet a paper in it, and ſet it on fire; the turpentine will here be diſcovered by the thick ſmoke it yields, it being, of all vegetable oils, that which yields much the thickeſt cloud in burning: and, on the contrary, that which has been adulterated with ſpirit of wine, will be diſtinguiſhed by the ſame trial, by its yielding a much finer and thinner ſmoke, and burning with a bright blue flame. If they be tried by firing them in a ſpoon, that which is adulterated with ſpirit of wine will burn very bright, and yield no fume at firſt; but as it grows near the bottom it will ſmoke a little, and finally will leave no reſiduum, except that it varniſhes over the inſide of the ſpoon: that adulterated with the oil of turpentine will burn more vehemently, ſmoke more, and leave a coarſer varniſh upon the ſpoon; and if it be of the coarſeſt kind, that is, if it hath been adulterated with badly rectified oil of turpentine, the fume will be the more abundant, and there will be left in the ſpoon a fetid matter, reſembling melted pitch.

Mr. Geoffroy tried whether, in the buſineſs of varniſhing, the oil of turpentine alone might not do as well as the oil of ſpike; he found that it dried perfectly well, but that it left a ſtinking ſmell upon the work, which never went off; whereas the mixture of this oil with that of ſpike, makes a ſmell like neither, and which ſoon goes off.

An ounce of oil of turpentine, with only twenty drops, either of our common oil of lavender, or the pure oil of ſpike, makes a liquor tolerably well ſcented, and which ſerves for the purpoſes of oil of ſpike. If two drachms of our oil of lavender be added to ſix drachms of ſpirit of wine, they immediately mix; and this, afterwards mixed in a ſmall proportion with oil of turpentine, makes a ſort of oil of ſpike.

The moſt regular method, however, that the artificer can uſe, if he can get the genuine oil of ſpike, is to mix one ounce of it with three ounces of oil of turpentine, which perfectly fits it for this purpoſe, and makes it the ſame with that in common uſe. The method of making this perfectly pure, is to rediſtil it in a balneum Mariæ; there will thus be procured an oil highly rectified, and pellucid as water, which will dry away as ſoon as touched on any thing. The great diſadvantage attending the oil of ſpike adulterated with ſpirit of wine is, that it will not readily mix with all the ſorts of varniſh.

Having gone through the properties of oil of ſpike, in regard to varniſh, it remains to inquire into them in regard to its other great uſe in enamel, and to conſider the effects of the two uſual methods of adulterating it in this work.

The oil of ſpike which wants body, is not at all fit for enamelling, becauſe it dries too ſuddenly, and does not at all aſſiſt the natural dryneſs of the enamel, which is only a ſort of powder of glaſs; and the particles of this powder, with a fluid of too little body, are not manageable by the artiſts, ſo that the colour never is brought to a due conſiſtence; and when the oil has too much body, the mixture becomes too tenacious, and is as unmanageable in that extreme as in the other; and this fault is attended with another very great miſchief, which is, that the fume raiſed by this oil, when heated, is often ſo groſs, as to deſtroy the beauty of the colours. In ſhort, thick oil of turpentine is always deſtructive of enamels by its ſmoke.

The true compoſition for enamelling is oil of ſpike mixed with ſpirit of wine, but the proportions muſt be nicely regulated from repeated trials: for if the quantity of the ſpirit be too large, it is apt to ſeparate itſelf from the oil and colour in the drying, and this always ſpoils the gloſs and beauty of the work. Artificers obſerve, that oil of ſpike does beſt for their purpoſes, after it has been kept two or three years. But this is only owing to the oil's being adulterated with ſpirit of wine, and uſually containing too large a proportion of the ſpirit when firſt ſent over: it becomes better for uſe when a part of that ſpirit has had time to evaporate in the keeping. It would be a better way for theſe curious works, to procure the oil pure, and then occaſionally mix it with ſuch a proportion of ſpirit of wine, as experience ſhews to be the moſt proper. Mem. Acad. Par. 1716.

Spike, *Lavender.* See Lavender.

Spike, *Winged, Graſs,* in *Botany.* See Stipa.

Spike, *Hand,* in *Mechanics.* See Hand-*Spike.*

Spike *a Gun,* in *Military Language, &c.,* ſignifies to choak up the touch-hole of a piece of ordnance, ſo as to render it uſeleſs. See Nail.

Spike-*Roller,* in *Agriculture,* a very uſeful implement of the roller kind, firſt introduced by Mr. Randall of York to the notice of the farmer. It has been found of much advantage in bringing ſtiff cloddy lands into a ſtate of ſuitable pulverization and fineneſs of mould for being ſown. It is likewiſe employed, in a beneficial manner, on ſward-land that is worn out and moſſy; by preparing it for the application of earthy compoſts and graſs-ſeeds. But it is remarked by the inventor, that in this buſineſs the roller muſt go up and down, till the ſwarth and ground are perfectly well broken up: this being done, the ſeeds of clover, trefoil, and rye-graſs, or any other mixed with them, muſt be ſown in the uſual way and quantity; then the compoſt muſt be ſpread over the ſeeds, ſo as to cover them; and a common barley-roller, with a thorn-buſh faſtened to it, muſt follow, and the ground be ſhut up, leſt the cattle ſhould do harm by treading.

In reſpect to this ſort of roller, the dimenſions in length were ſeven feet, the diameters at the ends eighteen inches, and the whole cylinder made of the heart of oak; and when the irons were burnt in, and the man ſeated on the box deſigned for that purpoſe, the weight of the whole was about a ton. But the blunt ends of the irons were oppoſed to the clods, and run more taper, till they came to the ſurface of the cylinder, into which the irons were burnt, and inſerted about three inches, which was their length above the ſurface of the roller, and which he always found very ſufficient to cruſh the hardeſt clod that ever came in their way. Had he, indeed, attempted to go on the ground, when the ſoil was not perfectly dry, this poſition of the irons would have carried the clods round with the roller; for it is not its province to ſqueeze, but cruſh. Nor indeed can a man do more harm to his ground than going upon it, when it is not quite dry, with a roller conſtructed in this way. He had the irons fixed in four inches aſunder, in the firſt row, from end to end. The ſecond row began juſt between the firſt and ſecond irons of the firſt row. The third row was like the firſt; and the fourth like the ſecond. Then alternately for the whole ſurface of the cylinder, as near as poſſible, the irons were four inches aſunder in each individual row; and four inches from row to row, as nearly as the ſuperficies of the cylinder would permit. He does not know how to convey a juſter idea of the ſhape of the irons than to call them ox-harrow teeth, or thoſe of a very large harrow; for when he ſent for the workman, he deſired him to make ſo many of this denomination, ſix inches in length, and burn the ſmall end three inches into the wood. This is a roller that requires a ſtrong team in performing its work.

But in addition to theſe uſes, it has been ſuggeſted that it may likewiſe be very uſeful in preparing clay for the making of canals, or pieces of water: for where, as ſometimes happens, the clay grows dry, and will not admit of being duly tempered for uſe, without great pains in breaking it, a very large quantity may very ſoon be reduced to the requiſite fineneſs, by ſpreading it on hard ground in a due thickneſs, and paſſing this roller a few times over it. In extenſive works, much trouble and labour may ſometimes be ſaved by this means, where ſuch a roller is at hand, and the clay prepared in a manner that will anſwer the purpoſe much more effectually.

It may alſo be noticed, that this is a ſort of tool which no farm, where the land is a ſtiff clay, or in the leaſt liable to clot, ſhould want: for beſides the conſtant advantage of ſaving labour, and bringing land to a better condition for any kind of ſowing than the plough and harrow, with any aſſiſtance of the work of hands, can make it; in favourable ſeaſons, and under certain circumſtances, the loſs of the whole crop, by an otherwiſe unavoidable delay beyond the ſeed-time, may be with certainty prevented.

It has been ſtated as an improvement in this implement, in order to prevent its tearing up the ground, and the great ſtreſs that is upon the frame in turning, to have it divided into two parts. Let the ends of each part be bound with narrow, but ſtrong, bands of iron, and let the ſpikes at the ends be placed cloſe to them; let each part have a ſeparate frame; but let the cheeks, in which the inward gudgeons turn, be made of iron plates, about two inches wide above, and four where the gudgeons enter; the thickneſs, a common flat bar of iron: and theſe fixed in any firm manner to two cheeks of wood, reaching down juſt to the bands, and of ſuch a thickneſs at bottom as not to interrupt the ſpikes. Let the inward gudgeons be made with quite flat heads, to prevent their ſlipping out in working, and bring the two ends of the roller nearer together, which is of conſequence, as the fewer clots will be miſſed in working.

Let the frames be joined together by four eyes, like thoſe of a ſmall gate, two at one end, about five or ſix inches apart; the two at the end of the other, to take place juſt within them; an iron pin being put through all four, and keyed. Let the thills be placed juſt on the middle of each frame, and a bar of wood juſt behind the horſe to ſtrengthen them; the bar ſawed through in the middle, and joined by a ſtrong flat hinge; one ſide made to haſp upon a ſtaple, kept down with a wooden clet. This gives the whole proper play in working.

The ſpikes are about four inches without, and three within the wood: the thickneſs of the roller and number of ſpikes may be determined, in ſome meaſure, by the nature of the ſoil it is to work upon. Thus formed, it will be found, it is ſaid, next to the plough, the moſt uſeful inſtrument in tillage, not only in reducing a ſtiff ſoil, but, with a buſh at its tail, to cover the ſeed, when ſown, much more effectually, and in a better manner, than a harrow, as it turns up the earth light and fine behind it; and, though ſeemingly unwieldy, will turn with eaſe, and may be worked with one, two, or three horſes at moſt, upon any land that is of a proper dryneſs to work upon.

This implement may likewiſe be employed to aſſiſt in reducing the half-burnt turf of burn-baked land, which requires much labour, as commonly done by hand; but by going over the land ſeveral times with the ſpike-roller, and harrowing it with heavy harrows alternately, to pull up the turfs, or ploughing them up, they may be reduced fine in a much ſhorter time, and at a much leſs expence, than by beating or breaking them by hand. The mode of conſtructing the tool, in the common manner, has been already ſhewn. See ROLLER.

Still more lately, a clod or improved roller of this kind has been conſtructed by Mr. Blithe Harries of Benthall-houſe, near Shiffnall, in which the danger of the horſes being injured in turning, by the ſpikes, is obviated. It is found very effectual on ſtrong ſoils, and well adapted for breaking and reducing clods, pulverizing old turf fallows, and preparing land previous to ſowing barley, and many other purpoſes. He deſcribes it in the Agricultural Magazine as conſiſting of twenty-one caſt-iron wheels, twenty-one inches and a half in diameter, the edges three inches aſunder; or a ſmaller pattern, conſiſting of fourteen wheels, twenty-three inches in diameter, the edges four inches and a half aſunder, faſtened upon an iron axle-tree, with a large wheel at each end to carry it to the field. It is further ſtated, that the invention is Mr. Gittin's, of the Iſle, Shropſhire, an ingenious farmer, who had one made at Mr. Onion's foundery, Broſeley; and Mr. Harris now makes them at his iron works, the price of which, in either of the patterns, is 10*l.*, excluſive of the row of ſpikes to clear dirt or ſtones, and the ſhafts.

In this ſtate it forms a ſort of cutting or bruiſing implement of the kind, and may be of very great utility in different caſes of ſtiff, cloddy, arable land, as well as in thoſe of the tough, unproductive, overrun ſward kind. It is capable of performing a good deal of work, in both theſe caſes, in a ſhort ſpace of time, and in the moſt effectual manner.

All implements of theſe kinds having great power and diſpatch, are conſequently capable of very general application in the buſineſs of tillage, as well as graſs huſbandry. They may be conſtructed in different cheap methods, and be made uſe of with much advantage in a variety of ſituations, where they are at preſent perhaps wholly, or in a great meaſure, unknown.

This implement is ſometimes called ſpiky-roller.

SPIKELET, in *Botany*, *Spicula*, is technically uſed for the aſſemblage of the florets of graſſes, within the calyx; and which conſiſts of two florets only in *Aira* and *Holcus*; of many in *Poa*, *Bromus*, &c.

SPIKENARD, *Baſtard French*. See NARDUS.

SPIKENARD, *Celtic*, a ſpecies of *Valerian*; which ſee.

SPIKENARD, *Falſe*. See LAVANDULA.

SPIKENARD, *Ploughman's*. See BACCHARIS.

SPIKENARD, *Ploughman's*, is alſo the name of a ſpecies of flea-bane, or *conyza*; which ſee.

SPIKENARD, *Nardus*, or *Spica Nardi*, in the *Materia Medica*, a kind of vegetable ſhoot growing even with the ground, and ſometimes, in part, within the ground, belonging to an Indian graſſy-leaved plant, of which we have no particular deſcription. The nard, as it is brought to us, is a congeries of ſmall, tough, reddiſh-brown fibres, forming a bunch, or ſpike, about the ſize of a finger.

The ſpica nardi is uſually reckoned in the number of roots. It is alſo called *nardus Indica*; becauſe brought from the Eaſt Indies.

It is now kept in the ſhops chiefly as an ingredient in the mithridate and theriaca, but was formerly employed in the ſame intention as the Celtic, and is ſaid to be uſed among the Orientals as a ſpice. It is moderately warm and pungent, accompanied with a flavour not diſagreeable. Lewis.

There is alſo another kind, called *ſpica Celtica*, a ſpecies of valerian, growing in the Alps, from whence the ſhops have been generally ſupplied with the dried roots, conſiſting of a number of blackiſh fibres. This root has been recommended as a ſtomachic, carminative, and diuretic: at preſent it is ſcarcely otherwiſe made uſe of, in this country, than as an ingredient in mithridate and theriaca, though its ſenſible qualities promiſe ſome conſiderable medicinal powers. It has a moderately ſtrong ſmell, of which it is very retentive, and a warm, bitteriſh, ſubacrid taſte, reſembling thoſe of common wild valerian. Lewis.

SPIKENARD, *Ointment of*. See NARDINUM *Unguentum*.

SPIKES, or, as the ſeamen call them, *ſpeeks*, in a *Ship*, are large long iron nails with flat heads. They are of divers lengths, ſome a foot or two long, and ſome are jagged, ſo that they cannot be drawn out again. They are uſed to faſten the planks and timber. See MARLING-*Spike*.

SPIKING *up the Ordnance*, a ſea-phraſe, uſed for faſtening a quoin with ſpikes to the deck, cloſe to the breech of the carriages of great guns, that they may keep cloſe and firm to the ſhip's ſides, and not get looſe when the ſhip rolls, and by that means endanger the breaking out of the butt-head of a plank. See QUOIN.

SPILAMBERTO, in *Geography*, a town of Italy, in the department of the Panaro; 8 miles S.E. of Modena.

SPILANTHUS, in *Botany*, originally called SPILANTHES by Jacquin, is derived from σπιλος, *a ſpot*, and ανθος, *a flower*, becauſe of its dotted or ſpeckled flowers.—Jacq. Amer. 214. Schreb. 543. Willd. Sp. Pl. v. 3. 1712. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 493. Juſſ. 187. Lamarck Dict. v. 7. 345. Illuſtr. t. 668. Gærtn. t. 167.—Claſs and order, *Syngeneſia Polygamia Æqualis*. Nat. Ord. *Compoſitæ Oppoſitifoliæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* nearly hemiſpherical, imbricated, with lanceolate, linear, compact ſcales, in a double row. *Cor.* compound, uniform, tubular, conically convex, the florets numerous, equal, all perfect, funnel-ſhaped, with a four or five-cleft, reflexed limb. *Stam.* Filaments four or five, capillary, very ſhort; anthers cylindrical, tubular. *Piſt.* Germen oblong, compreſſed; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, recurved. *Peric.* none, except the unchanged calyx. *Seeds* ſolitary, oblong; compreſſed, flattiſh. *Down* with a membranous margin, and two unequally-ſized awns at the tip. *Recept.* briſtly, conical, its ſcales compreſſed, deciduous.

Obſ. In *S. atriplicifolius* the ſeeds have no awns; and in *S. Acmella* and *uliginoſa* the radius is very ſmall, and compoſed of only three or five flowers.

Eſſ. Ch. Receptacle chaffy, conical. Down with two awns, one larger than the other. Calyx nearly equal.

1. S. *urens*. Biting Spilanthus. Willd. n. 1. Jacq. Amer. t. 126. f. 1.—Leaves lanceolate, entire. Stem proſtrate.—Native of ſandy fields in America, about Carthagena, flowering from May to October. *Root* perennial, fibrous. *Stems* herbaceous, round, ſmooth, procumbent, branched, fibrous at the joints. *Leaves* oppoſite, ſeſſile, ſmooth, ribbed. *Flowers* ſolitary, capitate, terminal, ſcentleſs, white, dotted with black.

The leaves of this ſpecies poſſeſs a hot, pungent flavour, reſembling the root of *Pyrethrum*, or Pellitory of Spain, for which they are occaſionally ſubſtituted.

2. S. *Pſeudo-Acmella*. Baſtard Acmella or Spear-leaved Spilanthus. Willd. n. 2. (Verbeſina Pſeudo-Acmella; Linn. Sp. Pl. 1270. Chryſanthemum mederaſpatanum latifolium, ſcabioſæ capitulis parvis; Pluk. Alm. 99. t. 159. f. 4.)—Leaves lanceolate, ſerrated. Stem erect.—Native of Ceylon, flowering in July. *Root* annual. *Stem* two feet high, round, branched, rather hairy. *Leaves* oppoſite, ſtalked, ovate, veined, the ſtalks channelled and ſlightly downy. *Flowers* ſolitary, yellow, on long, upright, naked ſtalks.

3. S. *Acmella*. Balm-leaved Spilanthus. Willd. n. 3. (Verbeſina Acmella; Linn. Sp. Pl. 1271. Abcdaria; Rumph. Amboin. v. 6. 145. t. 65.)—Leaves ovate, ſerrated. Stem erect. Flowers radiated.—Native of Ceylon, flowering from July to the end of ſummer. *Stems* about two feet high, much branched. *Leaves* like thoſe of the laſt ſpecies. *Flowers* ſolitary, radiated, yellow, on very long ſtalks. This plant is reputed to be a ſpecific for the ſtone in the Eaſt Indies. It differs chiefly from *Pſeudo-Acmella*, in being more branched, and in having radiated flowers.

4. S. *uliginoſa*. Boggy Spilanthus. Willd. n. 4. Swartz Prodr. 110. Ind. Occ. 1291.—Leaves ovato-lanceolate, notched. Stem erect, forked. Flowers radiated, terminal, ſtalked.—Native of the ſouth of Jamaica, in clayey, ſwampy ground, flowering in the ſpring. *Root* annual, long, ſimple, thread-ſhaped. *Stem* herbaceous, half a foot high, round, ſmooth, reddiſh. *Leaves* oppoſite, ſtalked, ſmooth. *Flowers* roundiſh at firſt, afterwards conical, yellow.

5. S. *exaſperata*. Rough or Warty Spilanthus. Willd. n. 5. Jacq. Ic. Rar. v. 3. t. 584. (S. radicans; Jacq. Collect. v. 3. 229.)—Leaves ovate, wavy. Stem forked, aſcending, rough with warts at the baſe. Calyx of five leaves.—Native of Venezuela, and flowering in ſtoves from July to January. *Root* branched, whitiſh. *Stem* nearly three feet in height, erect, ſomewhat hairy, rough towards the baſe, with ſharp, fleſhy warts. *Leaves* oppoſite, ſtalked, acute, ſlightly ſerrated, roughiſh. *Flowers* ſolitary, white, on downy ſtalks. *Seeds* black, fringed with white hairs.

6. S. *alba*. White-flowered Spilanthus. Willd. n. 6. L'Herit. Stirp. Nov. t. 4.—Leaves ovate, wavy; lower ones alternate. Stem branched, aſcending. Calyx of many leaves.—Native of Peru. It flowers in June and July. *Root* annual, fibrous, pungent, exciting ſaliva, whence Murray called this ſpecies *ſalivaria*. *Stem* herbaceous, wavy, upright, rugged, panicled. *Leaves* ſtalked, ſpreading, bluntiſh, hairy, fringed. *Flowers* terminal, ſolitary, conical, obtuſe, white.

7. S. *atriplicifolia*. Orache-leaved Spilanthus. Willd. n. 7. (Bidens atriplicifolius; Linn. Sp. Pl. 1168.)—Leaves alternate, deltoid, toothed, ſtalked, furniſhed with ſtipulas. Stem panicled.—Native of South America. *Stem* herbaceous, ſmooth. *Leaves* alternate, on ſlender ſtalks. *Stipulas* equal, kidney-ſhaped, like little ears. *Flowers* ſolitary, terminal. *Seeds* without awns, oblong.

8. S. *inſipida*. Taſteleſs or Mild Spilanthus. Willd. n. 8. Jacq. Amer. 215. t. 126. f. 2.—Leaves obovate, toothed, ſeſſile.—Native of America, and found by Jacquin at the Havanna, where it flowers in the winter. *Stems* ſhrubby, round, branched, procumbent. *Leaves* oppoſite, nearly ſeſſile, ſmooth, attenuated at the baſe. *Flowers* like thoſe of *urens*, and like that ſpecies the leaves of this have a ſalt or biting flavour, but in a milder degree, ſo that the ſpecific name is not extremely appropriate.

9. S. *oleracea*. Eſculent Spilanthus. Willd. n. 9. Jacq. Hort. Vind. v. 2. 63. t. 135.—Leaves ovate, heart-ſhaped, ſerrated. Stem branched, diffuſe.—Native of the Eaſt Indies, flowering at Kew from July to November. *Stems* a foot long, proſtrate, round, ſomewhat rugged. *Leaves* oppoſite, dark green above, yellowiſh or glaucous beneath. *Flowers* ſolitary, terminal, forming a ſort of cylinder, yellow. *Seeds* brown, fringed with white hairs.

10. S. *tinctoria*. Dyers' Spilanthus. Mart. Mill. Dict. n. 5. Loureir. Cochinch. 484.—Leaves lanceolate, ſerrated, ſmooth. Stem diffuſe. Flowers numerous, terminal.—Found on cultivated ground, in China and Cochinchina. *Stem* herbaceous, three feet high, rather procumbent, round. *Leaves* oppoſite, ſmooth, rather ſucculent, bright green. *Flowers* of a blueiſh-white hue. The leaves when bruiſed yield a fine blue colour, whence it is cultivated by the natives for dyeing. This is very cloſely allied to *S. Acmella*.

SPILBACH, in *Geography*, a town of Bavaria, in the territory of Rothenburg; 4 miles W.N.W. of Rothenburg.

SPILE, in *Ship-Building*, a plug made of fir to fill up holes, where nails have been driven, to prevent leaking, &c.

Spile, in *Rural Economy*, a piece of wood ſharpened at the point, and drove down into the ground, on the ſides of rivers, or other places, for the purpoſe of protecting their banks, or other parts, againſt the deſtructive violence of the waters. They ſhould be well proportioned for the purpoſe, and be very firmly driven down by proper machinery.

But in whatever way, or however firmly, ſpiles may be driven down into the ground, they never form a good or ſecure defence againſt the force of river-currents. The only method of completely effecting this is now well underſtood to be that of making the banks to ſhelve, or ſlope well backward from the rivers, and throwing the force of ſuch ſtreams in new, contrary, or other directions than thoſe to which they have been accuſtomed. In theſe ways much is not unfrequently accompliſhed, without any great deal of labour, trouble, or expence in any manner.

Spile is alſo a term provincially uſed to ſignify the vent-peg of a caſk.

SPILEMBERGO, in *Geography*, a town of Italy, in Friuli, on the Tajamento; 14 miles W. of Udina.

SPILINGS, in *Ship-Building*, the dimenſions taken from a rule-ſtaff, a mould's edge, or ſtraight line, to trim or fay one piece to another.

SPILKEVY, in *Geography*, a town of Norway, in the province of Drontheim; 88 miles S.W. of Romſdal.

SPILL, *To*, in *Sea-Language*, is to diſcharge the wind out of the cavity or belly of a ſail, when it is drawn up in the brails, in order to furl or reef it. This is performed either by collecting the ſail together, or by bracing its edge to the wind, ſo as to ſhiver or be laid aback. Falconer.

SPILLING-Lines, in a *Ship*, certain ropes fixed occaſionally to the main-ſail, and fore-ſail, in tempeſtuous weather, for raiſing or furling them more conveniently. They are paſſed through blocks above the yard, and thence leading down before the ſail, come under its bottom, and return upwards behind it to the yard, where they are faſtened; ſo that the ſail by this effort is cloſely and immoveably confined to the yard. Falconer.

SPILOMA, in *Botany*, ſo called by Acharius, from σπιλωμα, *a ſtain*, or *ſpot*, in alluſion to the appearance of the fructification.—Ach. Meth. 9. Lichenogr. 23. t. 1. f. 1. Syn. 1. Sm. Engl. Bot. v. 29. 2075.—Claſs and order, *Cryptogamia Algæ*. Nat. Ord. *Algæ*, *Lichenes*.

Eſſ. Ch. Receptacles ſhapeleſs, without a border, hairy and powdery, in an uninterrupted cruſt.

This minute and obſcure genus of the Lichen tribe has long been overlooked, or confounded with other things. The ſpecies, which are ſixteen in Acharius's recently publiſhed *Synopſis*, are found either on old wood, the bark of trees, or on rocks and walls. Thirteen are figured and deſcribed in Engl. Bot. v. 29—36. Some of theſe, as *S. Vitiligo*, t. 2075, looks to the naked eye like a little grey duſt, ſcattered over the pales on which it grows, and ſtaining the finger when touched. Others reſemble cruſtaceous Lichens, particularly *Lecideæ*; but are diſtinguiſhed by their black powder, which comes off with a touch; as *S. verſicolor*, t. 2076, and *varioloſum*, t. 2077, both found on old trees. *S. auratum*, t. 2078, is ſtill more remarkable for the internal orange-colour of its receptacles, which becomes viſible whenever they are rubbed or broken.

SPILSBY, in *Geography*, a market-town in the eaſt diviſion of the ſoke of Bolingbroke, parts of Lindſey, in the county of Lincoln, England, is ſituated on an eminence, overlooking to the ſouth a large tract of marſh and fen land, which is bounded by Boſton Deeps and the German ocean. Spilſby is the chief town in the ſouthern part of Lindſey diviſion, and is 31 miles E. from Lincoln, and 134 miles N. from London. It conſiſts principally of four ſtreets, uniting at the market-place, which forms a ſpacious ſquare, interſected in the centre by a row of houſes, with the market-croſs at the eaſt end, and the town-hall at the weſt. The market-croſs conſiſts of a plain octagonal ſhaft, with a quadrangular baſe; the whole elevated on five ſteps. The town-hall, a plain brick building, ſtanding on arches, was built in 1764, on the ſcite of the old hall, which, being in a ruinous ſtate, had been taken down. The general quarter-ſeſſions of the peace, for the ſouthern diviſion of the parts of Lindſey, have been holden here for upwards of an hundred years. The pariſh-church, ſituated on the weſt ſide of the town, is an irregular building, conſiſting of north and ſouth aiſles, the latter of much larger extent than the reſt of the edifice. A chapel occupies the extremity of the body of the church, in which are ſome ancient monuments, belonging to the families of Beke, Willoughby, and Bertie. At the weſt end of the church is an embattled tower, of a more modern date than the other parts of the ſtructure, and probably erected about the time of Henry VII. Here is a ſmall free-ſchool, ſupported by the rents of certain tenements bequeathed for that purpoſe; and a Sunday ſchool, recently eſtabliſhed, promiſes to be of great advantage to the lower claſſes of the people. A weekly market is held on Mondays, and three fairs annually. The population return of the year 1811 ſtates the number of houſes to be 230, occupied by 963 perſons.

At Ereſby, two miles from Spilſby, was formerly a manſion, noticed by Leland, belonging to the Bekes and to the Willoughbys. It was taken down, and another built on the ſcite, which was deſtroyed by fire: a ſtately avenue of trees leads to the ſcite. The place is now abandoned for the more ſplendid domain of Grimſthorpe. Ereſby was a grant from William the Conqueror to Walter Beke. It was poſſeſſed ſucceſſively by the Bekes, Willoughbys, and Berties, till the year 1778, when, with the manor of Spilſby, it became the property of ſir Peter Burrell, now lord Gwydir, by his marriage with lady Willoughby, daughter and coheireſs of the duke of Ancaſter. Beauties of England and Wales, vol. ix. Lincolnſhire, by J. Britton, F.S.A.

SPIN Hay, *To*, in *Military Language*, is to twiſt it up in very hard ropes, for an expedition: ſo that it may be the leſs bulky for the cavalry to carry behind them.

SPINA, in *Botany* and *Vegetable Phyſiology*, a thorn originating from the ſubſtance of the wood itſelf. (See Fulcra.) Linnæus remarks that a thorn is liable to diſappear by culture, or richneſs of ſoil, as in the pear-tree. Hence he ſpeaks of ſuch plants as becoming tame by the influence of good treatment; whereas prickles, *aculei*, ſeated in the bark, are not affected by ſimilar cauſes. The reaſon is well explained by Willdenow, who juſtly conſiders thorns as of the nature of abortive branches, ſtunted in their growth for want of nouriſhment.

Spina, in *Geography*, a town of France, in the department of the Tanaro; 9 miles S.W. of Acqui.

Spina *Bifida*, *Cloven ſpine*, in *Surgery*, frequently named alſo *Hydrorachitis*, is a tumour for the moſt part ſituated on the ſpines of young children, commonly on the lumbar vertebræ; occaſionally on the dorſal or cervical ones; and ſometimes, though leſs frequently, on the os ſacrum.

A tumour of a ſimilar nature is now and then obſerved upon the head. Richter's Chirurg. Bibliothek, 9 band, p. 186.

In caſes of ſpina bifida, the ſwelling is ſoft, and may be gradually diminiſhed, or even made to diſappear entirely by preſſure; but it always returns again immediately when the preſſure is removed. The fluctuation of a fluid is diſtinctly perceptible to the touch. The integuments retain their natural colour and appearance. However, the children ſeem to experience pain when the tumour is compreſſed, or when they are placed upon their backs. The ſize of the ſwelling is extremely various, it does not often exceed that of an orange; but, in a few inſtances, it is much more conſiderable.

The generality of children affected with ſpina bifida are deficient in ſtrength and vigour, and are ſubject to frequent diarrhœa. Some cannot retain their urine and feces. A weakneſs and emaciation are often particularly obſervable in the lower extremities, which, indeed, are ſometimes almoſt paralytic. Though moſt children agree with this account, it deſerves notice, that many others are, in every reſpect except the tumour, perfectly healthy and well formed.

When a ſpina bifida is diſſected, the ſwelling is found to conſiſt of a ſac, filled with an aqueous fluid, and compoſed of the integuments, and of the membranous ſheath which lines the canal of the ſpinal marrow. The lining of the ſpinal canal protrudes through a fiſſure in the vertebræ. This fiſſure is owing to an imperfect formation of theſe bones, and is commonly found at their poſterior part, where the ſpinous proceſſes would otherwiſe be. The preternatural opening is ſometimes confined to one bone, and then the ſwelling frequently has a ſmall baſe. In many inſtances, the oſſification of ſeveral of the vertebræ is not completed behind, ſo that the canal for the ſpinal marrow reſembles an open furrow. Even the whole ſpine, from one end to the other, has been found thus imperfect. (Maret, Mem. de Dijon, vol. ii. p. 105.) The aperture has been known to extend through the body of the affected vertebra, ſo that the finger could be paſſed quite through into the abdomen. (Saltzmann, De Tumoribus quibuſdam Seroſis externis.) In one example, there was not only a furrow in the vertebræ, all the proceſſes of theſe bones were wanting. Richter's Chir. Bibliothek, 4 b. 2 ſt. p. 350.

In general, the ſac is filled with a clear, tranſparent fluid; but occaſionally, the contents are turbid, yellowiſh, and bloody. The portion of the ſpinal marrow ſurrounded by the fluid is generally ſoftened, and almoſt like mucus, or thin matter. Mem. de l'Acad. de Dijon, vol. ii.; and Richter's Anfangſgr. der Wundarzneykunſt, band 2. p. 236, Dritte Auflage.

Children afflicted with this diſeaſe ſometimes ſuffer at the ſame time from hydrocephalus. They ſeldom live longer than a year after birth. The tumour generally continues to enlarge. Occaſionally it inflames and ulcerates, and then death very ſoon follows. Children are obſerved to live longeſt when the ſwelling is remote from the head. The inſtances of perſons attaining a middle age with this diſorder are rare, and theſe ſubjects have moſtly had their lower extremities in a paralytic uſeleſs ſtate. Examples, however, are recorded, in which patients labouring under this affliction, have lived to the ages of eight, ſeventeen, twenty, and fifty. Acrell K. Vetenſkaps, Ac. Haedligar, 1748, p. 91. Warner's Caſes in Surgery, p. 136, ed. 4. Hochſtaetter, Diſſ. de Spina Bifida, Altorf, 1703.

Experience has proved, that puncturing the tumour with a lancet, and thus diſcharging the fluid, either at once or gradually, cannot be practiſed without inducing fatal conſequences. Alſo, when the ſwelling ulcerates and burſts of itſelf, the child periſhes; nor has tying the pedicles of ſuch ſpinæ bifidæ as have narrow baſes proved more ſucceſsful. Some years ago, Mr. Abernethy ſuggeſted the method of letting out the fluid, healing the puncture directly afterwards, and repeating the ſame proceedings as often as neceſſary. (See Abernethy's Surgical and Phyſiological Eſſays, parts i. and iii.) This gentleman tried the plan in one inſtance, and though it was not attended with ultimate ſucceſs, it did not ſeem to bring on the ſudden fatal ſymptoms, which are the uſual effects of letting out the fluid in the common way.

This laſt propoſal, which originated with Mr. Abernethy, is important, inaſmuch as recent obſervations have proved, that a practice founded on the foregoing principles may actually effect a cure of a diſeaſe that, until very lately, always baffled the art of ſurgery. It is to Mr. A. Cooper that we are indebted for the mode of puncturing ſpinæ bifidæ with a fine needle, thus letting out the fluid from time to time, and promoting a cloſure of the opening in the ſpine, by applying a compreſs and bandage. The adheſive inflammation, in fact, obliterates the cavity in which the fluid collects, and the diſeaſe ultimately does not return. In one caſe, Mr. A. Cooper ſeems to have accompliſhed in this manner a perfect cure. See Medico-Chirurgical Tranſ. vol. ii. caſe 2, p. 326.

This eminent ſurgeon, however, purſues two modes of treatment for the relief of children afflicted with ſpina bifida; one palliative, the other radical.

The firſt conſiſts in treating the caſe as a hernia, and applying a truſs to prevent its deſcent; the ſecond, in pricking the tumour with a fine needle, and in producing an adheſion of the ſides of the ſac, ſo as to cloſe the opening in the ſpine, and ſtop the diſeaſe altogether. The firſt is attended with no riſk; the ſecond expoſes the patient to much conſtitutional irritation; but, if ſucceſsful, hinders the future recurrence of the diſeaſe. Even when the adheſive proceſs cannot be effectually accompliſhed by the ſecond plan, the palliative method may yet be tried. See caſe 4, lib. ſupra cit.

Unfortunately, there are numerous caſes of ſpinæ bifidæ which leave no hope of cure. The following examples of this deſcription are pointed out by Mr. A. Cooper.

If the tumour is connected with an unnatural enlargement of the head, hydrocephalus internus is conjoined with ſpina bifida, and the water will accumulate in the ventricles of the brain, whether the radical or palliative treatment of the tumour on the back be tried.

If the lower extremities are paralytic, or the feces and urine are diſcharged involuntarily, there is no hope of relief.

If the tumour has burſt at the time of birth, or ſoon afterwards, little expectation of a cure can be indulged; for although the opening in the ſkin may be cloſed with lint and adheſive plaſter, and union be produced, ſo that no more of the fluid can eſcape, yet hydrocephalus internus will follow.

The deficiency of the ſpine is ſometimes ſo great, that the tumour, at the time of the child's birth, is very conſiderable; the nerves are protruded out of the ſpinal canal; the ſpinal marrow is injured; and all attempts at a cure muſt be unavailing. Medico-Chirurgical Tranſ. vol. ii.

In this diſeaſe, purgatives and diuretics have been tried in vain; and no outward applications, excepting preſſure, have been found to do the leaſt good. Richter has ſuggeſted making two iſſues near the tumour; but the propoſal hardly brings with it a promiſe of utility. In ſhort, in the preſent ſtate of our knowledge, the practice tried by Mr. A. Cooper is the only one in favour of which facts and actual experience can be adduced; and, if we except the caſes publiſhed by this gentleman, we have no inſtance on record of a ſpina bifida being cured or benefited.

When the diſeaſe does not admit of the radical or palliative cure, the ſurgeon ſhould inſtruct the friends of the patient to keep the tumour out of the way of every thing that has a tendency to make it inflame and ulcerate; and, if any thing at all is done, the ſwelling ſhould be tenderly bathed every now and then with ſpirituous and mildly aſtringent lotions, with a view of averting inflammation and ulceration of the ſkin. Firſt Lines of the Practice of Surgery, by S. Cooper, edit. 3.

Spina *Burgi*, in *Botany*, a name uſed by ſome authors for the *alaternus*, or ever-green privet, a garden ſhrub, the fruit of which is a mild aſtringent.

Spina *Ventoſa*, in *Surgery*, a caries or abſceſs of the internal part of a bone. Spina was a term applied by the Arabian writers, becauſe the diſeaſe occaſioned a pricking in the fleſh; and the epithet ventoſa was added, becauſe the part affected communicates a feel as if it contained air. Spina ventoſa is often employed ſynonimouſly with white-ſwelling. See White-swelling.

SPINACH, or Spinage, in *Botany*. See Spinacia.

Spinach is ſometimes cultivated in the field for the advantage of the ſeed. The different ſorts of it are raiſed in this manner, in order to ſupply the demand for the different kinds of ſeed.

The land for theſe crops is finely prepared by different ploughings and harrowings in the early ſpring, and a little well rotted dung intimately blended with the ſoil, where the land is not of a good quality.

The different ſorts of ſeed are then ſown in ſmall furrows made for the purpoſe, in the ground, either by the hand-hoe, or by means of a drill for this uſe, at the diſtance of from about twelve to fourteen inches from each other; the prickly ſort of ſeed being uſed in the proportion of ſix gallons to the acre, and the round ſort in that of four to the ſame quantity of land.

Some time in the early part of March, when the plants have advanced ſo as to have leaves of about one or two inches in length, they are thinned out by the hoe to the diſtance of four or five inches. The rows of plants are always kept well moulded up both before and after the period of thinning, and the whole crop preſerved in a perfectly clean ſtate from weeds. As ſoon as the crop has reached the time of being in full bloom, the greater part of the male plants are drawn out, by the hand, from among the others, by which means the female plants are allowed more room, light, and air to grow in, and thereby to perfect their ſeed in a better and more full manner. The plants which are thus drawn out anſwer in a very profitable manner in the feeding of young pigs, and they may probably be given to ſome other ſorts of animals with advantage.

When the crop becomes quite ripe, it is pulled up, and the ſeed either threſhed out on a cloth in the field, or the whole carried to the barn, to be afterwards threſhed out. See Spinacia.

The produce is uſually from about two to five quarters on the acre, according as the ſeaſon and other circumſtances are leſs or more favourable.

The cultivation of ſpinach for ſeed in the field often turns out very advantageouſly, but it is attended with ſome degree of uncertainty, as is the caſe with moſt crops of this nature.

It is a crop which is much grown in the iſle of Thanet, and in Eaſt Kent, in order to ſupply ſeed for the London ſeedſmen.

Spinach, *Strawberry*. See Blitum.

Spinach, *Wild*, in *Agriculture*, the name of a weed, as the gooſe-foot. It is very troubleſome in ſome ſorts of land.

SPINACHIA, in *Ichthyology*, a name given by ſome authors to our common ſtickleback, or banſtickle, more uſually known among writers by the names *pungitius*, or *aculeatus piſciculus*. See Stickle-*Back*.

SPINACIA, in *Botany*, a name of dubious origin, but the moſt general and probable etymology deduces it from *ſpina*, a thorn, on account of the prickly or ſpinous integument of the fruit.—Linn. Gen. 520. Schreb. 688. Willd. Sp. Pl. v. 4. 766. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 385. Tournef. t. 308. Juſſ. 85. Lamarck Illuſtr. t. 815. Gærtn. t. 126.—Claſs and order, *Dioecia Pentandria*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth inferior, deeply cloven into five concave, oblong, obtuſe ſegments. *Cor.* none. *Stam.* Filaments five, capillary, longer than the calyx; anthers oblong, twin.

Female, *Cal.* Perianth inferior, of one leaf, permanent, cloven into four, alternately ſmaller ſegments. *Cor.* none. *Piſt.* Germen inferior, roundiſh, compreſſed; ſtyles four, capillary; ſtigmas ſimple. *Peric.* none, except the ſurrounding, hardened calyx, which encloſes a ſolitary, roundiſh *ſeed*.

Obſ. The fruit is occaſionally round, but generally beſet with two or four horns or ſpines.

Eſſ. Ch. Male, Calyx deeply five-cleft. Corolla none.

Female, Calyx four-cleft. Corolla none. Styles four. Seed ſolitary, within the hardened calyx.

1. S. *oleracea*. Garden Spinach. Linn. Sp. Pl. 1456. "Schkuhr. Handb. v. 3. 469. t. 324." (Spinachia; Ger. Em. 330.)—Fruit ſeſſile.—Native place of growth unknown. It was cultivated in Great Britain ſo long back as the year 1568, and flowers throughout the ſummer. *Root* annual. *Stem* one or two feet high, herbaceous, branched, hollow. *Leaves* arrow-ſhaped. *Male flowers* herbaceous, in long ſpikes, abounding with pollen. *Female flowers* on a ſeparate plant, in cluſters on the ſtalks at every joint, herbaceous, ſmall. *Seeds* roundiſh, unarmed, ſubject to vary with regard to ſpines.

There are two or three varieties of the garden ſpinach, one called *prickly*, another *ſmooth*; differing in the ſize and ſhape of the leaves, and in their ſeeds being more or leſs prickly.

This plant does not appear to have been known to the ancients. It is called Hiſpanac by Arabian phyſicians, and has been ſo long and generally cultivated in Spain, as to have obtained the name of *Hiſpanumolus*. A conjecture is propoſed by profeſſor Martyn reſpecting the introduction of this plant into Spain by the Saracens.

2. S. *fera*. Wild Spinach. Linn. Sp. Pl. 1456. (S. foliis ex deltoideo-ovatis, ſubſinuoſis, capſulis in orbem diſpoſitis; Gmel. Sib. v. 3. 86. t. 16.)—Fruit ſtalked.—Native of Siberia, in damp, unfrequented places.—*Root* annual, whitiſh. *Stem* nearly two feet high, branched, erect. *Leaves* ſtalked, triangular or ovate, occaſionally ſinuated, obtuſe. *Male flowers* in cloſe heads, near the *females*, or in ſolitary, interrupted ſpikes. *Fruits* axillary, three or more, on ſtalks of their own length, ovate or obovate, obtuſe, ſlightly keeled on each ſide, ſmooth, very obtuſe.

Spinacia, in *Gardening*, contains a plant of the annual culinary kind, of which the ſpecies cultivated is the garden ſpinach (S. oleracea.)

There are varieties of this which differ in the ſize and ſhape of the leaves, and the greater or leſs pricklineſs of the ſeeds; as the triangular with prickly ſeeds, in which the leaves are triangular and ſharp arrow-pointed, the ſeeds ſomewhat armed with ſhort ſpines; the round with ſmooth ſeeds, which has ovate thick leaves, not angular at their baſe; both the ſtalks and leaves are much more fleſhy and ſucculent than in the other ſort; and the ſeeds are ſmooth, without any ſpines. Of this alſo there are two or three ſub-varieties, differing in the ſhape, thickneſs, and ſize of their leaves.

In each of the principal ſorts there are variations in the leaves, as to their form and magnitude, but the broadeſt and thickeſt-leaved ſorts are far the beſt in quality. Thoſe with the moſt thick and ſtocky leaves, of a ſtrong dark green colour and luxuriant growth, are commonly ſuppoſed the moſt valuable ſort of the round kind.

Method of general Culture.—In theſe plants it is effected only by ſeed, by ſowing it every year in ſpring and autumn; the former furniſhing the main ſpring and ſummer crops; and the latter the winter, and thoſe for early ſpring uſe. The prickly ſort is the beſt for winter crops, and the round for the ſummer ones.

The ſeed ſhould be ſown at ſeveral intervals of time from January till Auguſt, as every month, three weeks, or fortnight, according to the earlineſs or advanced period of the ſeaſon, ſo as to obtain a regular ſucceſſion moſt part of the year. The general ſpring crop ſhould be ſown in March, and the general winter crop about the beginning of Auguſt.

But in the ſpring ſowings, as the crops in the very early ſowings in January run ſoon to ſeed, a moderate quantity ſhould only be ſown. However, in the autumn ſowings, as the plants do not run the ſame year, good full crops, to ſtand for winter and early ſpring uſe, may be put in.

Theſe plants ſucceed in any common ſoil of the kitchen-garden; but the richer in dung the better; always chooſing an open ſituation, not too near low ſpreading trees, &c. as they never ſucceed in cloſe or ſhady places, in which they are always drawn up weak, and ſoon run to ſeed without attaining perfection: a warm border may be proper for the early crops; but for the main crops in general, the open quarters are the moſt ſuitable, though a broad warm-lying border may alſo be proper for ſome part of the later ſown winter crops occaſionally, for the purpoſe of having the advantage of a little ſhelter of the fence, and benefit of the ſun during the winter ſeaſon; and freſh ſeed ſhould be procured for each ſowing, as this will be found of great importance in the free growth of the plants: for the autumn ſowings of the winter crops, it is of advantage to procure new ſeed of the ſame year.

And after the ground has been properly dug, the ſeed may either be ſown broad-caſt, and raked in, or in ſhallow drills a foot aſunder; though broad-caſt is the moſt expeditious, and probably the moſt proper method for the growth of the crops in the product of large full leaves; ſowing it all over the ſurface moderately thin, either in one continued plat, and trodden down evenly, if light ground, and raked in with a large rake or light harrow; or the ground may be divided into four or five-feet wide beds, with foot-wide alleys between each, eſpecially for the early and winter crops in moiſt ground; the ſeeds being ſown as above, raking them in evenly: drill-ſowing may alſo be occaſionally practiſed with convenience and advantage, in which the drawing of the drills ſhould be performed with a hoe flatways, near an inch deep, and ten or twelve inches aſunder, then ſcattering the ſeeds thinly along them, raking the earth over full half an inch deep; which mode is often very proper in ſowing between other crops, as between wide rows of beans, peas, cabbages, &c. as it admits of hoeing up the weeds between the rows with facility; and if ſown thin, and the plants be thinned out properly, they grow large and fine, and the produce is very conveniently gathered. It may likewiſe be ſown in wide drills alone, about a foot diſtance, for a diſtinct full crop: or in rows two feet aſunder, to admit of intercropping in the intervals, with rows of cabbages, beans, and other things occaſionally. In theſe ſowings the ſeeds ſhould be ſcattered moderately thin, and the plants be afterwards thinned out to three inches diſtance at leaſt, the ſeeds being directly raked regularly in: and when ſown broad-caſt all over the ſurface, if in light looſe land, and a dry warm ſeaſon in the advanced part of ſpring, or in the ſummer and autumn, it may be proper firſt to tread the ſeed evenly down, then raking it in effectually with a large rake. The ſeeds moſtly come up in a fortnight; or perhaps, if ſown very early in ſpring, it may be three weeks or a month before they appear.

In reſpect to the after-culture of the crops, when the plants have three or four leaves an inch broad, they ſhould be thinned out and cleared from weeds, either by hoe or hand; but the former is the moſt eligible, eſpecially for the broad-caſt ſown crops; chooſing dry weather, and cutting out the plants to three or four inches diſtance, together with all the weeds in every part; but the above diſtance is ſcarcely ſufficient, unleſs it is intended to begin thinning out the plants for uſe while young: in other caſes it is adviſable to hoe them out ſix or eight inches aſunder, eſpecially the ſpring and ſummer crops of the round ſpinach, which, having proper room, will grow very large, and ſpread its broad leaves widely, and does not run to ſeed ſo ſoon as if left cloſe. When the ſpring and ſummer-ſown crops are left too cloſe, they are apt to draw up weak, and ſoon go to ſeed. The winter crops of triangular or prickly ſpinach, it will be ſufficient in moſt caſes to thin out finally to three or four inches diſtance.

Theſe crops are often ſown in ſpring with other crops, for the ſake of cropping the ground to the beſt advantage; but it is beſt when performed alone in moſt inſtances.

They may, however, in ſome caſes, be put in between the rows of particular plants with ſome utility in the way of ſaving ground, where that is material, as between young cabbage and cauliflower plants, which have been finally ſet out at wide diſtances for main crops, as well as in the large intervals of pea and bean crops, eſpecially when of the low or dwarf kind, and between ſome other ſorts of general rowed crops with wide ſpaces. The ſpinach ſeed, in theſe circumſtances, is moſtly beſt put into the ground in ſingle or double drills in the middle parts, according to the diſtances of the rows of the other plants; but it is ſometimes ſown in the broad-caſt manner over the whole ſurfaces of the intervals, and raked in. And it is occaſionally ſown over all the piece of ground in mixture with ſhort-top radiſh ſeed, and raked in; after which, either immediately or in a ſhort ſuitable ſpace of time, the plants or other crops are planted out or ſown in their regular modes. The ſowing of ſpinach ſeed in this way, commonly takes place in the early parts of February and the following month, and is practiſed upon the borders, as well as the large quarters where ſuch main ſpring crops are to be grown and cultivated. The plants or other crops in this mode growing quickly, have ſoon the advantage of the mixed crops between their rows, though the ſmall plants of theſe kinds are not injured or retarded in their growth thereby, as they are ready to be gathered and removed for uſe long before the main crops have any hurtful tendency.

Immediately on the removal of ſuch ſmall crops, the intervals of the rows are hoed over to looſen the earth, which is then drawn up to the ſtems of the plants or other crops. Theſe methods of cropping are, however, only to be uſed in ſuch caſes as the above.

When the plants have leaves two or three inches broad, they may be gathered. The method of which is, either by cutting them up with a knife wholly to the bottom, or drawing and cleaning them out by the root, if the crops want thinning; or only cropping the large outer leaves, the root and heart remaining to ſhoot out again. With the ſpring crops, when the plants want thinning, they may be cut up wholly to the root, thinning them out where thickeſt in a gradual manner, ſo as to leave the ſtanding plants at leaſt ſix or eight inches diſtant to grow to perfection, which, when beginning to ſhoot for ſeed, may alſo be cut up wholly to the bottom: and in the winter crops, if the plants ſtand too cloſe at firſt, ſome may be thinned out quite to the bottom, afterwards the larger outer leaves only muſt be cropped in the winter and early part of the ſpring; but when the ſpring is more advanced, and the plants grown large and require thinning, or when they begin to run to ſeed, cutting them up to the bottom in a thinning order is the beſt method.

Some of the beſt of the different ſorts of plants ſhould be left in the ſpring to ſtand for ſeed, which ſhould be collected, when well ripened, in the manner directed below.

Culture in the early and ſucceſſion Crops.—In raiſing early crops of this ſort, as well as thoſe which are to come in regular ſucceſſion, during the beginning of the ſpring and the firſt part of the ſummer ſeaſon, it will be neceſſary to commence and continue the ſowing of the ſeed at two or three different times in the month of January, when the weather is mild and open, chuſing the moſt dry and warm ſituations that can be found for the purpoſe, and only putting in ſmall quantities in each of ſuch ſowings, as the crops are extremely liable to be deſtroyed or to run to ſeed. In the ſucceeding month it will likewiſe be proper to continue the ſowings in a more full manner as to the quantities, at two or three additional different periods, in almoſt any open places of the garden, by which means full ſucceſſions may be provided, for ſome length of time, to follow the crops of the firſt winter ſowings, which will now ſoon run up to ſeed, theſe ſowings coming in much about the ſame time. In the two months which follow the laſt, it will ſtill be proper to proceed or go on with the ſowing of this ſort of ſeed every ten days, or fortnight, making uſe of open but rather cooler ſituations. By this means regular ſupplies will be provided for the concluding ſpring and beginning ſummer months.

And in caſes where conſtant ſucceſſions of crops of this kind are wanted the whole of the ſummer ſeaſon, it will be requiſite and proper to continue the repetition of the ſowings every fortnight during the months of May, June, and July, as the plants in theſe ſowings very quickly run up for ſeed. The moſt moiſt ſpots which the garden affords ſhould now be ſelected for ſuch crops, they being free and open. It is alſo advantageous in the ſummer ſowings to have ſhowery weather for performing the work in, when it can be had. The ſeed ſhould be ſown rather thin, when in the broad-caſt method; and in the drill mode to only the depth of about an inch. The plants are to be kept pretty well thinned, in order to prevent their drawing up to ſeed. The ſowings which are made in the laſt of theſe months, will continue the crops in ſucceſſion, until they are ſucceeded by thoſe of the winter ſowings.

In theſe caſes the ſpinach is ſometimes not ſuffered to grow large, but cut in its young growth, allowing the bottom parts to grow again.

In the after-culture there is nothing material in theſe crops, beſides that which is neceſſary in the general ones.

Culture in the late or winter Crops.—In theſe caſes the ſeed is ſown to the moſt advantage for the ſucceeding crops towards the end of the firſt week in Auguſt, the beginning of the ſecond, and the middle of the third, according to the nature, ſituation, and ſtate of the ground, as they are the moſt prevented in common from running up too early to ſeed, while they get a little growth, and become ſomewhat forwarded and ſtrong before the winter weather ſets in. It is beſt when the ſowings can be performed in rather moiſt ſhowery times, as when it is done at dry hot periods, the ſeed is apt to ſprout and come up in an irregular manner, the plants appearing in a ſtraggling ſparing ſtate. Theſe crops ſhould conſtantly have, as much as poſſible, open ſituations, which lie dry at this ſeaſon of the year, and which have ſunny expoſures.

The ſeed is to be immediately ſown on the freſh newly turned up ſoil, either over the whole ſurface, or in the bed manner, which is more convenient for the cultivation and collecting of the produce. In ſome places, a ſlight ſprinkling of the brown Dutch and common cabbage lettuce ſeed, or other ſimilar ſorts, are ſown along with this kind of ſeed in theſe crops, in order to ſtand for culling out during the winter and early ſpring months. The ſeed is to be covered and trod in directly after being ſown.

Theſe late crops are alſo occaſionally, though rarely, ſown in the drill manner, but the former methods are more ſuitable in theſe caſes, where gradual thinning is to be practiſed with the crops, which is by much the beſt ſort of cultivation for having ſuch crops in fine perfection.

Where large crops of the winter kind are raiſed, as in market gardens, early cabbages are ſometimes planted out with theſe crops in wide rows, as three or four feet apart. The ſetting out of theſe plants takes place in October or the following month. At theſe diſtances no injury is done to the ſpinach crops by the growth of the cabbage plants, and in the early ſpring, the ſpinach being wholly cleared away for uſe, a full forward cabbage crop is left, and the moſt is made of the land and time.

The plants in theſe late crops want thinning and clearing from weeds early in their growth, as when leſs than an inch in the breadth of the leaves, which may be done by the uſe of the hoe in a dry time, leaving the plants not more than three or four inches apart, as ſome may be gradually afterwards thinned out for uſe, ſo as to let them ultimately ſtand about five inches from each other; the leaves are after this only to be gathered for uſe, during the whole winter ſeaſon, the larger outer ones being alone taken, the ſmaller inner ones being always left to expand themſelves by degrees, in their turn, and afford regular ſucceſſional ſupplies until the end of the ſpring, at which time, when the plants begin to grow large and crowd each other, or to ſhoot up for ſeed, they may be wholly cleared away.

In theſe crops much attention is neceſſary to keep them clear from weeds, by frequent hoeing and hand-weeding, being careful to remove chick-weed, which is always liable to infeſt theſe crops much in winter. All the large weeds ſhould be wholly removed from the ground, as if left they do great injury, and not unfrequently take root again.

As the ſpring advances, the ſurface of the ground ſhould be lightly hoed among and about the plants, taking a fine mild dry day for the purpoſe; which will greatly promote the growth of them, and by which they will ſoon ſhoot out ſtrongly, becoming further in a fine ſtate of perfection for uſe. The large outer leaves are ſtill only to be gathered, except where the plants ſtand too thick in the crops.

Saving Seed.—The ſeed being perfectly ripe in the plants which are left for this purpoſe, which ſhould always be thoſe of the moſt ſtocky growth, and which have the largeſt, the moſt expanded, and the thickeſt leaves, is eaſily known by its turning of a brown colour, and hardening in the tops of the ſeed-ſtalks. The plants of the winter crops moſtly run up firſt to form ſeed-ſtalks, being ſoon, however, followed by thoſe of the ſpring-ſowings, and they are commonly loaded with plenty of well-ripened fertile ſeeds about the cloſe of July or beginning of the following month. In this ſtate the ſtalks are to be pulled up and ſpread out to dry for a few days, turning them as it may be neceſſary, in order to fully dry and harden the whole of the ſeed in a proper manner. They are then to be beat or threſhed out from the ſeed-ſtalks upon a cloth, and put up in bags to be kept in a dry ſituation for uſe.

The ſeed which is newly ſaved is excellent for ſowing the winter crops with, provided it be ripe in due time. It will, however, remain perfectly good until the following year's ſowing, but ſhould not be truſted to when more than one year old, as new ſeed is always of material importance in this culture.

It is proper and neceſſary, in raiſing the ſeed of the different varieties, to have the plants of the different ſorts, in different ſituations, at ſome conſiderable diſtance from each other, in order to prevent injury and degeneracy, by the farina of one ſort being diſperſed over the other.

The plants of the different kinds are readily diſtinguiſhable when they are in flower, and the male plants, after they have diſperſed their farina, are in ſome diſtricts, where the providing of this ſort of ſeed is an object, drawn out, ſo as to leave more room for the ſeed-plants. See SPINACH.

SPINADESCO, in *Geography*, a town of Italy, in the department of the Upper Po; 4 miles W. of Cremona.

SPINÆ, in *Ancient Geography*, a ſtation in the 13th and 14th Iter of Antonine's Itinerary of Britain, between Durocornovium or Cirenceſter and Calleva or Silcheſter in the former, and Cunellio or Marlborough and Calleva in the latter, and correſponding to Speen, near Newbury, (which ſee.) The number of miles between Cirenceſter and Speen being only 15, which gives too ſmall a diſtance, Dr. Stukeley ſuppoſes that a ſtation is omitted between theſe two places; but Mr. Horſley conjectures, that the numerals oppoſite to Spinis ſhould have been 35.

SPINAL ARTERIES, in *Anatomy*, are two arteries, one anterior and one poſterior, both produced by the vertebrales; each of which, as ſoon as it enters the cranium, ſends out a ſmall branch, by the union of which the poſterior ſpinalis is formed. Afterwards the vertebrales advancing on the apophyſis baſilaris, or production of the occipital bone, detach backward two other ſmall branches, which likewiſe meet, and by their union form the ſpinalis anterior. Theſe ſpinal arteries run down on the fore and back ſides of the medulla ſpinalis, and by ſmall tranſverſe ramifications, communicate with thoſe which the intercoſtal and lumbar arteries ſend to the ſame part. See ARTERY, BRAIN, and SPINE.

SPINAL *Marrow.* See MEDULLA *Spinalis*, MEDULLARY *Syſtem*, and BRAIN.

SPINAL *Muſcles*, are thoſe vertebral muſcles which are wholly fixed in the ſpinal apophyſis. See MUSCLE and SPINE.

SPINAL *Nerves.* See NERVE and SPINE.

SPINAL *Apparatus*, a machine for affording ſupport to the ſpine, and imagined by certain practitioners to be uſeful in caſes of diſeaſe and diſtortion of the vertebræ.

SPINALIS, in *Anatomy*, a muſcle on the ſide of the neck, ariſing from the five ſuperior proceſſes of the vertebræ of the thorax, and the inferior of the neck; and which in its aſcent, becoming more fleſhy, is inſerted into the inferior part of the vertebræ of the neck laterally. It ſerves to draw the neck backwards. See SPINE.

SPINALIS *cervicis*, a name given by Albinus to a muſcle of the neck, called by Fallopius the *tertium par muſculorum dorſi*, and by Cowper and Morgagni, *ſpinalis colii.*

This is the muſcle, which the French anatomiſts call *les vertebraux externes du demi-epineux, ou le tranſverſaire epineux ducal.*

SPINALES *colli minores*, muſcles lying between the ſix ſpinal apophyſes of the neck, and between the laſt of the neck and firſt of the back; being inſerted in theſe apophyſes by both extremities on one ſide of the poſterior cervical ligament, which parts them from thoſe of the other ſide. They are likewiſe termed *interſpinales.*

SPINALIS *dorſi*, a name given by Albinus to a muſcle of the back, figured by Euſtachius, *Tab.* 37, and called by Fallopius *quinti paris dorſi muſculorum pars implantata in ſpinas vertebrarum thoracis.*

Others, as Spigelius, have called it a part of the ſemi-ſpinatus, and others a part of the longiſſimus dorſi. The French have named it *le grand epineux de dos.*

SPINALIS *dorſi major*, a pretty long and ſlender muſcle, lying upon the lateral part of the extremities of the ſpinal apophyſes of the back. It is compoſed of ſeveral muſcular faſciculi of different lengths, which croſſing each other, are inſerted laterally by ſmall tendons in the ſpinal apophyſes from the ſecond, third, or fourth vertebræ of the back; and ſometimes, though ſeldom, from the laſt of the neck, or firſt of the back, all the way to the firſt or ſecond vertebræ of the loins, with ſeveral irregular decuſſations, which vary in different ſubjects. The longeſt faſciculi are all a little incurvated, and the whole muſcle terminates in points at its ends, but is conſiderably broad in the middle. It communicates by ſome fibres with the longiſſimus dorſi and ſemi-ſpinalis, and ſends off faſciculi to ſeveral tranſverſe apophyſes of the back, from the fourth to the eleventh. It is called by ſome ſemi-ſpinalis, but very improperly. See MUSCLE and SPINE.

SPINALIS, *ſemi*, *colli*, and *dorſi*. See SEMI-SPINALIS.

SPINALES *dorſi minores*. Theſe muſcles are of two kinds; ſome go laterally from the extremity of one ſpinal apophyſis to another, being often mixed with the ſhort faſciculi of the ſpinalis major; the reſt lie directly between the extremities of two neighbouring ſpinal apophyſes, being ſeparated from thoſe on the other ſide by the ſpinal ligament. Theſe are ſmaller and thinner than thoſe of the neck, and are properly enough termed *interſpinales*. See MUSCLE and SPINE.

SPINALES *et tranſverſales lumborum*. There are ſome faſciculi which run up from the ſuperior falſe ſpines of the os ſacrum to the lower ſpinal apophyſes of the loins, which may be looked upon as ſo many *ſpinales lumborum majores;* and there are alſo ſome *ſpinales lumborum minores* between the ſpinal apophyſes of the loins, and *tranſverſales minores* between the tranſverſe apophyſes, which are ſometimes of a conſiderable breadth. See SPINE.

SPINALIS *Medulla*. See MEDULLA, &c.

SPINA-LONGA, in *Geography*, a ſea-port town and citadel, ſituated near a cape of the ſame name, on the iſland of Candia, with a good harbour, formerly the ſee of a biſhop; 30 miles E. of Candia. The harbour is formed by a peninſula,

ſula, which ſecures it from the eaſterly winds. Its entrance faces the N.N.E., but it is ſheltered and protected by an iſlet, on which the Venetians had built a fortreſs, ſimilar to that of Suda. For a long time the Turks made fruitleſs attempts to render themſelves maſters of this fortreſs; and it was not till the beginning of the laſt century that the Venetians permitted them to take poſſeſſion of it. N. lat. 35° 13′. E. long. 25° 42′.

SPINARELLA, in *Ichthyology*, a name given by Bellonius, and ſome other authors, to the little fiſh called by us the *leſſer ſtickleback*. In the Linnæan ſyſtem, this is a diſtinct ſpecies of the gaſteroſteus.

SPINATUS, in *Anatomy*, a name given by Riolanus, and others, to a muſcle of the neck, called by Albinus *ſpinalis colli*, and by Winſlow, and the other French writers, *les vertebraux externes du demi-epineux, ou tranſverſaire epineux du col.* See Spinalis and Transversalis.

SPINCOURT, in *Geography*, a town of France, in the department of the Meuſe, and chief place of a canton, in the diſtrict of Montmedy. The place contains 466, and the canton 9948 inhabitants, on a territory of 287½ kiliometres, in 27 communes.

SPINDLE, in *Mechanics*. See *Double* Cone, and Mensuration.

The axis of the wheel of a watch or clock is called the ſpindle, and its ends the pivot.

Spindle, *Parabolic*. See Pyramidoid.

For the method of finding its ſolidity, ſee Solidity.

Spindle, in *Sea Language*, a ſort of iron-pin, tapering at the upper end to a point. It is uſed to ſtick into the upper end of the top-gallant maſt, ſo as to carry a vane, which, turning thereon horizontally, will ſhew the direction of the wind. It is uſually crowned with a globular or conical piece of wood, called the *acorn*, which prevents the vane from being blown off.

Spindle alſo denotes the lower end or foot of the capſtan, which is ſhod with iron, and becomes the pivot or axis, upon which it turns in the ſaucer. See Capstan.

Spindle, in *Mining*, a piece of wood faſtened into either ſtow-blade. See Stows.

Theſe ſtows give a miner, or any other perſon that owns them, as good a right to a meer or meers of ground, (ſo that every meer have a pair of ſtows ſet on them,) as a deed of conveyance doth to any purchaſer.

Spindle-*Shell*. See Trumpet-*Shell*.

Spindle-*Tree*, in *Botany*. See Euonymus.

It is generally ſuppoſed that the euonymus of the ancients is the ſame plant that we at this time call by this name. The words of Theophraſtus have probably given occaſion to this opinion; as they ſound at firſt reading like words expreſſing the characters of the fruit of this tree; but on a cloſer inſpection, they will be found to expreſs a fruit of a very different kind. This author ſays, that the fruit of the euonymus is like the pod of the ſeſamum, marked with four protuberant ribs, and hard within, and divided into places for four orders of ſeeds. It is plain by this, that as their ſeſamum bore an oblong pod marked with four ribs, ſo as to ſeem of a quadrangular figure, ſo did their euonymus, and that in this long pod there were four orders of ſeeds, each of theſe orders containing a great many ſeeds. Now the fruit of our euonymus is ſhort and not at all like a pod, and contains only four ſeeds, and not four orders of ſeeds; there is alſo this farther proof of our euonymus not being that of the ancients, that our's is a wholeſome food to cattle, and they are very fond of cropping it whenever they can reach it, and never get any hurt by it; whereas the euonymus of the Greeks was poiſonous to cattle, according to Theophraſtus. See Fusanus and Tetrastoechon.

Spindle-*Tree, African*, or *Climbing*. See Staff-*Tree*.

Spindle-*Tree, Baſtard*. See Kiggelaria.

SPINDLING, in *Agriculture*, the act of running to ſeed in plants of the grain and other kinds. A great deal, in this buſineſs, depends upon the manner in which the plants are cultivated.

SPINE, in *Anatomy*, (the vertebral or ſpinal column; the back-bone, in common language; ſpina dorſi,) is the articulated bony pillar at the back of the trunk, forming the foundation or baſis of ſupport and connection to all the other parts of the frame. It is placed perpendicularly in the body, ſuſtaining the head by its upper extremity, while its lower end reſts on the pelvis. The bones of the cheſt, to which the upper extremities are connected, are fixed to its ſides; while the oſſa innominata, or the great bones, to which the lower limbs are articulated, are immovably united to it below. It is the point of attachment and ſupport, in front, for the viſcera of the thorax and abdomen, and for the great trunks of the blood-veſſels. We may thus regard it as the central and moſt eſſential piece of the ſkeleton; as the centre of motion for the head and limbs; and the baſis of ſupport for all the great internal organs. Again; the bones which compoſe it give attachment to the principal muſcles moving the head, the ſhoulders, and the arms, to thoſe which act upon the trunk, and to ſome part of the abdominal muſcles, and of thoſe which move the lower limbs. Further, it conſtitutes a canal, which receives and protects the medulla ſpinalis, and gives iſſue to the various nerves proceeding from that organ to the trunk and limbs. The importance of the ſpine, on all the accounts juſt enumerated, is ſo great, that it conſtitutes a leading character, modifying all the other details of organization in the animals which poſſeſs it. Hence the primary diviſion of the animal kingdom into vertebral and invertebral animals, adopted by the great modern naturaliſts, with Lamarck and Cuvier at their head, is founded on the preſence or abſence of the vertebral column.

The ſpine is formed of twenty-nine pieces of bone, ſtrongly articulated to each other, and placed in ſucceſſion from above downwards. The twenty-four upper ones are called vertebræ, and are farther named cervical, dorſal, and lumbar, according as they occupy the neck, back, or loins: there are ſeven of the firſt kind, twelve of the ſecond, and five of the laſt. The five other pieces of the column are the ſacrum, and the four oſſa coccygis, which form the back of the pelvis; the firſt being articulated to the twenty-fourth vertebra, and the latter to the end of the ſacrum and to each other.

The form of the ſpine is ſymmetrical; but the two halves do not always correſpond accurately in the healthy ſtate, and the deviations are ſtill more remarkable in diſeaſe. As the weight to be ſuſtained by this bony column increaſes conſtantly from above downwards, the bulk of the vertebræ, and, conſequently, the ſtrength of the pillar, increaſe alſo in the ſame direction, with a trivial exception or two, which will be noticed afterwards. In the attitude of ſtanding, the vertebræ are all ſituated horizontally; their proceſſes, however, deviate in various ways from this direction. They are diſtinguiſhed numerically in the different regions, excepting the firſt and ſecond cervical, which are commonly called atlas and vertebra dentata or axis. The general configuration of theſe bones is the ſame throughout; they are formed on a common plan, but this plan is modified in each diviſion by circumſtances peculiar to the different regions. The diſtribution of them into three claſſes is principally founded on theſe modifications: the claſſes are indeed named from their poſition, but the diverſities of their external forms characterize them. We ſhall firſt deſcribe the general form, and then notice the particular modifications of the vertebræ.

General Form of the Vertebræ.—They conſiſt of various irregular and prominent portions, ſeparated by different intervals, and united by different plates. The principal part of the bone in ſize is the anterior prominence, called the body; it is cylindrical or oval, and repreſents the ſection of a cylinder, being terminated above and below by two flat ſurfaces, which give attachment to the fibro-cartilages occupying the intervertebral ſpaces. This body of the vertebra forms in front a greater or leſs convexity, in which we obſerve a kind of tranſverſe depreſſion, bounded by two prominent edges; it is plane, or a little concave, behind, where it correſponds to the vertebral canal: in both ſituations there are ſeveral apertures for the paſſage of blood-veſſels into the ſubſtance of the bone. At each ſide the body is continuous with the reſt of the bone by a kind of pedicle.

A large oval or triangular opening, called the ring or foramen, and contributing to the formation of the vertebral canal, which holds the medulla ſpinalis, is placed immediately behind the body. Directly behind this opening is the ſpinous proceſs, varying in form and direction in the different regions, projecting backwards beyond the level of the bone, and ſeparated from the correſponding proceſſes immediately above and below it, by a ſpace filled either with muſcles or ligaments.

Such are the parts of each vertebra as come into notice on the middle line of the bone, from before backwards. When we view it laterally, we obſerve, 1ſt, two notches, a ſuperficial one above and a much deeper below, excavated on the pedicle, which connects the body to the articular and tranſverſe proceſſes, and forming, when the bones are joined, thoſe lateral foramina of the vertebral canal, through which the nerves are tranſmitted; 2dly, two articular or oblique proceſſes, a ſuperior and an inferior, furniſhed with cartilaginous ſurfaces, by which they are articulated to the correſponding proceſſes of the bones above and below, and having this ſurface turned backwards or inwards in the ſuperior, forwards or outwards in the inferior; ſo that each vertebra is mechanically locked in its ſituation by the two vertebræ immediately above and below it; its ſuperior articular proceſſes being overlapped by the inferior ones of the bone above, while its inferior proceſſes overlap thoſe of the bone next below: 3dly, a tranſverſe proceſs, directed horizontally, as its name indicates, longer or ſhorter in the different regions, and giving attachment to muſcles; and 4thly, a flattened plate, united to that of the oppoſite ſide to form the ſpinous proceſs.

Particular Forms of the Vertebræ.—The various common circumſtances juſt enumerated are greatly modified in the different regions; it is principally in the middle of each region that we muſt examine theſe modifications, which, at either end, gradually approach to the characters of the neighbouring regions.

The Cervical Vertebræ.—Their number is very conſtantly ſeven; but inſtances are mentioned, in which there have been eight or only ſix. (See Euſtachius, Oſſium Examen, p. 210; and Columbus de Re Anatomica, p. 263.) The peculiarities of form are ſtrongly marked and diſtinct in this region. The firſt and ſecond too, in conſequence of their articulation to the head, differ widely from the others, and muſt therefore be deſcribed ſeparately.

The *atlas*, or firſt vertebra of the neck, deviates more than any other from the general type. It is very much expanded laterally, and its ring or foramen is very capacious. When we look at it in front, it ſeems to want the body, inſtead of which we find a ſmall bony arc, flattened in an oppoſite direction to that of the bodies of the other vertebræ, convex and riſing into a tubercle in front, concave behind, where it bears a ſmooth cartilaginous ſurface, articulated to the odontoid proceſs, thin above and below, where it is connected, by means of ligaments, to the occiput and ſecond vertebra. Immediately behind this bony arc is the large ring, larger in this than in any bone of the column, and conſiſting of an anterior ſmaller, and a poſterior larger diviſion, of which the diſtinction is marked by two protuberances, between which a tranſverſe ligament is extended. The front of the ring is filled by the odontoid proceſs; its back part is the beginning of the vertebral canal. Inſtead of the ſpinous proceſs, and of the laminæ which unite to form it, there is a poſterior bony arc, about twice as large as the anterior, riſing into a ſmall tubercle at the middle, where the ſpinous proceſs ſhould be, and bounding the vertebral canal behind. The edges of this arc have ligamentous connections above and below. Inſtead of articular proceſſes, the atlas poſſeſſes on each ſide, above, a large oval cavity, directed obliquely from behind forwards and inwards, covered by cartilage, croſſed by a notch, in which a ſynovial gland is placed, more elevated at its outer than at its inner edge, and correſponding to the occipital condyle, with which it is articulated; below, a large, circular, and nearly horizontal plane, covered by cartilage, and articulated to a correſponding plane of the ſecond vertebra. A very deep channel, ſometimes formed by a bony plate into a complete foramen, is placed immediately behind the ſuperior articular concavity; it is occupied by the vertebral artery, and the firſt cervical or ſub-occipital nerve. The inferior notch, contributing to the opening for tranſmitting the ſecond cervical nerve, is behind the inferior articular plane: thus the nerves, which in all the reſt of the ſpine go out in front of the articular proceſſes, paſs behind them in the atlas. The tranſverſe proceſs is very remarkable for its length, much exceeding that of any other cervical vertebra. It is formed by a ſlender anterior and poſterior root, between which the foramen for the vertebral artery is placed, uniting into a conſiderable obtuſe prominence. Thus the atlas, with the exception of the thick lateral parts, to which the occipital condyles are articulated, forms nearly a bony ring.

To the tubercle of its anterior arch the longus colli and the rectus capitis internus minor are fixed: to the tranſverſe proceſs, the rectus lateralis, the obliquus ſuperior and inferior, the levator ſcapulæ, the intertranſverſi, and the ſcalenus anterior. The rectus poſticus minor is fixed to the tubercle of the poſterior arch.

The *vertebra dentata*, axis, epiſtropheus, or ſecond vertebra of the neck, is diſtinguiſhed from all others by its odontoid or tooth-like proceſs, and by its large, ſuperior, articular planes. Its body exhibits above, inſtead of the uſual ſuperior ſurface, a large bony proceſs, called the dentiform, odontoid, or tooth-like, having a ſlightly convex cartilaginous ſurface in front, articulated to the back of the anterior bony arc of the atlas, a ſmall, concave, articular face behind, on which the tranſverſe ligament plays, and terminating above in a rather unequal obtuſe extremity, from which ligaments ariſe, connecting it to the lateral anterior portions of the foramen magnum. The anterior ſurface of the body of the axis has a middle line, on each ſide of which it is ſlightly hollowed for the longi colli: the poſterior, rough, and perforated by ſmall openings for blood-veſſels, forms part of the vertebral canal. The inferior ſurface gives attachment to the firſt intervertebral fibro-cartilage. The ring is as large in this as in the atlas. The plates of the ſpinous proceſs are broad and thick, and the proceſs itſelf is ſtrong and prominent, projecting conſiderably beyond thoſe of the ſucceeding bones. It is rough below, and ends behind either in an expanded knob, or in a bifurcated extremity. On each ſide of the tooth-like proceſs there is a large circular and nearly horizontal plane, for articulation with the atlas. The inferior articular proceſſes are ſimilar to thoſe of the other cervical vertebræ: they are oblique, placed behind the tranſverſe proceſſes, and have their articular faces turned forwards. The ſuperior notches for the nerves are behind the ſuperior planes; while the inferior are in front of the correſponding articular proceſſes. The tranſverſe proceſs is ſmall, and perforated for the vertebral artery by a foramen, which is directed obliquely upwards and outwards

The axis is united to the head, the atlas, and the third vertebra of the neck.

To its tranſverſe proceſs, the ſplenius capitis, levator ſcapulæ, ſcalenus, tranſverſus cervicis, longus colli, and intertranſverſi anterior and poſterior, are affixed: to the ſpinous proceſs, the rectus capitis poſterior major, the obliquus inferior, the ſemi-ſpinalis cervicis, the interſpinalis, and multifidus ſpinæ.

The five lower cervical Vertebræ.—The body is very ſmall, in compariſon to the proceſſes and the ring; it is flattened in front, and elongated tranſverſely, ſo that it is on a level nearly with the tranſverſe proceſſes, inſtead of projecting into a bony column in front of them, as it does in the other regions of the ſpine. It is rather thicker before than behind: its ſuperior ſurface is concave from ſide to ſide, riſing up laterally into two thin ridges, and rather ſloping off in front: the inferior preſents juſt the oppoſite conformation, ſo as to fit it to be received into the hollow of the vertebra below. We may notice, in front, a middle ſurface, correſponding to the anterior vertebral ligament, and two lateral ones, adapted to the longi colli. A ſmall articular ſurface is obſervable on each ſide of the lower edge of the body of the ſeventh, contributing to the cavity in which the head of the firſt rib is lodged. The ring for the ſpinal marrow is large and triangular, with the angles rounded. The ſpinous proceſſes are priſmatic, horizontal, and either bifurcated at the end, or flattened and marked with a groove. They vary conſiderably in their direction, degree of bifurcation. &c. Three of the four vertebræ immediately ſucceeding the axis appear very ſmall in compariſon to its ſpinous proceſs; but the ſpine of the ſeventh is large and prominent. The notches for the lateral foramina are placed in front of the articular proceſſes; and the ſuperior and inferior ones differ very little in depth. The articular proceſſes are oval in their figure, and directed obliquely: the ſuperior backwards and upwards, the inferior forwards and downwards. The tranſverſe proceſſes increaſe in ſize from the axis; there is a deep channel in the ſuperior ſurface of each, lodging the anterior branch of the correſponding cervical nerve; hence the extremities are bifurcated. Each is perforated at its baſe by a round hole for the vertebral artery; which has been obſerved ſometimes to be abſent in the ſeventh.

The ſeventh cervical approaches in all reſpects very nearly to the characters of the dorſal vertebræ.

The muſcles attached to the cervical vertebræ are the interſpinales; the intertranſverſi anteriores and poſteriores; the rectus anticus major; longus colli; ſcaleni, anterior medius and poſterior; cervicalis deſcendens; tranſverſalis colli; ſacrolumbalis; ſerratus poſticus ſuperior; rhomboideus minor; trapezius; ſplenius capitis; and part of the rhomboideus major.

The Dorſal Vertebræ.—Their number depends on that of the ribs: they are very ſeldom eleven; more frequently thirteen; in which latter caſe there are generally only four lumbar vertebræ. Their chief characteriſtics ariſe from the articulation of the ribs to this part of the column.

The body projects in front, when compared to the vertebræ of the neck: it is thick behind, and narrower in front. The upper and under ſurfaces are plane. It is convex in front, a little concave behind. It is longer, thicker, larger in all reſpects, and more cylindrical, in proportion as we deſcend. The body of the firſt, or even of the ſecond alſo, is flattened in front, like thoſe of the cervical; but the third, fourth, fifth, and ſixth, have the cordiform ſhape, being broad behind, and narrow in front; the ſeventh, eighth, and the reſt, are more and more cylindrical. Generally, the third and fourth are the ſmalleſt of all. At its lateral and poſterior part there is a ſmall articular ſurface above and below, of which the upper is the largeſt. Theſe cartilaginous ſurfaces form, with the correſponding ones of the neighbouring vertebræ, and the intermediate fibro-cartilages, the articular concavities, which lodge the heads of the ribs. Sometimes the firſt dorſal vertebra has an entire articular concavity at its upper edge, and a half cavity below: or the upper may be a half cavity alſo, the articulation being completed by the lower margin of the ſeventh cervical. In the eleventh and twelfth there is a ſingle cavity only, placed either at the upper edge or towards the middle of the bone, and receiving by itſelf the head of the correſponding rib. The ring is ſmall and circular. The plates are broad, thicker, and more perpendicular than in the neck; and they give origin to a very long ſpinous proceſs, which is priſmatic, pyramidal, broad at the baſis, and growing narrower at the oppoſite extremity, which is pointed, and directed obliquely backwards and downwards. The ſpinous proceſs of the firſt dorſal vertebra is thick, extended nearly horizontally, and ends in a flattened tubercle. The ſecond, and particularly the third, is more ſlanting; the upper margin more acute; and the extremity longer and more pointed. Theſe characters become more ſtrongly marked in the fourth to the ſeventh or eighth: they are very long, and pointed, the ſuperior edge is very acute, and the inferior ſurface is nearly flat; they ſlope ſo much, that they lie one over the other, in cloſe contact, while thoſe of the three upper and four lower ſtand quite apart. The effect which this arrangement muſt have in limiting the poſterior inflexion of the column is very obvious. In the four loweſt dorſal vertebræ, the depth of the ſpinous proceſſes, from above downwards, is increaſed; they are extended more horizontally, and the length of their points is diminiſhed. The ſpinous proceſſes of the dorſal vertebræ are ſeldom all arranged in the ſame perpendicular line: one may deviate to the right, another to the left, &c. The articular proceſſes are perpendicular, the ſuperior being directed backwards, the inferior forwards, excepting the inferior ones of the twelfth, which are turned outwards, to be adapted to the ſuperior proceſſes of the firſt lumbar vertebra.

The tranſverſe proceſſes are very thick, and conſiderably inclined backwards: this, together with the concavity of the column in the back, enlarges the ſpace for the reception of the lungs. When the ſpine is viewed laterally, the tranſverſe proceſſes of the dorſal are conſiderably behind the line of thoſe of the cervical or lumbar regions. Each of them has a ſmall plane, or very gently concave, ſurface, on the anterior part of its extremity, by which it is articulated to the tubercle of the correſponding rib. Theſe ſurfaces are directed upwards in the ſuperior vertebræ, downwards in the inferior. The tranſverſe proceſſes decreaſe conſiderably from the tenth to the twelfth; and the two laſt have no ſurface for articulation with the ribs.

The configuration of the twelfth dorſal vertebra differs very little from that of the lumbar.

To the vertebræ of this region the following muſcles are affixed: *viz.* ſplenius capitis and colli, trachelomaſtoideus, biventer cervicis, complexus, longus colli, tranſverſalis colli, ſemiſpinalis colli, ſemiſpinalis dorſi, multifidus ſpinæ, ſacrolumbalis, levatores coſtarum, intertranſverſales and interſpinales dorſi, latiſſimus dorſi, rhomboideus major, trapezius, ſerratus poſticus ſuperior and inferior.

The *lumbar vertebræ* are ſeldom ſix in number, and more rarely four. Their great ſize, which increaſes down to the laſt, diſtinguiſhes them from thoſe of the back and neck; while the thick fibro-cartilages, by which they are joined together, and the free ſpace between their ſpinous proceſſes, give them conſiderable power of motion. The bodies are large and cylindrical, with flat ſurfaces above and below, excepting the inferior, which is cut off obliquely, to accommodate it to the ſacrum, with which it is united to form the promontory: the ring is triangular, and larger than in the neck. The laminæ are thick and ſtrong, and form a large ſpinous proceſs, which is flattened laterally, terminating above and below in a thin edge, and forming a rounded end behind. That of the laſt is very ſhort, and ſometimes entirely wanting. The tranſverſe proceſſes are flattened, and rather turned backwards: it is ſhort in the firſt, increaſes in the ſecond and third, then again diminiſhes. The articular proceſſes are perpendicular; the ſuperior ſlightly concave, and the inferior proportionally convex. The former have their articular faces turned inwards and backwards; the latter outwards and forwards: the ſpace between the ſuperior is, therefore, neceſſarily more conſiderable than that between the inferior.

The following are the muſcles attached to the lumbar vertebræ; *viz.* interſpinales and intertranſverſales lumborum, ſpinalis dorſi, multifidus ſpinæ, quadratus lumborum, obliquus internus and tranſverſus abdominis, ſacrolumbalis and longiſſimus dorſi, ſerratus poſticus inferior, the diaphragm, the pſoæ major and minor.

The bodies of the vertebræ conſiſt almoſt entirely of ſpongy texture; it is covered by a very thin layer of compact bone: hence a vertebra, when thoroughly cleaned, is very light in compariſon to its bulk. In the recent ſtate it appears bloody and medullary. The circumference of the two ſurfaces is ſmooth, the centre rougher. At the ſame time that the cellular ſtructure of the vertebral bodies increaſes the ſtrength of the column, without adding to its weight, it makes theſe bones liable to thoſe affections which belong more particularly to ſuch ſtructure. The compact tiſſue is tolerably abundant in the atlas and axis; and it predominates conſiderably in the proceſſes, which, however, are cellular in their middle, and in parts where they are ſwelled, as at the ends of the ſpinous proceſſes in the loins, &c. The oſſification of the vertebræ goes on in three pieces; one for the body, and the two others for the lateral and poſterior parts: yet ſeparate points may be ſometimes ſeen at the baſes of the ſpinous proceſſes. The lateral portions are united to each other behind, at the baſis of the ſpinous proceſs; and they are united in front to the body, at the ſituation of the articular proceſſes. The atlas uſually has five primitive bony pieces; one for the anterior arch, two for the poſterior, and one for each ſide.

We have included the ſacrum and the os coccygis in the enumeration of pieces compoſing the ſpine, although they are generally denominated bones of the pelvis. Their deſcription may in truth be connected, without impropriety, either with that of the laſt mentioned cavity, or of the vertebral column. They belong, however, more naturally to the latter. The ſacrum is formed on the ſame model as the vertebræ, and conſiſts originally of five diſtinct pieces, juſt like vertebræ, united by fibro-cartilages; differing from vertebræ only in ſome inſignificant points of ſize, figure, &c. Theſe pieces are indeed ſoon conſolidated into one bone, which then has much leſs reſemblance to the vertebræ than it had before. One great office of the ſpinal column, that of continuing and protecting the medulla ſpinalis, belongs equally to the ſacrum. The modification which the ſpine exhibits in this part, ariſes from the attachment of the lower limbs: a large ſurface is neceſſary for this purpoſe, and a ſtrong bone; and theſe conditions are anſwered in the ſacrum, which in every other reſpect has the configuration belonging to the ſpine.

The *ſacrum* (os latum, clunium) is the largeſt bony piece of the vertebral column, placed immediately below the laſt lumbar vertebra, and at the back of the pelvis; ſupporting, above, the head, upper limbs, ſpine, and ſuperior part of the trunk, and tranſmitting the weight thus received from the laſt lumbar vertebra to the pelvis, where its broad ſides are ſtrongly tied to the oſſa innominata, between which it is received like a wedge; and containing the lower extremity of the medulla ſpinalis. Its baſis is joined to the laſt lumbar vertebra, in the ſame way as the individual vertebræ are connected to each other; its apex is united to the firſt bone of the coccyx. When viewed in its ſituation, it is not placed perpendicularly, but turned backwards, making an angle with the lumbar vertebræ, called the promontory.

The figure of the bone is wedge-ſhaped or triangular, with the baſis turned upwards, the apex downwards, and the two ſides placed laterally. It is ſymmetrical. It is not only broadeſt above, but alſo thickeſt from before backwards, and gradually diminiſhes downwards in both theſe directions. It is concave in front, and tolerably ſmooth, convex, and rugged behind. We ſhall deſcribe its ſpinal, pelvic, vertebral, and coccygeal ſurfaces, and the two lateral ſides.

The ſpinal ſurface is convex, very irregular, and covered by the origins of the muſcles, which fill the lateral hollows of the ſpinal column. We obſerve in it, 1ſt, on the middle line, four eminences, diminiſhing in ſize from above downwards, analogous to the ſpinous proceſſes of the vertebræ, of which they continue the ſeries, ſometimes running into a continuous bony ridge. Theſe are the ſpinous proceſſes of the ſacrum, affording points of attachment to muſcles. They are terminated below by a triangular opening, the end of the ſacral canal, which is cloſed by the poſterior ſacrococcygeal ligament, and bounded laterally by two prominent knobs, which are uſually articulated to two correſponding ones of the coccyx. Under theſe, ſometimes called the deſcending proceſſes of the ſacrum, the laſt ſacral nerve paſſes. The inferior opening of the ſacral canal is ſometimes much more extenſive, reaching nearly to the upper part of the bone, ſo that the canal is ſlit in its whole length: the opening in ſuch inſtances is ſtill occupied by ligament. 2dly. On each ſide, a rough depreſſion above, for the inſertion of powerful ligaments, which tie the ſacrum to the os innominatum; and, lower, four poſterior ſacral foramina, ſituated in a channel continuous with that of the vertebræ, but ſhallower, and filled by the lumbar muſcles. Theſe holes, diminiſhing in diameter from above downwards, are traverſed by the poſterior branches of the ſacral nerves, and communicate with the canal of the bone: they are bounded externally by more or leſs diſtinct prominences, which may be conſidered as repreſenting the tranſverſe proceſſes of the vertebræ.

The pelvic ſurface is concave, and correſponds more particularly to the rectum. It preſents, 1ſt, on the middle line, four ſlight tranſverſe ridges, indicating the points of union between the original pieces of the bone, and ſeparated by quadrilateral ſurfaces, a little concave, which anſwer to the anterior part of the bodies of the vertebræ; 2dly, on each ſide, the four anterior ſacral foramina, much larger than the poſterior, oppoſite to which they are placed, and with which they communicate by the ſacral canal, diminiſhing in ſize from above downwards, giving paſſage to the anterior branches of the ſacral nerves, and ſeparated by bony intervals, uniting in a ſurface, to which the pyramidalis is attached.

The vertebral ſurface, repreſenting the baſe of the triangle, exhibits a configuration very ſimilar to that of the ſurface of a vertebra, and is adapted for union with the laſt lumbar vertebra. On the middle and anterior part there is an oval ſmooth ſurface, cut rather obliquely, to correſpond to the oblique inferior ſurface of the laſt-mentioned bone, with which it is joined by means of a fibro-cartilage, at an angle, which forms the promontory of the pelvis. Immediately behind this is ſeen the orifice of the ſacral canal, which has a flattened triangular figure, with the baſis turned forwards, and the apex towards the ſpinous proceſſes; diminiſhes in ſize from above downwards; is continuous with the vertebral canal, from which it receives the lower end of the medulla ſpinalis, ſurrounded by its membranes; communicates externally by the anterior and poſterior holes juſt deſcribed, and terminates below at the triangular fiſſure already noticed. On each ſide of this round articulating portion the ſacrum forms, in front, a ſmooth, convex, tranſverſe ſurface, continuous with the iliac foſſa, and covered by ligaments. Behind, there are two concave articular proceſſes, facing backwards and inwards, and joined to the inferior articular proceſſes of the laſt lumbar vertebra. This proceſs is bounded in front by a ſlight notch, contributing to the opening for the paſſage of the laſt lumbar nerve; and behind by a thin edge, forming the lateral boundary of the ſacral canal, correſponding to the margin of the vertebral laminæ, and having the laſt of the yellow ligaments attached to it.

The coccygeal ſurface, repreſenting the baſe of the triangle, is very ſmall, and forms an oval face articulated to the coccyx.

The edges of the ſacrum are formed into broad ſurfaces, for articulation with the oſſa innominata. In theſe parts, which repreſent the tranſverſe proceſſes of the vertebræ, the reſemblance between them and the former bone is the leaſt. Each edge exhibits, above, a ſurface above two inches long, and an inch and a half broad, united with the os innominatum by the ſacro-iliac ſymphyſis, oblique in its direction, in conſequence of the wedge-like figure of the bone, and gradually decreaſing in breadth from above downwards, as the whole ſacrum diminiſhes in thickneſs in the ſame direction. This articular ſurface is divided by a waving line from above downwards, into the anterior and poſterior part: the former is comparatively ſmooth, and united by the intervention of a cruſt of cartilage to the os innominatum; the poſterior is ſcabrous and irregularly excavated, to afford attachment to powerful ligaments paſſing between the two bones.

The coccygeal extremity, or the apex of the triangle, is an oval ſurface for articulation with the firſt bone of the coccyx.

The bony ſubſtance of the ſacrum is like that of the vertebræ, cellular internally, and covered on the outſide with a compact layer. It is more denſe in the ſpinous proceſſes.

The multifidus ſpinæ, the longiſſimus dorſi and ſacrolumbalis, gluteus maximus, pyriformis, ſerratus poſticus inferior, latiſſimus dorſi, and obliquus internus abdominis, are connected to the ſacrum.

This bone is compoſed originally of five pieces, exactly reſembling vertebræ, joined together by fibro-cartilages, which remain till the fourteenth year, or longer, after which the ſeparate portions are conſolidated into one bone. Hence the ſacrum and os coccygis have been called the column of falſe vertebræ. Each of the ſacral vertebræ poſſeſſes in the fœtus certain diſtinct bony nuclei, like thoſe of the true vertebræ. There are five in each of the three upper ones, and three in each of the two lower. The lateral portions are conſolidated firſt; the anterior and poſterior parts later. The cartilages of the front diviſions do not entirely diſappear till the time of puberty, or even afterwards.

The ſacrum ſometimes conſiſts of ſix portions; very ſeldom of four.

The *coccyx* (os, or more properly oſſa, coccygis) is a triangular ſymmetrical bone, conſiſting of four pieces, which are united by cartilaginous ligaments in ſuch a way as to form a continuation of the curvature of the ſacrum, placed at the poſterior and inferior part of the pelvis, where it ſupports the termination of the rectum. The firſt piece is the largeſt, and they decreaſe ſucceſſively, but not always ſo: their breadth exceeds their length: they are joined by articular ſurfaces. The ſpinal face of the bone is convex, uneven, and marked by prominences, which indicate the original diviſions. The great ſacro-ſciatic ligament, and the gluteus maximus, are attached to it. To the pelvic ſurface, which is gently concave, marked by tranſverſe ridges, and covered by a thick ligamentous ſtratum, the rectum correſponds. The ſacral ſurface is the broadeſt and thickeſt part of the bone: it has an oval concavity articulated to the ſacrum, and behind that two aſcending tubercles, which join the two deſcending ones of the ſacrum, and form together the openings through which the laſt ſacral nerves paſs out. The edges are uneven, and occupied by the attachment of the leſs ſacro-ſciatic ligament: they unite below in a rounded angle, to which the levator ani is connected.

While the bones are ſeparate, the firſt is the largeſt: it is triangular, convex behind, and concave in front; the ſecond, third, and fourth, are circular and flattened.

The gluteus maximus, the curvator coccygis, the coccygeus, the levator ani, and ſphincter ani, are inſerted in this bone.

The bony ſubſtance of the coccyx is ſpongy, and remarkably looſe and ſoft in its texture. In the fœtus the four pieces are completely cartilaginous, and the oſſification takes place later than in the ſacrum. Late in life the different portions frequently anchyloſe; and ſometimes the bone itſelf is anchyloſed to the ſacrum: the latter event is leſs frequent in the female.

Articulations of the Vertebral Column.—From the great number of pieces which enter into its compoſition, the joints of the ſpine muſt neceſſarily be numerous. Moveable articulations are required, on account of the motions executed by various parts of the ſpine; but ſolidity and ſtrength are alſo neceſſary, becauſe the ſpine is the point of ſupport of the limbs and head, the centre from which their motions proceed, and becauſe it contains the ſpinal marrow, to which any injury, preſſure, or ſhock, would be ſo very dangerous. Hence we find the vertebræ joined by very broad ſurfaces, and otherwiſe very ſtrongly tied together, ſo that luxation is impoſſible, and the ſpine poſſeſſes as much ſtrength, as if it were compoſed of a ſingle piece, although a power of motion is combined with that capacity for reſiſtance. The numerous joints, and the great quantity of ſoft elaſtic matter in the ſpine, give a ſpring to all the motions of the trunk, and ſtop the effect of all ſhocks, ſo as to prevent their propagation, and to obviate concuſſion of important organs, particularly of the brain. But, beſides the articulations which join the component pieces of the ſpine, there are ſeveral others, by which various parts are joined to the ſpine. Such are the joints of the head with the firſt and ſecond vertebræ of the neck, and of theſe vertebræ with each other: theſe, and the motions they execute, are conſidered under the article HEAD. The connection of the ribs with the dorſal vertebræ is deſcribed under LUNGS. The articulation of the ſacrum with the oſſa innominata, and with the coccyx, and of the different pieces of the coccyx with each other, are deſcribed under PELVIS.

Articulations of the Vertebræ.—Theſe bones are joined, 1ſt, by their bodies; 2dly, by their articular proceſſes; 3dly, by their laminæ; and 4thly, by the ſpinous proceſſes. The mode of connection is the ſame throughout the ſpine, excepting in the caſe of the atlas and the axis. Of the uniting media, however, ſome form ſeparate and inſulated organs at each intervertebral interval; ſuch are the fibro-cartilages, and the yellow ligaments: others conſtitute common organs, embracing at the ſame time the whole vertebral column, or its greateſt part, as the anterior and poſterior vertebral and the ſupraſpinal ligaments. Yet the fibres of the latter do not run through the whole length.

The bodies of the vertebræ are united by an anterior and a poſterior vertebral ligament, and by a fibro-cartilage between every two bones.

The anterior vertebral ligament, or faſcia longitudinalis anterior, occupies the anterior ſurface of the column, extending from the axis to the upper part of the ſacrum. It is not equally ſtrong nor broad throughout: it is narrow in the neck, broader in the back, and ſtill wider in the loins. In the firſt ſituation it is thin, ſtronger in the ſecond, and again rather thin in the loins, where the tendons of the crura diaphragmatis are intermixed with it. The fibres of this ligament do not run through the whole length of the column; ſome end and others begin in each bone. This ligament conſiſts of a thin ſtratum cloſely adhering to the bone, and covered, in the neck, by the pharynx and œſophagus, in the back, by the latter, by the aorta, vena azygos, and thoracic duct, and in the loins by the aorta and the inferior vena cava. At the ſides it correſponds, in the neck, to the recti majores antici and longi colli; in the loins to the pſoæ. It adheres to the fibro-cartilages, and to the projecting edges of the vertebral bodies, more cloſely than to the concavities of the latter. The more ſuperficial fibres go from one vertebral body or fibro-cartilage to the fourth or fifth below; others belong to three bones or fibro-cartilages; and the deepeſt only to two. The fibres are interwoven with thoſe on the front of the fibro-cartilages; and they leave ſmall intervals for the paſſage of veſſels. At the ſides of this ligament in the neck, under the longi colli, are two ſmall fibrous faſciculi for each vertebra, paſſing obliquely downwards and outwards from the vertebra above to that next below it.

The poſterior ligament (faſcia longitudinalis poſtica) occupies the poſterior aſpect of the vertebral bodies, where they form the front of the canal, extending from the axis and the occipito-axoid ligament, or apparatus colli ligamentoſus, to the ſacrum. It is more denſe in its ſtructure than the anterior, and appears more diſtinct, ſmooth, and ſhining. The narroweſt part of it is in the back: it enlarges at the fibro-cartilages, and is contracted at the bodies of the vertebræ; thus, when viewed in its whole length, it is alternately contracted and expanded at each vertebra and its neighbouring cartilage. The dura mater covers it behind, ſeparated from it by a looſe cellular tiſſue, never containing fat, but often much ſerous fluid. It correſponds in front to the fibro-cartilages and the bodies of the vertebræ, adhering leſs cloſely to the latter than to the former. Like the anterior ligament, it conſiſts of ſuperficial and deep-ſeated fibres, of which the former are the longeſt, and paſs over three or four vertebræ, while the latter go from one bone or fibro-cartilage to the next.

The fibro-cartilages (ligamenta intervertebralia) are organs, of which the nature is little underſtood, holding the middle place, in point of ſtructure, between ligament and cartilage, and occupying the intervals of the vertebral bodies throughout the column, excepting between the atlas and axis. Their form varies according to that of the bodies which they unite; and conſequently is different in the neck, back, and loins. Their thickneſs increaſes ſucceſſively from above downwards; ſo that the lumbar are ſeparated by larger intervals than the cervical and dorſal vertebræ. Moreover, they are thicker in front than behind, in the neck: on the contrary, they are thickeſt behind in the back; and the arrangement in the loins is the ſame as in the neck: theſe differences are obviouſly connected with the natural bendings of the column. The fibro-cartilages adhere very intimately above and below to the correſponding flat ſurfaces of the vertebræ. In the fœtus they adhere to the cartilages of oſſification; when they are removed nothing remains attached to the vertebræ; but, in the adult, the bony fibres and thoſe of the fibro-cartilages are ſo completely identified, that we find no inſtances in the animal economy of ſtronger union. The circumference of theſe ſubſtances correſponds to the anterior and poſterior vertebral ligaments: on each ſide, they form part of the holes through which the ſpinal nerves paſs; and in the back they contribute to the articular cavities for the heads of the ribs.

The fibro-cartilages are formed externally of concentric fibrous laminæ, numerous in front and at the ſides, fewer behind, with decuſſating fibres, ſeparated by more conſiderable intervals as we approach the centre. In the latter we find a ſoft pulpy tiſſue, increaſing in quantity as the intervals increaſe in breadth. The fibrous laminæ degenerate gradually into the pulpy ſtructure, which occupies alone the middle of each fibro-cartilage. This tiſſue is moſt abundant in the child, where it is alſo ſoft, whitiſh, and even nearly tranſparent, while it is yellowiſh and thick in the adult. It becomes denſe and compact in the old ſubject, and is conſtantly diminiſhing. To it the fibro-cartilages owe their pliancy and elaſticity; while their ſtrength reſides in the laminæ, which incloſe this ſoft ſtructure. Hence the ſpine is diſtinguiſhed by the firſt property in infancy; while the other predominates afterwards. The laminæ ſoon become red when immerſed in water: the middle part ſwells and riſes into a conical projection. If the ſpine be ſawn through longitudinally, the fibro-cartilage ſwells out, on the cut ſurface, beyond the bone. The effect of theſe ſubſtances in reſtoring the column, when it has been bent in any direction, is very obvious. The inflexion compreſſes the fibro-cartilages at the bent part; and they reſtore themſelves as ſoon as the compreſſing cauſe ceaſes to act. When the body has been long erect, the fibro-cartilages yield to the weight which preſſes them from above, and thus the length of the ſpine, and conſequently of the body, is diminiſhed: the ceſſation of this preſſure, when the body is in the horizontal poſition, allows them to recover their original dimenſions. See CARTILAGE.

The correſponding faces of the articular proceſſes are covered by thin cartilaginous layers, and furniſhed with a ſmall ſynovial membrane, which is very cloſely drawn between the oppoſed ſurfaces, and contains very little ſynovia. Several ſhort and irregular, but ſtrong ligamentous fibres, lie on this membrane.

The yellow ligaments (lig. ſubflava), ſo called from their colour, tie together the laminæ of the vertebræ, which do not touch each other, and complete the canal of the ſpine, which would be otherwiſe open at the intervals of their laminæ. The firſt of theſe ligaments is placed between the ſecond and third cervical vertebræ; the laſt between the fifth lumbar and the ſacrum. Each conſiſts of two portions, a right and left, united at an angle towards the baſis of the ſpinous proceſs, and having at this union a ſmall interval containing a little cellular tiſſue. Each portion is attached, above, to the inner ſurface of the ſuperior lamina; and below to the upper edge of the inferior: hence they are hidden behind, and can only be ſeen to advantage from the vertebral canal; they may be beſt expoſed by ſawing out the ſpinous proceſſes, and their laminæ, from the vertebral column, in one continuous piece. They correſpond, in front, to the dura mater, to which they are connected by a looſe cellular tiſſue; behind, to the inner ſurface of the upper laminæ of each interval, and to the multifidus ſpinæ. The angle formed by the union of the two lateral pieces is continuous in the back and loins with the interſpinal ligaments: on the outſide each is contiguous to the ſynovial membrane of the articular proceſſes. Their fibres are numerous and cloſely ſet; longer towards the canal, where they appear ſmooth and poliſhed, than towards the vertebral channel, where they are rough and uneven. There is very little cellular tiſſue in their compoſition, ſo that they are diſſolved under ebullition with great difficulty, and reſiſt it longer than any analogous organs. They are elaſtic, very ſtrong, ſo that vaſt force is required to break them: ſtronger indeed than the fibro-cartilages, in which the fibres are ſeparated by much of the pulpy texture. It is very clear that theſe ligaments will powerfully tend to reſtore the ſpine, after it has been inclined forwards.

The ſpinous proceſſes, ſeparated by intervals more or leſs conſiderable in different ſituations, are united by two kinds of ligaments; one of which connects the proceſſes themſelves, while the other envelopes their points.

The interſpinal ligaments (membrana interſpinalis) occupy the intervals of the proceſſes, but do not exiſt in the neck, where the correſponding ſpaces are filled by the interſpinales muſcles. Their breadth and ſtrength increaſe from above downwards; in the back they are narrow, elongated, and thin, and can ſcarcely be ſaid to exiſt in the upper part of the region. They are quadrilateral, broader and thicker in the loins, where they may offer conſiderable reſiſtance to the ſeparation of the proceſſes. Their points of attachment are the lower edge of one ſpinous proceſs, and the upper edge of the next: they correſpond, in front, to the angle of union of the two portions of the yellow ligaments; behind, to the ſupraſpinal ligaments; and on the ſides, to the multifidus ſpinæ and longiſſimus dorſi. They are compoſed of decuſſating fibres.

The ſupraſpinal ligament (lig. quo apices vertebrarum connectuntur) extends along the points of the ſpinous proceſſes of the back and loins, from the ſeventh cervical vertebra to the ſpinous proceſſes of the ſacrum. It is very thick in the loins, where it is ſo interwoven with the tendinous attachments of the muſcles, that they can hardly be diſtinguiſhed. In the back it is thinner and more diſtinct from the aponeuroſis. The longitudinal direction of its fibres ſerves to diſtinguiſh it from the tendons, of which the fibres are oblique. Its fibres are of different lengths; the deepeſt go from bone to bone; the more ſuperficial are longer, paſſing over one, two, or more vertebræ, and giving origin to the aponeurotic fibres of the neighbouring muſcles. The ſkin covers this ligament behind; adhering to it by a cloſe cellular tiſſue.

The ligamentum nuchæ, which ariſes from the cervical ſpinous proceſſes, belongs more to the head than to the ſpine. It is deſcribed under HEAD.

The laſt vertebra of the loins is articulated to the ſacrum, juſt in the ſame way as the individual vertebræ are joined together; *viz.* by a fibro-cartilage, by yellow ligaments, by an interſpinal ligament, and by articular proceſſes.

The Spine conſidered as a Whole.—The twenty-nine bones juſt deſcribed, *viz.* the twenty-four vertebræ, the ſacrum, and the four oſſa coccygis, are joined by the articulations which have been now explained, (all being connected by the intervention of fibro-cartilages, except the atlas,) ſo as to form, by their aſſemblage, the ſtrong but flexible bony column which ſuſtains the head, forms the baſis of the trunk, affords a point of attachment to the upper limbs, and below is received between and ſupported by the haunch bones. We diſtinguiſh in it an anterior, a poſterior, and two lateral regions, and two extremities. We may obſerve, in general, that the whole column increaſes in ſize from above downwards, as it has to ſupport an increaſing weight; but to this there are ſome exceptions, that will be noticed.

The anterior region, compoſed of the bodies of the vertebræ and the intermediate fibro-cartilages, preſents in ſome degree the appearance of a bony pillar, which term is little applicable to the rows of bony proceſſes, which form the lateral and poſterior aſpects of the ſpine. This region is broad in the neck, narrow in the back, and again ſpreads out in the loins. Its breadth in the firſt ſituation ariſes from the ſmallneſs and inconſiderable prominence of the vertebral bodies; in conſequence of which the tranſverſe proceſſes in this region form part of the anterior aſpect of the ſpine; while in the back and loins, the bodies form, by their bold convex projection, the whole front of the column. The front of the ſpine preſents a ſeries of ſuperficial tranſverſe excavations, and of prominent edges which bound them: the number of the latter is double that of the former, as each tranſverſe channel is bounded above and below by a ridge. Theſe excavations are confined to the front in the neck; but they reach to the ſides in the middle of the column. The anterior vertebral ligament, the recti capitis majores, the longi colli, the vena azygos, thoracic duct, aorta, and inferior vena cava, cover the ſpine in front.

We obſerve, on the poſterior aſpect, in the middle line, the ſeries of ſpinous proceſſes, projecting horizontally at the upper and lower parts, and very ſlanting in the middle. They are ſeparated by intervals, which are large in the neck and ſtill more ſo in the loins; but very much narrowed in the back, in the middle of which the proceſſes actually overlap. In the neck and loins there are openings between the laminæ, leading into the vertebral canal, in the ſkeleton; but the ſlanting of the ſpinous proceſſes covers theſe in the back. The points of the ſpinous proceſſes are generally all in the ſame line; but there may be deviations, ariſing either from a lateral inclination of the proceſs, or from an unnatural poſition of the vertebra. On each ſide of the ſpinous proceſſes there is a longitudinal hollow, beginning at the upper extremity of the column, and ending below upon the ſacrum. Theſe lateral hollows are broad above, contracted towards the middle, and narrow below. They are formed by the ſeries of vertebral laminæ, ſeparated by larger or ſmaller ſpaces, which are occupied by the yellow ligaments. They are filled by the vertebral muſcles, particularly by the multifidus ſpinæ.

The ſeries of tranſverſe proceſſes occupies each lateral region; but they have not all the ſame direction: they are more anterior in the neck and loins, and thrown backwards in the back. Between them in the neck, and in front of them in the back and loins, there is a ſucceſſion of large holes, increaſing in ſize from above downwards, and giving paſſage to the vertebral nerves. In front of theſe, in the back, are the ſurfaces for articulation of the heads of the ribs.

The ſuperior extremity, articulated to the occiput, forms a right angle with it on each ſide; and an anterior and poſterior angle, which vary according to the flexion or extenſion of the head. This extremity preſents, from before backwards, the anterior arc of the atlas, the tooth-like proceſs, the commencement of the canal, and the poſterior arc of the atlas. On each ſide of the canal, towards the front, there is the concavity for the occipital condyle, and the large tranſverſe proceſs. The inferior extremity preſents merely the ſmall rounded point formed by the laſt bone of the coccyx.

The length of the ſpine does not vary greatly in different individuals; the differences of ſtature depending more on the limbs than on this column. In malformations, however, where it is curved in various directions, the ſtature is much affected; and the limbs, although not exceeding their ordinary ſize, appear diſproportionately long. We have already obſerved, that the compreſſion of the fibro-cartilages by the weight which they naturally ſupport, diminiſhes the length of the ſpine after long ſtanding; and that the column recovers its former length by repoſe in the horizontal poſture. This effect is leſs ſtrongly marked in the old ſubject, where the fibro-cartilages are very denſe, and conſequently do not eaſily yield to preſſure.

The ſize of the column increaſing from above downwards, in proportion to the greater weight and more powerful effects it has to ſupport, it may be regarded as a pyramid, of which the baſis is below, and the apex above. Yet this augmentation is not gradual throughout; and the column may be conſidered as the aſſemblage of four pyramids. The upper end, including the atlas and axis, deſtined for articulation with the head, which it ſupports, is larger than the immediately ſucceeding part of the neck. From the third to the ſeventh cervical vertebra the ſpine is gradually expanded: thence, to the third or fourth dorſal vertebra, it contracts again; and is gradually augmented from the latter to the baſis of the ſacrum: it contracts again from the baſis of the ſacrum to the apex of the os coccygis. Meaſured tranſverſely, the ſpine increaſes from the third cervical to the fifth dorſal vertebra, while the remaining dorſal and the lumbar vertebræ are nearly of the ſame breadth, or increaſe very ſlightly downwards. The depth of the vertebræ is alſo increaſed; but the inferior cervical are all nearly of one depth.

The intervertebral intervals are nearly of uniform ſize, down to the third dorſal; from which they increaſe downwards. The flat ſurfaces of a vertebra are always parallel to each other, and the intervals are conſequently of the ſame depth before and behind. There is an exception, however, of the parts in which the column is bent; the intervals of the third, fourth, fifth, and ſixth dorſal vertebræ being narroweſt in front, while thoſe between the fourth and fifth lumbar, and the ſacrum, are broadeſt in front.

The ſpinal column is ſtraight, when viewed before or behind; and might be divided by a perpendicular line into a right and left correſponding half: but, when we view it laterally, we find that it is bent in ſeveral parts, ſo as to deſcribe a waving line, in which each anterior prominence is accompanied by a correſponding poſterior convexity. The cervical portion projects ſlightly in front; the dorſal is decidedly convex behind. The concavity of the dorſal part of the ſpine combines with the inclination backwards of the tranſverſe proceſſes to increaſe the capacity of the thorax. The greateſt depth of this concavity is oppoſite to the lower bone of the ſternum. In the loins, the ſpine is again convex in front, while the ſacrum and coccyx ſlant backwards remarkably, ſo as to preſent a deep concavity. The middle of the firſt convexity correſponds to the fourth cervical vertebra; that of the ſucceeding concavity to the ſeventh or eighth dorſal; the middle of the lumbar projection to the junction of the fifth lumbar vertebra with the ſacrum; and that of the ſacral concavity to the middle of the bone. About the third, fourth, and fifth dorſal vertebræ, the ſpine is ſometimes a little convex towards the right. This has been aſcribed to the preſence of the aorta; but that cauſe is manifeſtly inadequate. The explanation, which is grounded on the greater uſe of the right arm, and a conſequent inclination of the trunk to the left ſide, in order to afford a firmer point of ſupport, appears rather more probable. Any habitual attitude, particularly when perſiſted in from childhood, will affect the direction of the vertebral column. Under various diſeaſed ſtates, remarkable curvatures are produced; in which we find that the vertebræ and their fibro-cartilages become accommodated to the unnatural poſition, being greatly diminiſhed in depth on the concavity of the curve, ſo that the two ſurfaces are no longer parallel. It is alſo conſtant, that a bend in one part renders curvature neceſſary in another, in order to preſerve the centre of gravity in a ſtraight line. The poſition of the head and upper limbs is alſo calculated to maintain the equilibrium of the body; and thus nearly the whole frame is influenced by a cauſe originally affecting only a part of the ſpine.

The canal of the ſpine extends throughout the column, excepting a ſmall portion of the lower end of the ſacrum and the os coccygis: it is continuous, above, with the cavity of the cranium, and ends below on the back of the ſacrum. It does not occupy the centre of the column, being placed much nearer to the poſterior part. In the neck it is large; more ample in the upper than in the lower part of the back, the narroweſt part being from the ſixth to the ninth: it expands a little in the eleventh and twelfth dorſal vertebræ, is very large in the lumbar, and again ſuddenly contracted in the ſacrum. Its figure is triangular, with the angles rounded; ſo that it has an anterior, and a right and left ſurface; it is more nearly round in the middle, and quite triangular in the ſacrum. It partakes of all the curvatures of the ſpine. It is formed in front of the backs of the vertebral bodies and fibro-cartilages, covered by the poſterior ligaments. Behind, the laminæ and the yellow ligaments compoſe it. On each ſide it preſents a ſeries of twenty-nine large foramina for the paſſage of the nerves; or there are thirty, if we include the exit of the firſt cervical pair, between the occiput and the atlas.

This canal is lined by a prolongation of the dura mater, including the medulla ſpinalis, covered by its arachnoid coat and pia mater. (See Brain and Nervous *Syſtem.*) The dura mater is ſurrounded by a looſe cellular tiſſue, containing ſerous fluid.

Developement of the Spine.—Few parts of the ſkeleton undergo more remarkable changes in the progreſs of oſſification than the vertebral column. It differs much in the child and the adult; and in old age is again very different from both.

It is one of the firſt parts formed in the embryo, where it ſeems to be a kind of foundation, on which the ſtructure of the body is erected. Its form is diſcernible at the end of the third week after conception, when we can juſt ſee the head and a curved line connected to it. Long before the extremities can be ſeen, the ſpine continues viſible. The commencement of its oſſification by numerous points may be dated about the end of the ſecond month. The gelatinous ſpine, or carina, as it has been called from its incurvated keel-like ſhape, is the firſt trace of developement in the incubated egg.

The formation of the ſpine is more advanced, and its ſize more conſiderable, in compariſon with other parts, particularly with the pelvis and lower limbs, at the time of birth. Hence the trunk is proportionably longer. The general ſtature too, at this time, depends on the ſpine, while in the adult it is influenced more by the lower limbs. This great length of the ſpine correſponds to the depth of the cranium, which is much more conſiderable proportionally in the fœtus and young ſubjects than in the adult. The vertebral canal being alſo large, the breadth of the column, which depends much on the ſize of the canal, is conſiderable. All parts which relate to this excavation are much advanced. On the contrary, whatever has reference to ſupport or locomotion, is little developed at this time. The ſpinous proceſſes do not exiſt; conſequently the points of attachment for the muſcles are weaker. The bodies are ſtill in great meaſure cartilaginous: behind, where they contribute to the canal, they are the moſt formed; but there is much ſoft ſubſtance in front, where, when the ſpine is dried, we ſee merely a ſeries of rounded bony tubercles. Such a ſtate is very unfavourable to the ſolid ſupport which is neceſſary for preſerving the erect attitude. At this age, the tranſverſe proceſſes are ſmall in the loins, where they relate to the muſcles only; they are much more conſiderable in the back and neck, on account of their connection with the ribs and the vertebral artery.

The column, at this time, does not form a pyramid, of which the baſis is downwards and the apex upwards. The cervical portion is larger than the lumbar, on account of the developement of the tranſverſe proceſſes, which, being placed nearly on the ſame line with the bodies, give to the former region a conſiderable volume; and of the comparatively imperfect ſtate of the lumbar vertebræ. The dorſal and lumbar regions are nearly equal in ſize; but in ſome inſtances the former vertebræ are largeſt. As the principal effort, in ſtanding, is ſupported by the loins, the imperfect ſtate of the lumbar vertebræ is very unfavourable to the maintenance of that attitude in the newly born child. The imperfectly developed ſtate of the bones coincides with the inconſiderable volume of the pelvis.

The direction of the column is remarkable in the fœtus: it is ſtraight, or at leaſt exhibits the hardly ſenſible commencement of thoſe curves, which it will preſent in the ſequel. In conſequence of this ſtraightneſs, the vacillations which occur in the erect poſture of the body, and in all the motions executed in that poſture, are much more ſenſible, and the centre of gravity is more eaſily carried beyond the baſis of ſupport. Hence another reaſon why newly born children cannot keep themſelves upright, or move in that attitude.

The vertebral column, in early age, is ſmall and narrow in front, particularly at the back and loins. In conſequence of the want of ſpinous proceſſes, there is great flexibility, particularly backwards. The latter property is favoured by the large quantity of ſoft ſubſtance in the column; the cartilaginous portion of the vertebral bodies being added to the fibro-cartilages. The vertebral channels are very ſhallow, in conſequence of the ſtate of the ſpinous proceſſes. The lateral holes are very large: the laſt lumbar vertebra does not form ſo marked an angle with the ſacrum. The upper end of the column does not differ materially from its ſtate in the adult.

As oſſification proceeds, all the peculiarities juſt enumerated gradually diſappear. The erect attitude is more ſecure, and progreſſion is performed with greater facility. Hence the ſupport of the trunk by all the limbs, is a reſult of the organization of the fœtus. The child, having crawled about for ſome time, gradually experiences thoſe developements of its bony and muſcular fabric, which enable it to appear in the erect poſture as a biped. The vertebral column, however, arrives at the ſtate which we have deſcribed as exiſting in the adult, by a very ſlow progreſſion. At the time of puberty, in both ſexes, the atlas and the coccyx are complete. In the ſix lower cervical vertebræ, the proceſſes are not yet conſolidated to the body; and the vertebræ of the back and loins are ſtill leſs complete, having a bony plate at each ſurface of the body, and a bony nucleus in the ſpinous proceſs. Slight marks of the original ſeparation are ſtill viſible in the ſacrum. In a few years theſe imperfections diſappear; the apices of the ſpinous proceſſes of the back and loins being among the laſt parts that are conſolidated.

In the old ſubject, the intervertebral fibro-cartilages ſhrink and become harder: ſometimes, but very rarely, they oſſify. The ſpine, at this age, generally bends forwards, apparently from debility of the poſterior muſcles: thus, the force which ſhould counterbalance that tendency to fall forwards, ariſing from the poſition of the viſcera in front of the ſpine, is gradually loſt. To counteract this inclination of the ſpine forwards, and ſupport the centre of gravity, the pelvis recedes, and the knees and legs project in front. The latter circumſtance is more ſtrongly marked in proportion as the inclination of the ſpine forwards is more conſiderable. The weight of the trunk being carried towards the front, the baſe of ſupport muſt move forwards alſo. There is always an exact proportion between the bending of the ſpine, the receding of the pelvis, and the advance of the knees. In this caſe, the trunk and lower limbs together exhibit the ſame phenomenon as the ſpine itſelf in its particular curves, which balance each other in the neck, back, and loins.

Mechaniſm of the Spine.—This muſt be conſidered in three points of view: 1ſt, with reference to the canal; 2dly, as the point of ſupport of the trunk; and 3dly, as the centre of the motions performed by the latter.

1. *Of the Canal.*—All the arrangements about the vertebral column are calculated to enſure the ſafety of this part. The breadth of the vertebral bodies; the multiplicity and ſtrength of the uniting ligaments; the parts lying in front of the ſpine in the neck, cheſt, and abdomen; and the thick muſcular maſſes that fill the vertebral hollows behind; all concur in protecting the contents of the canal from external injury. Hence the reſiſtance which the ſpine oppoſes to all efforts directed againſt it; a reſiſtance which renders luxation impoſſible. The individual vertebræ are capable of ſo very ſlight a motion, that the medulla ſpinalis cannot be compreſſed in any inflexions of the ſpine.

2. *Mechaniſm of the Spine in Standing.*—Here the ſpine is the point of ſupport of the trunk, of which it tranſmits all the weight, together with that of the head, to the pelvis.

The mode in which the head is ſupported on the ſpine, is conſidered under the article Head. The part in front of the articulation certainly preponderates over that behind;

but the difference is leſs conſiderable, than it would appear from noticing merely the relation of the occipital condyles to the front and back of the head, in conſequence of the anterior portion containing the face, of which the weight does not correſpond to the bulk, while all the poſterior part is ſolid and heavy.

If the poſition of the head tends to incline the ſpine forwards, the ſame effect is much more ſtrongly produced by the ſituation of the pectoral and abdominal viſcera wholly in front, without any thing to counterbalance them behind. The muſcles of the vertebral channels, inſerted either in the ribs or the vertebræ, exert a conſtant effort in oppoſition to that of the anterior viſcera, maintaining by their exertion the vertebral column, and, conſequently, the trunk, in the erect attitude. The greateſt effort is below, where the ſpine ſupports the moſt conſiderable weight. Here the muſcles are thicker, the bones large, and their proceſſes more prominent. Here, too, the ſenſe of fatigue is felt after long ſtanding; whence ariſes the practice of tying a firm band round the loins, to ſupport the muſcles and favour their action.

Thus, in ſtanding, the ſpine is placed between two forces acting in oppoſite directions; an anterior paſſive one, which is the trunk; a poſterior active one, the action of the extenſor muſcles. The habitual tendency of the ſpine to bend forwards, produced by the weight of the viſcera, is further obviated by the hip-joints, at which the trunk is ſuſtained on the lower limbs, being placed in front of the ſacro-iliac ſymphyſes. The baſis of the trunk occupies the ſpace between the latter ſymphyſes and the cotyloid cavities. It will be readily underſtood that falls muſt have been much more frequent, if the thighs had been articulated on the ſame line with the ſacrum. The waving line deſcribed by the vertebral column, and allowing extenſive motion in the upper parts, without the line of gravity, which paſſes through all the curves, abandoning the baſe of ſupport, is another diſpoſition very favourable to the ſolidity of the trunk in its erect attitude. The gradual increaſe in ſize of the column, from above downwards, contributes to the ſame end. Thus, ſtanding cannot be regarded, by any means, as an attitude of repoſe; it requires great efforts, which naturally cauſe conſiderable laſſitude, if the poſture be long maintained.

3. *Motions of the Spine.*—The general motions are, forwards, backwards, to either ſide, or in the intermediate directions. Inclination forwards, or flexion, as it is commonly termed, is the moſt extenſive, as all our principal efforts have this direction. In this motion, the anterior vertebral ligament is relaxed; the fibro-cartilages are looſened in front, and ſtretched behind; the poſterior vertebral ligament, the yellow ligaments, and thoſe of the ſpinous proceſſes, are ſtretched. The laminæ of the fibro-cartilages, being much more numerous in front than behind, yield more readily to motion in the former than in the latter direction. In extenſion, we obſerve phenomena exactly contrary to theſe. The muſcles, however, which produce extenſion, being fixed to the vertebral proceſſes, are very near the centre of motion, and, conſequently, act leſs powerfully than the flexors, which operate through the medium of the ribs, and, conſequently, at a diſtance from the centre of motion. The ſpinous proceſſes, too, particularly of the back, limit extenſion very much.

In inclination to either ſide, the fibro-cartilages are principally affected; being ſtretched on one ſide and relaxed on the other. The ribs principally limit this motion, by coming in contact with each other.

All theſe motions are much more ſenſible at the junction of the dorſal and lumbar regions than elſewhere. When they are all performed in ſucceſſion, the trunk is carried round in a circular direction, deſcribing a cone, of which the baſis is upwards, the apex downwards.

Beſides the motions juſt enumerated, a power of rotation has been aſcribed to the ſpine, in which the vertebræ are ſuppoſed to be twiſted on their axes. Winſlow admits this, and Bichat does the ſame; adding, however, that it can only be accompliſhed with conſiderable difficulty. He calls it a ſpecies of general twiſting, in which all the ligaments are ſtretched, reſulting from the partial twiſting of each fibro-cartilage. When we conſider how the vertebræ are joined together; when we reflect on the nature of the fibro-cartilages, on the yellow ligaments, on the mechanical locking of the articular proceſſes, and more particularly on the attachments of the ribs, and the overlapping ſpines in the back, we ſhall begin to doubt whether this rotation be poſſible. Dr. Barclay decidedly denies it. (Muſcular Motions, p. 337, et ſeq.) If the head and ſhoulders be prevented from moving on the trunk, and the pelvis be alſo kept motionleſs, no rotation of the ſpine can be effected. An appearance takes place, which might be aſcribed to ſuch a rotation, from a motion of the pelvis on the hips. This may eaſily be detected, by placing a rod of ſome feet in length acroſs the pelvis, when any motion of the latter will be immediately viſible at its extremity.

The motions vary in each region: on account of the ſmallneſs of the vertebræ, the obliquity of the articular proceſſes, the ſhortneſs and horizontal projection of the ſpinous proceſſes, which are not tied together by interſpinal ligaments, the quantity of motion in all the directions already enumerated is conſiderable. The cervical region either repreſents a ſimple lever, or it may be conſidered, in connection with the head, as an angular lever, and will follow all the motions of that part. In one part of this region there is a true rotatory motion; it is at the articulation of the atlas with the axis. Whenever the head is twiſted to one ſide or the other, there is a revolution of the former bone on the latter, and not any general twiſting of the ſpine.

Every thing concurs to limit motion in the back: for example, the articulations of the ribs to the bodies and tranſverſe proceſſes, and their connection to the ſternum in front; the length and overlapping of the ſpinous proceſſes.

In the loins, again, there is free motion; particularly above, at the junction of this region with the back.

The motions of the individual vertebræ are extremely obſcure; but they take place in the ſame direction as the general motion which we have juſt deſcribed. The viſible movement of any part of the ſpine reſults, therefore, from the combined effect of ſeveral hardly ſenſible motions: one vertebra could not move ſufficiently on another to produce a perceptible motion of the trunk. This circumſtance concurs with ſeveral others relating to the mode of union of the vertebræ, and the mechanical confinement of the articular proceſſes, to render luxation impoſſible: meaning by that term, a diſplacement of the bone without any fracture. The effort is diſtributed over a conſiderable region, and cannot therefore act ſufficiently on a ſingle bone. Neither can any force be eaſily applied before or behind, ſufficient to drive out one vertebra from its place. Moreover, were ſuch a force actually applied, the vertebra could not be diſplaced forwards without a fracture of its inferior, nor backwards, without that of its ſuperior articulating proceſſes.

Of the muſcles which are concerned in theſe motions, ſome act directly on the trunk, while others affect it through the medium of the ribs, the ſcapulæ, &c. All of them, being placed on the right or left ſide of the body, muſt have the power of moving the trunk laterally, more or leſs, according to their degree of obliquity, or their diſtance from the meſial plane. The following is a liſt of the muſcles which carry it forwards; including both thoſe which act directly and the indirect ones.

Pectorales majores and minores; ſerrati magni; obliqui externi abdominis; obliqui interni abdominis; tranſverſi abdominis; recti abdominis; pyramidales; pſoæ magni and parvi.

The muſcles moving it backwards are, trapezii; rhomboidei; latiſſimi dorſi; ſerrati poſtici ſuperiores and inferiores; ſacrolumbales; longiſſimi dorſi; ſpinales dorſi; ſemiſpinales dorſi; multifidi ſpinæ; interſpinales; intertranſverſarii dorſi and lumborum; quadrati lumborum.

The muſcles of the neck may be arranged in like manner into the two claſſes of (1) thoſe which incline it forwards; and (2) thoſe which incline it backwards. In both claſſes, thoſe which are to the right or left of the meſial plane, will inflect the cervical column to their reſpective ſides. Theſe liſts include, beſides the muſcles which act immediately on the neck, thoſe which influence it through the head.

1. Muſcles bending the neck forwards: latiſſimi colli; biventres maxillæ; mylo-hyoidei; genio-hyoidei; genio-hyogloſſi; omo-hyoidei; ſterno-hyoidei; thyro-hyoidei; ſterno-maſtoidei; recti capitis interni majores and minores; recti capitis laterales; longi colli; ſcaleni antici.

2. Muſcles bending it backwards: trapezii; rhomboidei minores; ſerrati poſtici ſuperiores; ſplenii capitis and colli; complexi; trachelo-maſtoidei; cervicales deſcendentes; tranſverſales cervicis; ſpinales cervicis; ſemi-ſpinales cervicis; multifidi ſpinæ; recti capitis poſtici majores and minores; obliqui capitis ſuperiores and inferiores; ſcaleni poſtici; and levatores ſcapularum.

The ſcaleni medii and intertranſverſales can only inflect laterally.

Spine, *Diſeaſe and Curvature of*, in *Surgery*. In the preſent article we intend to conſider a particular diſeaſe of the ſpine, attended with a total or partial abolition of the power of uſing, and ſometimes even of moving, the lower extremities.

It was that eminent ſurgeon Mr. Pott, who gave the firſt accurate deſcription of this ſerious affliction. To this diſtemper, he obſerves, children are the moſt ſubject; adults are by no means exempt from it; but it hardly ever affects perſons after the age of forty. In infants, the true cauſe of the paralytic diſorders of the lower limbs is ſeldom diſcovered by parents or nurſes, who never imagine that it is ſituated in the back-bone. When the diſeaſe affects a child who has been able to walk, the loſs of the uſe of his legs is gradual, though not very ſlow. He at firſt complains of being very ſoon tired, and is unwilling to move about much; and very ſhortly afterwards he frequently trips and ſtumbles, although there be no impediment in his way. Whenever he attempts to move briſkly, he finds that his legs involuntarily croſs each other, by which he is frequently thrown down. Upon endeavouring to ſtand erect, even for a few minutes, his knees give way and bend forward.

When the diſtemper is a little farther advanced, it will be found that the patient cannot, without much difficulty and deliberation, direct either of his feet preciſely to any exact point; and very ſoon after this, both thighs and legs loſe a great deal of their natural ſenſibility, and become perfectly uſeleſs for all the purpoſes of locomotion. In adults, Mr. Pott obſerved, that the progreſs of the diſeaſe was rather quicker than in children.

The affection of the lower limbs is ſomewhat different from a common nervous palſy. The legs and thighs are rendered unfit for all the purpoſes of locomotion, and do alſo loſe much of their natural ſenſibility; but they have neither the flabby feel which a truly paralytic limb has, nor that ſeeming looſeneſs at the joints, nor that total incapacity of reſiſtance, which allows the latter to be twiſted in almoſt all directions. On the contrary, the joints are often very ſtiff, and the feet frequently cannot be placed flatly on the ground, in conſequence of the toes pointing downward.

The diſeaſe of the ſpine varies in ſituation, extent, and degree; being either in the neck, back, and ſometimes, though very ſeldom, in the upper part of the loins; ſometimes comprehending only two vertebræ, ſometimes three, or more.

Some patients are rendered totally incapable of walking at a very early period of the diſtemper; others can manage to move about with the help of crutches, or by graſping their own thighs with their hands.

When a weak infant is the ſubject, and the curvature reſulting from the morbid ſtate of the ſpine is in the vertebræ of the back, it is not unfrequently productive of deformity, by rendering the back humped, and by alterations which the poſition of the ribs and ſternum undergoes, in conſequence of the flexure and morbid ſtate of the ſpine.

The general health does not ſeem at firſt to be materially affected; but when the diſtemper of the ſpine has made much progreſs, many complaints come on, ſuch as difficulty in reſpiration, indigeſtion, pain, a ſenſe of tightneſs in the ſtomach, obſtinate conſtipations, purgings, involuntary diſcharge of the urine and feces, &c.

The paralytic affection of the legs is certainly owing to the particular ſtate in which the ſpinal marrow, ſurrounded by the diſeaſed vertebræ, is placed. When the diſtemper has exiſted only a ſhort time, the ligaments connecting thoſe vertebræ which form the curve are ſomewhat thickened and relaxed, and the bodies of the bones affected with a change, ſimilar to what takes place in the heads of the bones in caſes of white-ſwelling. (See White-swelling.) When the complaint has been of longer exiſtence, the ligaments are now manifeſtly thickened, and the bones more obviouſly altered, and even becoming carious. The quantity of elaſtic ſubſtance between the bodies of the vertebræ is much diminiſhed; and, after death, in advanced caſes, the bones are always found carious, while a quantity of ſanious fluid is lodged between them and the membrane inveſting the ſpinal marrow. The corpora vertebrarum, howſoever ſoftened, diſeaſed, or rendered carious they may be, are never found ſpread and enlarged in their texture. Mr. Pott was well convinced that the bones were not expanded. The diſeaſe ſeems to be very analogous to the affection of the heads of the bones in the ſcrofulous white-ſwelling, and as we know that this latter diſorder is commonly unattended with any real increaſe in the dimenſions of the diſeaſed parts of the bones, we ought indeed to expect that no ſuch change would prevail in the diſtemper now under conſideration.

The convexity of the curvature is always from within outwards, and is invariably preceded, as well as the paralytic affection of the legs, by a diſtempered ſtate of the ligaments and bones.

The only thing from which relief is ever obtained in the preſent diſtreſſing affliction, is an iſſue, made on each ſide of the ſpinous proceſſes of the affected vertebræ. The beſt mode of forming the iſſue is to rub the potaſſa cum calcé upon the ſkin until the part turns brown. To accompliſh this object in a neat manner, it is as well to cover and defend the integuments with adheſive plaſter, excepting the two longitudinal portions, about half an inch broad, which are to be converted into eſchars by the application of the cauſtic. The end of this ſubſtance is to be dipped in water, and freely rubbed on the ſituation of the intended iſſues. As ſoon as the ſkin has become quite brown, the cauſtic may be waſhed off with ſome wet tow, the adheſive plaſter may be removed, and the part covered with a linſeed poultice.

Immediately the eſchars are looſe, and can be taken away without pain, the iſſues are to be filled with peas, or kidney-beans. Theſe are to be covered with adheſive plaſter, which will confine them in their ſituation. However, as the hollows ſoon become filled up with granulations, unleſs conſiderable preſſure be made, it is generally deemed neceſſary to bind a piece of paſteboard, or a compreſs containing a bit of ſheet-lead, firmly on the ſituation of the iſſues. The preſſure thus maintained, though creative of uneaſineſs at firſt, will, in the end, ſave the patient an immenſe deal of pain; for, in conſequence of its operation, the peas or beans will ſoon form as many little hollows in the cavity of the iſſue as their own number, and into theſe the future peas may afterwards be put and retained, without the leaſt uneaſineſs, provided the ſurgeon gives particular injunctions not to allow the bandage to be ever ſlack. The preſſure ſaves the patient, in the end, a great deal of pain, which would otherwiſe be unavoidable, on account of the ſurgeon being neceſſitated to repreſs the riſing granulations in the cavity of the iſſue, by ſprinkling them with powder of cantharides, or the pulv. ex ærug. æris et ſabinæ, or even rubbing them with the cauſtic. In moſt inſtances, however, it is now and then requiſite to apply one of the above powders underneath the beans or peas. In order to apply peas advantageouſly, they ſhould be previouſly ſoftened in warm water, and connected together like beads, by paſſing a thread through their centre. Then they ſhould be allowed to become completely dry, when they are fit for immediate uſe. There ſhould always be a greater length of thread than of peas, by which means, two little portions at the ends of the peas may extend beyond each extremity of the iſſue, and be fixed there by two ſmall bits of adheſive plaſter. This little contrivance will have great effect in keeping the whole row of peas in its right ſituation. When the iſſue is more than half an inch in breadth, two rows of peas ſhould be placed in it.

It is ſaid that a ſtring of beads anſwers quite as well as one of peas or beans, and certainly it is more convenient, as, when regularly waſhed every day, it may be uſed as long as the ſurgeon thinks proper; and thus the trouble and expence of getting freſh peas or beans may be avoided.

The iſſues are to be kept open until the cure is complete; that is, until the patient perfectly recovers the uſe of his legs, or even for ſome time afterwards. Mr. Pott judiciouſly recommends the practitioner to heal at firſt only one of them.

In conjunction with the iſſues, bark, ſea-air, and ſea-bathing, are frequently proper.

There have been various contrivances propoſed for the purpoſe of affording mechanical ſupport to the ſpine. This method does not, however, promiſe to be uſeful. When the morbid affection of the corpora vertebrarum has advanced to a certain ſtate, the adjoining ſound bones, both above and below the ſeat of the diſeaſe, become approximated to each other, and at length anchyloſed. This ſalutary proceſs, if influenced at all by mechanically ſupporting the ſpine, muſt obviouſly be retarded. From this account we alſo ſee the reaſon why the projection of the ſpinous proceſſes, at leaſt in adult ſubjects, muſt always remain. In children, however, a great diminution, and even an entire removal of a certain degree of deformity, may take place during the growth of the body. Pott's Chirurgical Works, vol. iii. Cooper's Firſt Lines of the Practice of Surgery, edit. 3, part 2.

Spine, in *Agriculture*, a term ſignifying provincially the ſurface turf, ſod, or ſward of land.

Spine, a ſharp, firm, hard point which is ſent off from the woody parts of ſome ſorts of plants. It conſequently differs from a prickle, which only riſes from the bark of the plant. The ſpines in plants of this nature are produced either ſingly, as is the caſe in moſt of them; doubly, or by pairs, as in ſome particular ſorts; or in a triple manner, as in the three-thorned acacia.

Spines *of Echini*, in *Natural Hiſtory*. Theſe in their foſſile ſtate make a great appearance in the cabinets of the curious, and in the works of the learned, and are of an almoſt infinite variety of kinds; and many of them are of the ſame figures and dimenſions with thoſe of the echini now living in our own and other ſeas, and well known to us. But beſide theſe, there is an almoſt infinite variety of others, which, though allowed on all hands to be truly ſpines of ſome echini or other, yet evidently differ from thoſe of all the known recent fiſh of that name, and have certainly belonged to a ſpecies of it, of which we have not now the leaſt knowledge. Theſe, however different in ſhape from one another, yet all agree in their texture and conſtituent matter.

SPINEDA, in *Geography*, a town of Italy, in the department of the Upper Po; 4 miles N.N.E. of Sabionetta.

SPINELL, or *True Ruby*, *Spinelle* of Haüy and Broch, in *Mineralogy*. (See Gems.) The colour of this gem is red, blended with tints of blue or yellow; and it occurs in grains, in ſmall rounded fragments, and cryſtallized. The primitive form of its cryſtals is the regular octohedron, exhibiting alſo the varieties of the cuneiform octohedron, the primitive octohedron with the edges of the common baſe truncated, the ſame with all the edges truncated, and the primitive octohedron divided obliquely into two ſegments, which are turned on each other $\frac{1}{6}$th of a circle, thus forming a ſolid with alternate ſaliant and re-entering angles. The cryſtals are ſmall and very ſmall, rarely middle-ſized. The faces of the octohedron are ſmooth, and the planes of the truncatures are longitudinally ſtriated. Its luſtre, externally and internally, is brightly ſhining, vitreous. Its croſs fracture is conchoidal, its longitudinal fracture is lamellar in three directions. It varies from tranſlucent to tranſparent. It is conſiderably hard, though in this reſpect inferior to ſapphire. Sp. gr. 3.57—3.64. Before the blowpipe it is infuſible without addition, but melts with borax, acquiring a green colour. When ground to a very fine powder, it is ſoluble by long digeſtion in boiling ſulphuric acid. It was firſt analyſed by Klaproth, and afterwards by Vauquelin, with the following reſults:

	Klaproth.	Vauquelin.
Alumine -	74.5	82.47
Silex - -	15.5	0.
Magneſia -	8.25	8.78
Oxyd of iron	1.5	0.
Lime - -	0.75	0.
Chromic acid -	0.	6.18
	100.50	97.43

Although its geological ſituation is not known, it occurs imbedded in calcareous ſpar and adularia, accompanied by mica and magnetic pyrites. See Gems. See alſo Corundum. Aikin's Dict.

Mineralogiſts formerly claſſed all varieties of ruby with ſpinell, and alſo the oriental ruby or ſapphire. The cochineal-red variety of ſpinell is the Balais ruby of the jewellers, ſo called from Balachan, the Indian name of Pegu, where it is found. The violet-blue ſpinell is the almandine of Pliny; it is named from Alabanda, a town in Leſſer Aſia. The orange-yellow variety is the rubicelle ruby of jewellers. A newly diſcovered variety of ſpinell is called by Werner Salam ſtone, the name by which it is known in India; its colours are red and blue. It is cryſtallized in ſix-ſided priſms, variouſly truncated. It is in general only tranſlucent, and exhibits a pearly light on the ſurface. It is ſomewhat heavier than true ſpinell, but in other characters agrees with it. It is found in the peninſula of India.

SPINET, *Spinetto*, Ital. *Eſpinette*, Fr. from *ſpina*, a thorn, or quill, the tone being produced by a crow's quill inſerted in the tongue of a little machine called a jack. (See JACK, and TONGUE.) The inſtrument conſiſts of a cheſt or belly, made of the moſt porous and reſinous wood to be found, and a table of fir faſtened on rods, called the ſound-board, which bears on the ſides: on the table are raiſed two little prominences or bridges, in which are fixed as many pins as there are ſtrings on the inſtrument. See BRIDGE.

It is played with keys, like the virginal, or ſmall piano-forte; the long keys are for the diatonic or natural notes, and the ſhort for the flats and ſharps. See KEYS, and SCALE.

The keys, when preſſed down at the end by the finger, on the principle of the lever, make the other end throw up jacks, which ſtrike the ſtrings, and cauſe the ſound by means of the quills with which they are armed.

The thirty thickeſt ſtrings are of braſs; the others, for the more delicate tones, are of ſteel or iron-wire, faſtened at one end by hooks, and at the other on pins, by which they receive their tenſion over the bridges already mentioned.

The figure of the ſpinet is like that of the harpſichord, a horizontal harp, and the harp an inverted ſpinet. It is tuned in the ſame manner as other keyed inſtruments, by 5ths and 8ths, with or without bearings, as the tuner or the owner of the inſtrument ſhall pleaſe.

There have been ſpinets and harpſichords made for curious people with ſome or all the ſhort keys ſplit or cut in two for harmonics, or at leaſt to perfect ſome of the extraneous keys, furniſhing a different tone for F♯ and G♭, D♯ and E♭, &c. to perfect ſome of the moſt offenſive keys in common tuning. Zarlino had an inſtrument of this kind made at Venice, which we ſaw at the houſe of Percetti, the compoſer's widow, and it was afterwards ſent to England; but the mechaniſm and tone were ſo bad, that no tuning could render its ſounds agreeable. There are quarter-notes, as they are called, in the Temple organ, to three of the five ſhort keys; but except in pſalmody, or very ſlow movements, Stanley never ventured to touch them.

We have ſeen ſpinets made by Haywood, in the time of James and Charles I., with box keys for the natural notes; by Keen and Slade, in queen Anne's time, with the long keys of ebony and the ſhort of ivory; and excellent ſpinets by the two Hitchcocks, father and ſon, with ivory natural keys, and ebony or dried pear-tree for the ſharps and flats.

The ſpinet had but a ſingle ſtring to each note. As the ſpinet rivalled the virginal, the ſmall piano-forte has ſupplanted the ſpinet in the public favour; and we believe that very few have been made ſince the middle of the laſt century.

SPINIAGOR, in *Geography*, a town of Ruſſia, in the government of Viatka; 40 miles S.W. of Elabuga.

SPINIFEX, in *Botany*, from *ſpina*, a thorn, and *facio*, to make, becauſe of the thorny nature of its involucral leaves.—Linn. Mant. 2. 163. Nov. Gram. Gen. 29. t. 1. Schreb. Gen. 744. Willd. Sp. Pl. v. 4. 1129. Mart. Mill. Dict. v. 4. Brown Prodr. Nov. Holl. v. 1. 198. Juſſ. 30. Lamarck Illuſtr. t. 840.—Claſs and order, *Polygamia Dioecia*; rather *Triandria Digynia*. Nat. Ord. *Gramina*.

Gen. Ch. *Cal.* Common Involucrum of two lanceolate, channelled, unequal, ſpinous-pointed leaves; partial of about four ſimilar ones. Flowers on awl-ſhaped cluſtered receptacles, naked above. Perianth of two equal valves, containing one or two florets. *Cor.* of two lanceolate convoluted valves, the innermoſt enfolding the organs of fructification. *Stam.* Filaments three, capillary; anthers long, linear, cloven at each end. *Piſt.* Germen oblong; ſtyles two, thread-ſhaped, longer than the glumes; ſtigmas villous, prominent. *Peric.* none, except the hardened corolla, united to the oblong, ſmooth, ſolitary *ſeed*.

On one plant the flowers are ſituated at the baſe of each receptacle, each calyx containing two florets, and the anthers are moſt perfect in one, the ſtigmas in the other. On a ſeparate plant the florets are ſolitary, all male, and numerous along the lower part of each receptacle.

Eſſ. Ch. Involucrum of two ſpinous leaves. Calyx of two valves, two-flowered. Corolla of two valves. Seed united to the hardened corolla.

Some flowers male, on a ſeparate plant.

1. S. *ſquarroſus*. Linn. Mant. 2. 300. Willd. n. 1. (Stipa ſpinifex; Linn. Mant. 1. 34. Cyperus littoreus; Rumph. Amboin. v. 6. 6. t. 2. f. 2.)—Smooth. Leaves channelled, rigid, ſpinous-pointed, rough at the edges.—Native of the ſandy ſea-ſhores of the Eaſt Indies. A large, rigid, tough, ſhrubby *graſs*, whoſe ſurface is ſmooth and glaucous. *Leaves* three or four inches long, with broad ſheathing baſes, rough-edged. *Flowers* in large, terminal, aggregate and compound heads, the ſpinous points of their receptacles and involucral leaves projecting in every direction. Theſe heads are blown to a great diſtance by the wind, and roll along the ſands with great velocity.

2. S. *longifolius*. Brown n. 1. (Cyperus; Peron, Voy. aux Terres Auſtr. v. 1. 113.)—“Smooth. Leaves flaccid, ſemi-cylindrical, unarmed, ſmooth-edged, thrice as long as the ſeed-bearing receptacle. Glumes of the male flowers rough.”—Gathered by M. Baudin, in the tropical part of New Holland. *Brown*.

3. S. *fragilis*. Br. n. 2.—“Smooth. Leaves flaccid, ſemi-cylindrical, unarmed, rough-edged, longer than the ſeed-bearing receptacle.”—Obſerved by Mr. Brown, in the tropical part of New Holland.

4. S. *ſericeus*. Br. n. 3.—“Silky. Leaves unarmed, ſmooth, like their ſheaths, at the inſide. Point of the male receptacle ſeveral times ſhorter than the ſpike.”—Found by Mr. Brown in the laſt-mentioned country, as well as in New South Wales.

5. S. *hirſutus*. Br. n. 4. Labill. Nov. Holl. v. 2. 81. t. 230, 231.—Silky. Leaves unarmed, villous as well as their ſheaths. Point of the male receptacle nearly equal to the ſpike.—Native of the ſouth coaſt of New Holland.

SPINIS. *Attachiamenta de Spinis & Boſco*. See ATTACHIAMENTA.

SPINNEY, in *Rural Economy*, a term ſignifying provincially a clump of trees, or ſmall grove or plantation.

SPINNING, the art of combining animal or vegetable fibres into threads or cords, by twiſting them together. Wool, ſilk, cotton, flax, and hemp, are the matters moſt commonly employed for ſpinning into threads; and of theſe, moſt of the vegetable fibres, except cotton, require to be wetted during the operation of ſpinning, to render them more ſupple; but cotton, wool, and ſilk, are ſpun in a dry ſtate.

The machines employed for ſpinning are of very different kinds, and adapted to the materials to be operated upon; but they have all a ſpindle, revolving with a rapid motion, to twiſt the fibres which are attached to the end of it, and are ſupplied in a regular quantity, as faſt as the twiſting motion of the ſpindle will form them into a thread; and there is alſo ſome proviſion of a bobbin upon the ſpindle, to take up and retain the thread when made.

The moſt ancient mode of ſpinning is by the ſpindle and diſtaff, and this method is the ſimpleſt of all others. The ſpindle is nothing more than a piece of hard wood, made round, and ſharp-pointed at one end, ſo that it can be made to ſpin upon its point, in the ſame manner as a child's top: the upper part is reduced to a pin or peg, and it is this part which has the fibres united to it, the lower or enlarged part being only to give ſufficient weight to make it ſpin. The ſpinner muſt be ſeated upon the ground, and after having put the diſtaff in motion upon its point, by twirling it between the hands, get it up to a rapid motion, by ſtriking it occaſionally with the hand, with a motion very ſimilar to that by which a child keeps up the motion of his whipping-top, when he draws the laſh of a whip round it.

The flax, or material which is to be ſpun, after being properly prepared, is lapped round the end of the diſtaff, which is nothing more than a ſtick that the ſpinner holds in the left hand, ſo as to be conveniently ſituated to draw off from it a few fibres at a time, with the finger and thumb of the right hand, to form the thread. The upper part of the ſpindle, which is made ſmaller, like a pin, has the ends of the fibres which are to form the thread attached to it before it is put in motion. Theſe fibres are drawn out of the bunch which is wound upon the diſtaff, and held between the finger and thumb, ſo as to be in the direction of the length of the ſpindle; therefore, when the ſpindle is once made to revolve, it twiſts theſe fibres together, to form a thread, and as faſt as the thread forms, the ſpinner draws off more flax from the diſtaff, and guides the fibres between the finger and thumb, ſo that they ſhall be regularly delivered out, and make an even thread. The motion of the ſpindle is conſtantly kept up, by ſtriking it as often as the hand can be ſpared from the operation of guiding the thread. When by theſe means as great a length of thread is formed as is convenient to reach from the end of it to the ſpindle, the thread is wound upon the outſide of the ſmall part or pin of the ſpindle, for which purpoſe the ſpinner applies the fore-finger againſt the thread, cloſe to the end of the ſpindle, and bends the thread at that part, ſo that it will be at right angles with the direction of the ſpindle, inſtead of being nearly in the direction of its length; and alſo, that it will be guided oppoſite to the middle of the pin, or ſmall part of the ſpindle, inſtead of being at the extreme end thereof. In this ſituation the motion of the ſpindle, which is continually kept up, occaſions the thread to wind up, or lap upon the pin of the ſpindle, inſtead of twiſting round upon itſelf, as in the former caſe; but when nearly all the length of thread is thus diſpoſed of, the finger is removed from the thread, and it immediately aſſumes its original direction, by ſlipping to the extreme end of the ſpindle, ſo as to be twiſted round itſelf by the motion of the ſpindle, and more fibres are now ſupplied to it from the bunch upon the diſtaff, to form a freſh length of thread. In this manner the ſpinning proceeds, until as much thread is ſpun and wound upon the pin of the ſpindle as will make a moderate ſized ball.

This ſimple and inconvenient method of ſpinning becomes very efficient, when the ſpindle, inſtead of being ſpun upon the ground, is mounted in a proper frame, and turned by a wheel and band; this forms a machine which is called the one-thread wheel, and is ſtill uſed in the country for ſpinning wool: the ſpindle is made of iron, and placed horizontally, ſo that it can revolve freely; and the extremity of the ſpindle, to which the thread is applied, projects beyond the ſupport.

The wheel which turns it is placed at one ſide, the pivots of both being ſupported in upright pieces, riſing up from a ſort of ſtool. The ſpinner puts the wheel in rapid motion by its handle, and its weight is ſufficient to continue the motion for ſome ſeconds; then walking backwards from the ſpindle, in the direction of its length, ſhe ſupplies the fibres regularly, and the motion twiſts them into a thread; but when a convenient length is ſpun, the ſpinner ſteps on one ſide, and reaches out that arm which holds the end of the thread, ſo as to alter the direction of the thread, and bring it nearly perpendicular to the length of the ſpindle, which motion gathers or winds up the thread upon the middle of the projecting part of the ſpindle. This being done, ſhe holds the thread in the direction of the ſpindle, ſo that it will receive twiſt, and retreats again to ſpin a freſh length of thread. For ſpinning wool, it is not wound round the diſtaff the ſame as flax, but the ſpinner holds a lock of it, doubled over the fore-finger, and draws away the fibres from the middle part of the lock, to do which with regularity is the great art of ſpinning by hand.

A ſpinning-machine more perfect than this is the one-thread flax-wheel, with ſpindle and flyer; it has the property of conſtantly drawing up the thread as faſt as it is ſpun, inſtead of ſpinning a length, and then winding it upon the ſpindle. For this purpoſe the ſpindle is made longer than the other, and is turned by a band and wheel; but the wheel receives motion from the foot by a ſmall treadle, becauſe the ſpinner ſits before the wheel to work the ſpindle, which is ſupported upon its two extreme ends, and near one end the flyer is fixed; this is a piece of wood curved to an arc, the vertex of which is fixed on the ſpindle, and from the extremities of the arc two arms proceed, ſo as to be parallel to the ſpindle, and at ſuch a diſtance from it as to admit a wooden bobbin to be fitted looſely upon the ſpindle; and at the ſame time the arms of the flyer can revolve round the bobbin without touching it. The end of the thread is faſtened to the bobbin, and conducted through a hook fixed in the flyer, ſo that it proceeds from the circumference of the bobbin to this hook, in a direction perpendicular to the bobbin, but turns round the hook ſo as to come into the direction of the ſpindle. The thread is then conducted through a perforation made in the centre of the end of the ſpindle or pivot, upon which it revolves, and to this end of the thread the fibres are ſupplied. The twiſting motion given by the revolution of the ſpindle forms them into a continuation of the thread, which is gathered up upon the bobbin as faſt as the ſpinner lets it go through her fingers, by a tendency which the bobbin has to turn ſlowly, at the ſame time that the flyer to which the thread is hooked is revolving rapidly round the bobbin. For this purpoſe a ſtring is paſſed round a ſmall neck upon the bobbin, and one end of the ſtring being faſtened to the frame, the other has a ſmall weight to draw it tight round the neck of the bobbin, and occaſion friction. In other ſpinning-wheels, a ſecond band from the great wheel is made to turn the bobbin more ſlowly than the ſpindle. The thread which paſſes over the hook of the flyer is rapidly carried round the circumference of the bobbin; but as the bobbin follows the motion of the flyer, it only winds up as much thread upon the bobbin as the difference of the two motions;

and this tendency to wind up can be increaſed or diminiſhed at pleaſure, by the friction which is occaſioned by the ſtring or band which paſſes round the neck of the bobbin. When the winding-up of the thread upon the bobbin has accumulated a ridge of thread upon it oppoſite to the hook in the flyer, the thread muſt be ſhifted to another hook oppoſite to a different part of the bobbin, for which purpoſe the arms of the flyer are furniſhed with different hooks, and this muſt be repeated ſeveral times, until the whole length of the bobbin is filled; it is then taken off to be reeled, and replaced by another empty bobbin.

An improvement was made in the ſpinning-wheel by Mr. Antis ſome years ago, which was an application of what ſir Richard Arkwright had before invented. The object is to obviate the neceſſity of ſtopping the wheel to remove the thread from one hook to another, in the manner juſt deſcribed. For this purpoſe, the bobbin is made to move regularly backwards and forwards upon the ſpindle a ſpace equal to its length, ſo that every part will, in ſucceſſion, be preſented oppoſite the hook over which the thread paſſes, and thus receive the thread regularly upon the whole length of the bobbin. The additional parts neceſſary for producing this movement are as follow: a pinion of only a ſingle leaf is made to project from the extremity of the pivot of the great wheel, or a worm or endleſs ſcrew formed on the end pivot, will anſwer the ſame purpoſe, which is to actuate a wheel of ſeven inches diameter, and ninety-ſeven teeth; therefore ninety-ſeven revolutions of the great wheel will produce one revolution of this ſmaller wheel; upon the face of which a circular ring of wire is fixed, and ſupported from the wheel by ſix legs, ſo as to be oblique to the plane of the wheel, as it touches it at one part, and at the oppoſite ſide of the ring projects nearly three-fourths of an inch. This ring of wire gives motion to an upright lever, about fifteen inches long, and moving on a centre at three inches from its lower extremity, where it has a pin fixed in it, and reſting againſt the oblique ring of wire; therefore, when the wheel turns round, it communicates a ſmall motion to the lever, in conſequence of its obliquity to the plane in which it revolves. The upper end of the lever is connected to an horizontal ſliding-bar, ſituated beneath the ſpindle, and having an upright piece of braſs, which works in the notch of a pulley, formed on the end of the bobbin, and drives the bobbin backwards and forwards upon the ſpindle, according as the oblique ring of wire forces the pin at the lower end of the lever in or out, when the wheel moves round. To regulate and return this alternate motion, a ſmall weight hangs by a line to the ſliding-bar, and, paſſing over a pulley, riſes and falls as the bobbin recedes and advances, and tends conſtantly to keep the pin at the lower end of the lever in contact with the wire. It is evident, from this deſcription, that one ſtaple only is wanted to the arms of the flyer, which being placed near the extremity, the thread paſſes through it, and by the motion of the bobbin, is laid regularly upon it from one end to the other.

The invention has alſo another advantage over the old method, which always winds the thread in ridges upon the bobbin; and if the thread breaks in reeling the yarn, the whole bobbin may as well be thrown away, becauſe the thread cannot eaſily be found again; but this improved wheel always winds the threads acroſs upon one another, by which means the end can never be loſt.

In order to regulate the friction on the bobbin, and retard its motion in a greater or leſs degree at pleaſure, there is a neck of braſs or ſteel faſtened to one end of it, and embraced by a kind of ſmall vice, or pincers, fixed to the ſliding-bar. This vice muſt be made either with two elaſtic ſprings with wooden tops, or of wood wholly, and faced with leather; but if made of wood only, then a ſpring muſt be made beneath the ſhoulder of the ſcrew, to anſwer the ſame purpoſe. By tightening this ſcrew more or leſs, the friction on the bobbin may be regulated to the greateſt nicety, provided the ſprings are of a ſtrength rightly proportioned to their functions. It will readily appear, that all this may be done without the leaſt effect on the velocity of the whole machine, as thereby nothing is added to the general friction ſo as to obſtruct it.

It was not until the latter end of the laſt century, that ſpinning-machines of greater powers were conſtructed; but all threads were ſpun by one of the machines which we have deſcribed; the firſt being uſed for cotton and wool, and the other, with the bobbin and flyer, for flax; but for very coarſe threads, two ſpindles were applied to the latter machine, and the ſpinner having the wool wound round a band, tied it round her waiſt, inſtead of winding it upon a diſtaff, and was thus able to draw out fibres with each hand, and ſupply two ſpindles. And of the other ſimple ſpindles, ſeveral were made to turn together by the movement of one large horizontal wheel, around which the ſpindles were arranged in directions radiating from the centre, and each ſpindle received a rapid motion by the contact of the edge of the large wheel, which was turned round by one perſon. The ſpinners each ſtood oppoſite to his reſpective ſpindle, ſo as altogether to occupy a large apartment, and by this means they could do much more work than formerly, having none of the interruptions of turning the wheel.

The firſt improvement of any importance in ſpinning, was that of the ſpinning-jenny, invented by Hargraves, as related in our article COTTON; and the machine itſelf will be deſcribed under the article WOOLLEN *Manufacture*. This machine conſiſts of a number of ſpindles, ſimilar to thoſe of the one-thread wheel, which are all mounted in a perpendicular direction in the ſame frame, and turned round by one large wheel, ſituated in an horizontal direction, and put in motion by a crank at the upper end of its ſpindle. The threads from each ſpindle are conducted nearly in an horizontal direction, but being quite at the point or upper extremity of the ſpindles, do not wind upon the ſpindles, but will receive twiſt, becauſe the threads ſlip over the top of the ſpindles as they revolve. The threads are guided between two rulers of wood, called the *claſps*, inſtead of the finger and thumb of the ſpinner. Theſe rulers are made to fit together, ſo as to hold the fibres between them, and are fitted up with wheels at the end to run upon the frame, and thus advance or retreat at pleaſure from the ſpindles. It was not attempted with this machine to ſpin a finiſhed thread immediately from the lock of wool or cotton, but coarſe and looſe threads are previouſly prepared on the hand-wheel, which can be done with great rapidity, and the coppins or balls of theſe looſe threads are placed in the jenny, and conducted, firſt between the claſps or rulers before mentioned, and then to the ſpindles. By this means, when the carriage of the claſps is drawn backwards from the ſpindles, the claſps being ſeparate, the threads draw between them from off the coppins, and at the ſame time that portion of each thread which is between the claſps and the ends of the ſpindles, receives its twiſt; but having drawn out a certain length of each thread in this manner, the claſps are ſhut together; and the motion of the ſpindles, as alſo the retreat of the claſps, is continued, by which means the threads are ſtretched out to their intended fineneſs, and being thus finiſhed, the threads are wound upon the ſpindles, by being brought oppoſite to the middle part of the ſpindles by a rail of wood, called the *faller*, which moves upon centres, ſo as to deſcend horizontally before all the ſpindles, and depreſs all the threads together, ſo that they will wind up by the motion of the ſpindles, and as they wind, the claſps return towards the ſpindles. The operations are then again repeated, and thus continued, until the coppins or balls of thread, wound upon the ſpindles, acquire their proper ſize.

The next improvement in ſpinning-machines was the introduction of the ſlubbing-machine, or billy, for preparing the rovings for the jenny; an operation which was at firſt performed by the hand-wheel. This machine has ſimilar parts to the jenny, but they are differently arranged, to adapt it to ſpin the wool as it comes from the carding-machine, in the ſtate of cardings, which are locks of wool drawn out to about the ſize of candles, and from two to three feet in length. For this purpoſe the ſpindles are made to travel on the carriage, and the claſps ſtand ſtill, being the reverſe of the jenny. The cardings are laid upon an endleſs cloth, which revolves over two rollers, and lies in an inclined poſition at the end of the machine; and one carding is laid upon the cloth oppoſite to each ſpindle, the ends being pieced with freſh cardings by children, as faſt as the ſpindle works them up. A roller preſſes down upon the cardings, to hold them faſt upon the feeding-cloth, and to make them move with it; and juſt beyond this roller the claſps are fixed to hold the rovings, when the proper lengths are drawn out by the retreating of the ſpindles, which, as before ſtated, are ſituated in the carriage. The operation of the billy is the ſame as that of the jenny, *viz.* that the carriage is drawn out, and the feeding-cloth revolves over its roller to give out the cardings until a certain length: the claſp is then ſhut down, and the further extenſion of the threads is produced by ſtretching; which being done, the threads are wound upon the ſpindles.

The inventions of ſir Richard Arkwright ſoon ſuperſeded theſe machines. His principal invention in the ſpinning was the introduction of the rollers, to draw out or extend the fibres to their full length, which is by this means much more perfectly performed than by the fingers of the ſpinner. For the immediate twiſting of the thread, he adopted the ſpindle, bobbin, and flyer of the old flax-wheel, placed in a vertical poſition, but added to it the important improvement of raiſing and lowering the bobbin, to diſtribute the thread regularly and equally upon all the length of it, the ſame which we have before deſcribed as being applied by Mr. Antis to the common ſpinning-wheel. A full deſcription of this machine, which is called the water ſpinning-frame, will be found in the article *Cotton* MANUFACTURE, *Plate* IX. *Cotton Manufacture.*

The ſpinning-jenny was again introduced, and rendered equal, and for ſome purpoſes ſuperior, to the water-frame, by Mr. Crumpton, who combined with it the ſyſtem of rollers of ſir Richard Arkwright, and called it the mule. It is alſo fully deſcribed under *Plate* XI. *Cotton Manufacture.* See *Cotton* MANUFACTURE.

The great ſucceſs which attended the ſpinning of cotton by theſe machines, induced many perſons to attempt the ſpinning of flax and wool by ſimilar means. Short wool, for the manufacture of cloth, is ſpun by the billy and jenny; but flax and long wool for worſted require very different treatment from cotton and ſhort wool, particularly the flax, owing to the great length of the fibres, and to their being of ſuch irregular lengths: in conſequence, when they are extended by the rollers, on Arkwright's principle, ſome fibres will be broken, if the diſtances between the rollers is too ſmall; and on the other hand, if the diſtance is too great, the fibres will not be properly extended. The latter, however, is the leaſt evil of the two; and, in conſequence, the ſpinning-frames for flax have the rollers, between which the extenſion or drawing out is effected, placed at a diſtance of from 14 to 18 inches between the firſt two pair of rollers, through which the flax paſſes; the next two pair ſix or eight inches; after which it is paſſed between the third pair of rollers at a diſtance of five or ſix inches, and then delivered to the ſpindles, which are ſimilar to thoſe of the water-frame, but placed in an inclined poſition. The rollers are made in a very different manner from thoſe for cotton, being only narrow wheels juſt wide enough to receive the fibres of flax between them; and the fibres are prevented from getting out ſideways by ſmall tin ſpouts, through which the flax paſſes, as the rollers draw it forwards. The reaſon of this is, that the flinty ſurface of the flax would ſoon wear a hollow part round a plain roller, which would then let the flax ſlip through; but the narrow wheel wears down equally over the whole breadth of its edge. The lower pair of theſe rollers, or wheels, revolves in a ſmall trough of water, in the ſame manner as a grind-ſtone, and thus keeps the flax conſtantly wet, which is neceſſary, in order to ſoften the fibres, and make them ſpin into a firm and ſmooth thread.

Worſted is alſo ſpun in a frame reſembling the water-frame of Arkwright, from which it only differs in the relative diſtances of the rollers, by which the drawing out or extending of the fibres is effected.

Meſſrs. Clarke and Bugby obtained a patent in 1806, for improvements in a machine for ſpinning hemp and flax, which is intended to be worked by hand labour, and to be at ſuch a ſmall expence, as to bring it within the reach of ſmall manufacturers. The inventors ſtate it to be conſtructed upon ſuch ſafe and eaſy principles, that no length of experience is neceſſary to enable children to work it; and that it occupies ſo little ſpace, that the machines may be placed in ſmall rooms, out-buildings, or other cheap places. To effect the above purpoſes, it was neceſſary to get rid of the flyer fixed upon the ſpindle uſed in the old machinery for ſpinning hemp or flax, which additions require a power in proportion of five to one; and alſo to ſurmount the difficulty which ariſes from the want of elaſticity in theſe ſubſtances, and which prevents them from being ſpun, by ſtretching out at the ſame time that the thread is twiſted, in the manner of the mule or jenny.

Theſe patentees recommend a machine, which is in fact a mule with certain modifications; and to give the effect of elaſticity in the fibres, they have two methods. The moſt ſimple, and that which they particularly recommend, is to provide a holder of large wire for every ſpindle, which holders are ſeveral inches in length, fixed in an arbor or ſhaft, that extends from one end of the carriage to the other.

This arbor or ſhaft, with the holders, may be conſidered as an enlarged and improved ſubſtitute for what is called the faller in the mules or jennies for ſpinning cotton, and the wire-holders fixed therein have elliptical eyes at their extremities, through each of which a thread is conducted in its paſſage from the rollers which draw out the thread to its ſpindle. The wire of which the holder is made, after forming the elliptical eye, is left or extended beyond the uppermoſt part, ſomething in the manner of a cork-ſcrew, ſo that the yarn may be conveniently ſlipped in when occaſion may require it. Theſe holders for each thread are for the purpoſe of keeping the yarn in a ſtate nearly vertical over the tops of the ſpindle, when the carriage which contains them is coming out; and as they will readily yield or ſpring from the vertical poſition, they have the ſame effect as elaſticity in the fibres of the ſubſtance which is to be ſtretched out; but the wires being removed from the vertical ſituation at the beginning of the return of the carriage, and thrown into nearly a horizontal poſition, by inclining the ſhaft into which they are all fixed, they bring the yarn below the tops of the bobbins or quills which are fixed upon the ſpindles, which will then wind up the threads upon them when the ſpindles are turned round, and then the wire-eyes being regularly curved, and raiſed up again by the motion of an elliptic wheel, which is turned round by the machine, they diſtribute the yarn regularly upon the bobbins or quills, and prevent it from hinkling, and improperly doubling or twiſting together. Another method of compenſating for the want of elaſticity in hemp and flax, is to fix a round bar of wood, about an inch and a half in diameter, the whole length of the carriage, about three or four inches above the tops of the ſpindles, ſo that the outer ſurface, or that next the perſon who works the machine, may be perpendicular, or nearly ſo, over the tops of the ſpindles, the inner ſide having pieces of wood or metal fixed or nailed thereto, leaving only ſmall ſpaces or notches between each, for the yarn to paſs through. The uſe of theſe pieces is to prevent the threads from getting together and entangling. Every thing relating to the wire-holders before mentioned, and the arbor to which they are affixed, muſt be applied in concert with theſe pieces of metal, which form a ſeparation between the threads.

The art of ſpinning, which nature has given to many animals of different kinds for their preſervation, and other purpoſes, is not confined to the inhabitants of the earth or air alone, but is even extended to thoſe of the ſea. M. Reaumur has ſhewn, by a ſeries of curious experiments, that the common muſcle, and ſome other ſhell-fiſh of the ſea, poſſeſs it in a great degree of perfection. See Muscle.

But he obſerves, that though the workmanſhip is the ſame, the manner of producing it is very different. Spiders, caterpillars, and the like, make threads of any length that they pleaſe, by making the viſcous liquor, of which they are formed, paſs through a fine perforation in the organ appointed for this ſpinning: but the way in which the muſcles form their threads is very different, as the former reſembles the work of the wire-drawer, ſo does this that of the founder, who caſts metals in a mould. The canal of the organ deſtined for the muſcle's ſpinning, which, from its ſhape, is commonly called its tongue, is the mould in which its thread is caſt, and gives it its determinate length. Mem. Acad. Par. 1711.

Spinning-*Wheel*, in *Rope-making*, for twelve ſpinners to ſpin yarn at the ſame time, is about five feet in diameter, and is hung between two poſts fixed in the ground: on its top is fixed a ſemi-circular frame, called the head, which contains twelve whirls, that turn on iron ſpindles, with hooks to their front ends to hang the hemp on, and are worked by means of a leather band encircling the wheel and whirls. The whirls are made to run with a truer motion when the head on the riſing ſide of the band has a larger ſegment of a circle than the falling ſide; or in other words, let the baſe part of the head be longer from the middle than the oppoſite or falling ſide, by which means the band will be kept equally tight over the whirls, and conſequently the motion be alike to all. N.B. Heads made in this manner have the wheel turned always the ſame way.

SPINO, in *Geography*, a town of Italy, in the department of the Upper Po; 8 miles W.N.W. of Crema.

SPINOLA, Ambrose, in *Biography*, one of the moſt celebrated generals of his time, was born in 1569. His family was noble, and originally from Genoa. His brother Frederic, general of the gallies ſtationed in the Low Countries, in the ſervice of Spain, engaged him to bring a body of 9000 Italian and Spaniſh veterans into Flanders, where he ſoon diſtinguiſhed himſelf by his valour and good conduct. He marched againſt the famous prince Maurice, and it was agreed between him and king Philip that he himſelf ſhould pay his own ſoldiers, to be reimburſed afterwards; by which regulation, while the other Spaniſh troops were extremely diſorderly and mutinous for want of their pay, thoſe under his command were patterns of obedience and ſtrict diſcipline. He was commiſſioned to raiſe ſome additional regiments, in order that he might undertake, in concert with his brother, ſome important expedition, but the death of the brother, in a ſea-fight with the Dutch, put an end to the project. The town of Oſtend had been in a ſtate of ſiege nearly three years, and ſmall progreſs had been made towards its reduction; for which reaſon the archduke Albert, governor of the Netherlands, reſolved to commit the whole management of it to Spinola. Before he took upon himſelf the management of this buſineſs, he ſent ſome officers to examine the works, and though they differed in opinion as to probability of ſucceſs, the love of glory induced him to accept the charge. His plans ſucceeded, and the place ſurrendered after the end of the third year, having, it is ſaid, coſt the lives of 100,000 men. Spinola was rewarded with honours of every kind, and at the concluſion of the campaign, he went to Madrid, and obtained the rank and office of camp-marſhal-general, and commander-in-chief of the Spaniſh and Italian troops. He paſſed through Paris, and had an interview with Henry IV., by whom he was interrogated as to the plan of the enſuing campaign, of which he gave a faithful account. The king, taking for granted that his intention was to deceive, wrote to prince Maurice juſt the contrary of what he had heard from Spinola, and afterwards, when he found his miſtake, he ſaid, "Others deceive by telling falſehoods, but this man by telling the truth." Spinola now put into execution his deſign of carrying on the war into the enemy's country, and croſſing the Rhine, he penetrated into Overyſſel, where he took ſeveral places, in which he left conſiderable garriſons. His progreſs was at length ſtopt by prince Maurice, and theſe two great commanders exhauſted the whole art of war during that and the following campaign, in keeping each other in check. Both parties at length becoming weary with war, a congreſs was appointed in 1608 to treat of peace at the Hague, and Spinola was at the head of the deputies on the part of the archduke. Wherever he came the people flocked to gain a ſight of ſo celebrated a commander, and they were met at Dordrecht by prince Maurice, who treated his antagoniſt with the greateſt reſpect. The difficulties ariſing in the progreſs of the negociation were ſo great, that a truce only could be concluded. In 1621 the war was renewed, on account of a diſputed ſucceſſion to the countries of Cleves and Juliers, and Spinola being placed at the head of an army, penetrated into the latter country and reduced its capital. Prince Maurice was again his opponent, who was not able to prevent the fall of Cleves, or the inveſtment of the ſtrong town of Breda. While this ſiege was going on, prince Maurice died, and Spinola was brought into a dangerous ſtate of health. The ſiege was, however, carried on with great vigour, and the town was defended with equal reſolution. At length, it becoming evident that the garriſon could not hold out any longer, Spinola, in admiration of their valour and perſeverance, offered them the moſt honourable terms of capitulation. Theſe were accepted, and the garriſon, greatly reduced, marched out. Spinola drew up his army to ſalute them, and as they paſſed, he paid particular compliments to the governor and principal officers. He diſtributed money among the ſoldiers, provided with the utmoſt attention for the cure of the ſick and wounded, and conveyed the reſt in the moſt commodious manner poſſible to the next fortreſs. Having fulfilled the duties of a hero, he reſigned his command, as having no longer an equal foe in the field with whom he could contend. In 1627, paſſing from Antwerp to Madrid, he took Rochelle in his way, in order to witneſs the memorable ſiege of that place. Richelieu conſulted him on the beſt means of bringing it to a concluſion. "Shut the port," he ſaid, "and open the hand;" meaning thereby, that the beſiegers ſhould be liberally treated.

The court of Spain recalled Spinola from the Low Countries in 1629, and ſent him into Italy, where he in the following year took Caſal. The citadel, however, remained in the hands of the French, owing to the impediments thrown in his way by orders from Madrid. The anxiety and vexation which this circumſtance occaſioned, co-operating with diſeaſe, put an end to his life in the ſame year, at a moment when he was at the ſummit of his military reputation. It is ſaid that his great antagoniſt, prince Maurice, gave this teſtimony to his character, when being aſked who was the firſt captain of the age, replied, "Spinola is the ſecond."

SPINOLETTA, in *Ornithology*, the name of a ſmall bird of the lark kind, the *alauda ſpinoletta* of Linnæus, called *tordino* by the Venetians, and ſeeming to be the *ſtopparola*, as alſo the *griſola* and *ſpipola*, of Aldrovandus. It is ſmaller than the common lark; its head, neck, ſhoulders, and back, are of a greyiſh colour, with an admixture of green; its breaſt and belly white, and its throat ſpotted: the female differs from the male, in that her belly is yellow; the wing-feathers are of a duſky brown, with whitiſh or yellowiſh edges; its tail is moderately long, and part of the feathers are ſnow-white, the reſt brown or blackiſh; the length of the heel diſtinguiſhes this bird from all others, except the lark kind, and it differs from all the ſpecies of larks in the colour of its beak and legs, which are black. It is common in the markets of Venice and other places. Ray.

SPINOSA, in *Zoology*, the name by which the Italians call the porcupine.

SPINOSE Leaf, among *Botaniſts*. See Leaf.

SPINOSI Pisces, in *Ichthyology*, ſuch fiſhes as have ſome of the rays of their back fins running out into thorns and prickles, as the perch, &c. See Fish.

SPINOZA, in *Biography*. See the next article.

SPINOZISM, or Spinosism, the doctrine of Spinoza; or, atheiſm and pantheiſm propoſed after the manner of Spinoza.

The great principle of Spinoziſm is, that there is nothing properly and abſolutely exiſting, but matter and the modifications of matter; among which are even comprehended thoughts, abſtract and general ideas, compariſons, relations, combinations of relations, &c.

Benedict de Spinoza, or Eſpinoza, was a man well known in Holland. He was born at Amſterdam, in the year 1632, being a Jew both by deſcent and education; but at an early period of his life he manifeſted ſuch diſſatisfaction with the religion of his fathers, and advanced opinions ſo contrary to their eſtabliſhed tenets, that a ſentence of anathema was pronounced againſt him by his brethren. Having been excommunicated from the ſynagogue, ſome Chriſtians, who were attached to him, afforded him an aſylum, and gave him an opportunity of acquiring a knowledge of the Latin and Greek languages, and of ſtudying the Carteſian philoſophy. But as he ſtill continued with great vehemence to attack the religion of his countrymen, they attempted firſt to ſilence him by bribe, offering him an annual penſion of 1000 florins, and afterwards to take him off by aſſaſſination. Both theſe meaſures proving ineffectual, they accuſed him, before the magiſtrate, of apoſtacy and blaſphemy; and he was baniſhed from the city. In his exile, he ſtudied mathematics and natural philoſophy, and procured a ſubſiſtence by poliſhing optical glaſſes. He reſided chiefly at Rhenburg, where he was often viſited by the followers of Deſcartes, who conſulted him on difficult queſtions. At their requeſt he publiſhed, in 1664, "The Principles of the Carteſian Philoſophy demonſtrated geometrically," with an appendix, containing metaphyſical opinions altogether inconſiſtent with the doctrine of Deſcartes. In order to eſcape the odium which was occaſioned by this publication, he retired to a village not far from the Hague, whither he was followed by many of his countrymen and foreigners, who were inclined to adopt his doctrines. The elector palatine invited him to occupy the chair of philoſophy at Heidelberg; but apprehending that his liberty would be abridged, he declined the propoſal, and continued to live in retirement, with great ſobriety and decency of manners, until a conſumption brought him to an early end, in the year 1667.

Spinoza compoſed ſeveral books in Latin; the moſt celebrated of which is his "Tractatus Theologico-Politicus," printed at Amſterdam in 1670, in which he attempts to overturn the foundation of all religion: the book, accordingly, was condemned by a public decree of the States; though it has ſince been ſold publicly, and even reprinted, both in Latin and French, in that country, and in Engliſh at London.

In this work Spinoza inſinuates, that all religions are only political engines, calculated for the public good, to render the people obedient to magiſtrates, and to make them practiſe virtue and morality.

He does not here lay down his notion of the Deity openly, but contents himſelf with ſuggeſting it. In his "Ethics demonſtrated geometrically," publiſhed among his poſthumous works, he is more open and expreſs; maintaining, that God is not, as we imagine him, an infinite, intelligent, happy, and perfect Being; nor any thing but that natural virtue, or faculty, which is diffuſed throughout all creatures.

His other poſthumous treatiſes are entitled "Politics," "On the Improvement of the Underſtanding," "Epiſtles and Anſwers," and a "Hebrew Grammar." The various impieties contained in theſe treatiſes excited general indignation; and refutations were iſſued by writers of all religious perſuaſions, who concurred in amply expoſing the empty ſophiſms, the equivocal definitions, the falſe reaſonings, and all the abſurdities with which his writings abounded.

The life of Spinoza has been accurately written by Colerus, whoſe performance was publiſhed at the Hague in 8vo. in 1706. But a more ample and circumſtantial account of this ſingular man has been given by Lenglet du Freſnoy, and is prefixed to Boulainvilliers's Expoſition of the Doctrine of Spinoza, which was publiſhed at Amſterdam, in 12mo., in 1731. Freſnoy republiſhed the work of Colerus, and added to it ſeveral anecdotes, borrowed from a Life of Spinoza, written by Lucas, a phyſician at the Hague.

The learned Fabricius, in his Bibliotheca Græca, lib. v. part iii. p. 119, and Jenichen, in his Hiſtoria Spinoziſmi Lehnhofiani, p. 38—72, have given an ample liſt of thoſe writers who have refuted the ſyſtem of Spinoza. Witſius in Holland, Majus in Germany, and De la Mothe in England, wrote againſt his Tractatus; but Bredenburg, according to Mr. Bayle, ſucceeded beſt on this ſubject; who, however, is ſaid to have been afterwards a convert to Spinoziſm, and to have written a demonſtration of the truth of it: a refutation of his defence by Iſaac Orobio, a learned Jewiſh phyſician at Amſterdam, was publiſhed in 8vo. 1703. See alſo Buddeus's Theſes de Atheiſmo et Superſtitione, c. i. ſect. 26; and Fabricius's Syllab. Script. de Verit. Relig. Chriſt. p. 357, &c. Mr. Bayle, and above all Dr. Clarke and Dr. Cudworth, have diſtinguiſhed themſelves by their refutation of the ſyſtem of Spinoza. See Bayle's Dict. art. *Spinoza*, and Clarke's Demonſtration of the Being and Attributes of God, p. 25—45, &c. ed. 1725. Cudworth's Intellectual Syſtem.

Spinoza, in his Tractatus above-mentioned, is very full on the ſubject of the authors of the ſcriptures; and endeavours to ſhew, that the Pentateuch is not the work of Moſes; contrary to the common opinion, both of the Jews and Chriſtians. He has alſo his particular ſentiments as to the authors of the other books. This part of the work has been anſwered by Mr. Huet, in his Demonſtratio Evangelica; and by M. Simon, in his Hiſt. Crit. du Vieux Teſt. See PENTATEUCH.

Spinoziſm is a ſpecies of naturaliſm, or pantheiſm, or hylotheiſm, as it is ſometimes called, *i. e.* of the dogma which allows of no other God but nature, or the univerſe; and, therefore, makes matter to be God. Accordingly, Buddeus, in a diſſertation "De Spinoziſmo ante Spinozam," proves at large, that Spinoza's doctrine of God and the world, is far from being his own invention, but that it had been held by many philoſophers of different ſects, both among the Chaldeans and Greeks. It is certain, the opinion of the Stoics, and of thoſe who held an *anima mundi*, was not far from it. Lucan introduces Cato diſcourſing thus:

> "Eſtne Dei ſedes niſi terra, et pontus, et aër,
> Et cœlum, et virtus? ſuperos quid quærimus ultra?
> Jupiter eſt quodcunq; vides, quocunq: moveris."
> Luc. Pharſ. l. 9. v. 578.

Strato likewiſe, and others among the Peripatetics, maintained ſomething very like it; and, what is more, though no ancient ſect ſeems farther removed from Spinoziſm than the Platonic, as they attributed the greateſt freedom to God, and carefully diſtinguiſhed him from matter; yet Gundlingius has proved at large, that Plato gave matter much the ſame origin with Spinoza. But the ſect that approached neareſt to Spinoziſm was that which taught, that all things were one, as Xenophanes the Colophonian, Parmenides, Meliſſus, and eſpecially Zeno Eleates; whence it obtained the name of the "Eleatic Syſtem of Atheiſm." To the ſame may alſo be reduced the opinion of thoſe, who held the firſt matter for God, as Amalricus and David of Dinantum. Add, that the ſect of Foe in China and Japan, and that of the Soufi in Perſia, and that of the Zindikites in Turkey, are found to philoſophize much after the manner of Spinoza.

The impious ſyſtem of Spinoza was ſo ingeniouſly maintained, that it found many patrons in the United Provinces, among whom were Lewis Meyer, who republiſhed Spinoza's works, and who himſelf wrote a work entitled "Philoſophy the Interpreter of Scripture," and Van Leenhof, an eccleſiaſtic of Zwoll, who wrote a piece entitled "Heaven in Earth," of the doctrine of which he was obliged to make a public recantation. Others, under the pretence of refuting Spinoza, ſecretly favoured his ſyſtem.

The chief articles in Spinoza's ſyſtem are reducible to theſe: that there is but one ſubſtance in nature; and that this only ſubſtance is endued with an infinite number of attributes, among which are extenſion and cogitation: that all the bodies in the univerſe are modifications of this ſubſtance, conſidered as it is extended; and that all the ſouls of men are modifications of the ſame ſubſtance, conſidered as cogitative: that God is a neceſſary and infinitely perfect Being, and is the cauſe of all things that exiſt, but is not a different being from them: that there is but one being, and one nature; and that this nature produces within itſelf, by an immanent act, all thoſe which we call creatures: and that this being is at the ſame time both agent and patient, efficient cauſe and ſubject; but that he produces nothing but modifications of himſelf.

As Spinoza taught, that there is no difference of ſubſtances, he maintained, that the whole and every part of the material world is a neceſſary exiſting being, and that there is no other God, but the univerſe: and, moreover, ſince it is abſolutely impoſſible for any thing to be created or produced by another, and alſo abſolutely impoſſible for God to have cauſed any thing to be in any reſpect different from what it now is; every thing that exiſts muſt needs be ſo a part of the divine ſubſtance, not as a modification cauſed in it by any will or good pleaſure or wiſdom in the whole, but as of abſolute neceſſity in itſelf, with reſpect to the manner of the exiſtence of each part, no leſs than with reſpect to the ſelf-exiſtence of the whole; conſequently the material world, and every part of it, with the order and manner of being of each part, is, upon this ſcheme, the only ſelf-exiſtent, or neceſſarily exiſting being.

And he alſo maintains, that motion, as a dependent being, has been eternally communicated from one piece of matter to another; and, therefore, without having at all any original cauſe of its being, either within itſelf or from without: this, Dr. Clarke has proved to be a plain contradiction, and conſequently, motion muſt of neceſſity be originally cauſed by ſomething that is intelligent, or elſe there never could have been any ſuch thing as motion in the world; and, therefore, the ſelf-exiſtent being, the original cauſe of all things, muſt of neceſſity be an intelligent being. Hence it follows, that the material world cannot poſſibly be the original ſelf-exiſtent being. For ſince the ſelf-exiſtent being is intelligent, and the material world plainly is not ſo, it follows, that the material world cannot poſſibly be ſelf-exiſtent.

Agreeably to Spinoza's ſyſtem, he is led to maintain that the ſupreme cauſe is a neceſſary agent, and, therefore, that no thing, or mode of exiſtence of any thing, could poſſibly have been in any reſpect different from what it now actually is; becauſe, he ſays, from an infinitely perfect nature, infinite things in infinite manners muſt needs proceed: if any thing could poſſibly be otherwiſe than it is, the will and nature of God muſt be ſuppoſed capable of change; and if all poſſible things in all poſſible manners do not always and neceſſarily exiſt, they never can all exiſt, but ſome things that do not exiſt, will ſtill always be poſſible only, and never can actually exiſt; and ſo the actual omnipotence of God is taken away. To this reaſoning Dr. Clarke replies, that the firſt argument is a plain begging of the queſtion; for, that an infinitely perfect nature is able indeed to produce infinite things in infinite manners, is certainly true; but that it muſt always actually do ſo, by an abſolute neceſſity of nature, without any power of choice, either as to time, or manner, or circumſtances, does by no means follow from the perfection of its nature, unleſs it be firſt ſuppoſed to be a neceſſary agent, which is the very queſtion begged that was to be proved.

The ſecond argument, he ſays, is, if poſſible, ſtill weaker; for, how does it follow, if God, according to his eternal unerring purpoſe and infinite wiſdom, produces different things at different times, and in different manners, that, therefore, the will and nature of God are changeable? It might exactly as well be argued, that if God (according to Spinoza's ſuppoſition) does always neceſſarily produce all poſſible differences and varieties of things; therefore his will and nature are always neceſſarily infinitely various, unequal, and diſſimilar to themſelves.

And as to the third argument, it is juſt ſuch reaſoning as if a man ſhould argue, that if all poſſible eternal duration be not always actually exhauſted, it can never be all exhauſted; and that, therefore, ſo the eternity of God is taken away: a mode of arguing, the weakneſs of which muſt be diſcerned by every one at firſt ſight. Beſides, the aſſertion itſelf, that no thing, or mode of exiſtence of any thing, could poſſibly have been made in any reſpect different from what it is, is ſo palpably abſurd and falſe, ſo contradictory to experience and the nature of things, and to the moſt obvious and common reaſon of mankind, that of itſelf it immediately, and upon the firſt hearing, ſufficiently confutes any principle of which it is a conſequence. For all things in the world appear plainly to be the moſt arbitrary that can be imagined, and to be wholly the effects not of an abſolute neceſſity of nature, but merely of a neceſſity of fitneſs, or of wiſdom and choice. Moreover, Spinoza maintaining that the ſupreme cauſe is a neceſſary agent, is conſtrained to expoſe all final cauſes as the fictions of ignorant and ſuperſtitious men; and ſo laugh at thoſe who are ſo fooliſh and childiſh as to fancy, that eyes were deſigned and fitted to ſee with, teeth to chew with, food to be eaten for nouriſhment, the ſun to give light, &c. a mode of arguing to which reply is needleſs. See the article GOD.

Againſt Spinoza's ſyſtem it is alleged by Mr. Bayle, 1. That it is impoſſible the univerſe ſhould be but one ſubſtance, ſince every thing that is extended muſt neceſſarily have parts, and what has parts muſt be compounded. And as the parts of extenſion do not ſubſiſt in each other, it follows either that extenſion in the general is not ſubſtance, or that every part of extenſion is a different ſubſtance. Now, according to Spinoza, extenſion in general is an attribute of ſubſtance. And he allows, with other philoſophers, that the attributes of ſubſtance do not differ really from the ſubſtance itſelf. He muſt, therefore, allow, that extenſion in general is ſubſtance; whence it will follow, that every part of extenſion is a particular ſubſtance; which overturns the whole ſyſtem.

2. If it be abſurd to make God extended, as this robs him of his ſimplicity, and makes him be compoſed of parts, it is ſtill worſe to reduce him to the condition of matter, the loweſt of all beings, and that which moſt of the ancient philoſophers ranked immediately above nothing; matter, the theatre of all ſorts of changes, the field of battle of contrary cauſes, the ſubject of all corruptions and generations; in a word, the being, of all others, moſt incompatible with the immutability of the Deity.

The Spinoziſts, indeed, maintain, that it is not ſuſceptible of any diviſion; but the argument they allege in proof of it we have elſewhere ſhewn to be falſe: it is, that for matter to be divided, it is neceſſary that one of the parts be ſeparated from the other by a void ſpace, which is impoſſible; ſince, they ſay, there is no vacuum in nature. See VACUUM.

3. If Spinoziſm appear extravagant, when we conſider God as the ſubject of all the mutations, corruptions, and generations, in bodies, it will be found ſtill worſe, when we conſider him as the ſubject of all the modifications of thinking. It is no ſmall difficulty to unite extenſion and thinking in the ſame ſubſtance; ſince it is not an union like that of two metals, or of water and wine, that will ſerve the purpoſe: theſe laſt require only juxta-poſition; whereas to combine thinking and extenſion, requires an identity. Thinking and extended are two attributes identified with the ſubſtance, and, conſequently, they are identified with each other by the fundamental rule of all logic.

Again, when we ſay, that a man *denies this*, *affirms that*, *likes that*, &c. we make all thoſe attributes fall on the ſubſtance of his mind, not on his thoughts, which are only accidents or modifications of it: if, therefore, what Spinoza advances be true, that men are modalities of God, it would be falſe to ſay, *Peter denies*, *likes*, *wills*, &c.; ſince, in reality, on this ſyſtem it is, that God denies, wills, &c.; and, conſequently, all the denominations which ariſe from the thoughts, deſires, &c. of men, fall properly and phyſically on the ſubſtance of God. From whence it alſo follows, that God affirms and denies, loves and hates, wills and nills the ſame thing, at the ſame time, and under the ſame conditions; contrary to the great principle of reaſoning, *oppoſita ſunt quæ & neque de ſe invicem, neque de eodem tertio ſecundum idem, ad idem, eodem modo atque tempore verè affirmari poſſunt*; which muſt be falſe, if Spinoziſm be true; ſince it cannot be denied, but ſome men love and affirm what others hate and deny, under all the conditions expreſſed in the rule.

4. But if it be phyſically abſurd to ſay, the ſame ſubject is modified at the ſame time with all the different thoughts of all men; it is horrible when we conſider it in a moral light; ſince it will follow, that the infinite, the all-perfect Being, is not conſtant, is not the ſame one moment, but is eternally poſſeſſed even with contrary paſſions: all the uniformity in him in this reſpect, will be, that for one good and wiſe thought, he will have twenty fooliſh and wicked ones. He will not only be the efficient cauſe of all the errors, iniquities, and impurities of men, but alſo the paſſive ſubject of them, the *ſubjectum inhæſionis*. He muſt be united with them in the cloſeſt manner that can be conceived, even by a penetrative union, or rather an identity, ſince the mode is not really diſtinct from the ſubſtance modified. Bayle, art. *Spinoza*.

SPINSTER, in *Law*, an addition uſually given to all unmarried women, from the viſcount's daughter downwards.

Yet ſir Edward Coke ſays, *generoſa* is a good addition for a gentlewoman; and that, if ſuch a perſon be named ſpinſter in any original writ, appeal, or inſtrument, ſhe may abate and quaſh the ſame.

Spelman ſays, that anciently, even queens uſed the diſtaff and ſpindle; whence ſpinſter became a common appellation for all women.

SPINT, in *Commerce*, a corn meaſure of Germany. At Bremen, a laſt of corn, peaſe, or beans, contains 4 quarts, 40 ſcheffels, 160 viertels, or 640 ſpints; 50 ſcheffels anſwering to 101 buſhels, Wincheſter meaſure. At Hamburgh, a laſt of wheat or rye contains 3 wiſpels, 30 ſcheffels, 60 faſſes, 120 kimterns, or 480 ſpints; and according to the ſtandard meaſure of the faſs, which is $21\frac{13}{16}$ inches in diameter, and $10\frac{3}{8}$ inches deep, Hamburgh meaſure, its contents are 3872 Hamburgh cubic inches, or 3213 Engliſh inches, 1 ſcheffel or two faſſes = 3 buſhels, Wincheſter meaſure nearly; and 1 laſt of Hamburgh = $89\frac{2}{3}$ Engliſh buſhels, or $11\frac{5}{24}$ Engliſh quarters.

SPINTHER, among the Romans, a kind of bracelet which the women, in the firſt ages of Rome, uſed to wear on the upper part of their left arm.

SPINTHERA, in *Mineralogy*, a mineral of greeniſh colour, which occurs cryſtallized in irregular dodecahedrons, compoſed of a double four-ſided pyramid, obliquely truncated at the apexes. The cryſtals are ſmall, and brightly ſhining; the fracture is lamellar. Its hardneſs is inferior to that of glaſs; it is tranſlucent on the edges. It melts before the blowpipe without much difficulty. It has not been analyſed. It was diſcovered by Haüy implanted in calcareous ſpar from Dauphiné. Aikin's Dict.

SPINUS, in the *Natural Hiſtory of the Ancients*, the name of a foſſile body of a very remarkable quality; for, according to the accounts of Theophraſtus, and other authors of the greateſt credit, it broke to pieces, and thrown in a heap expoſed to the ſun, it took fire and burnt, and that the more if moiſtened or ſprinkled with water.

It ſeems to have been a ſubſtance nearly allied to what they call the *lapis thracius*, but with this remarkable quality, both of them ſeem to have been of the claſs of the harder bitumens, and are wholly unknown to us. Some late writers have imagined, that the common black ſlate-ſtone, ſo frequent with us in the coal-pits, was the ſubſtance called by Theophraſtus, and the ancients, by this name; but it had none of the qualities attributed to the ſpinus. Hill's Theophraſtus, p. 35.

SPINUS, in *Ichthyology*, a ſpecies of the ſparus, with a bifid tail, and the dorſal ſpine recumbent. It is found in the Indian ſeas.

SPINUS, the *Fringilla ſpinus* of Linnæus, in *Ornithology*, the name of a ſmall bird, called by ſome *ligurinus*, and in Engliſh the *ſiſkin*. Its head is black, and its neck and back green; the neck, however, has ſome ſlight admixture of a blackiſh tinge, and the roots of the back feathers have alſo ſome blackiſhneſs; its rump is of a greeniſh-yellow, as are alſo its breaſt and throat; its belly is white, and its tail is yellow underneath, with ſome browniſh ſpots; the female is paler coloured than the male; and its throat, and its ſides, under the wings, are whitiſh, with ſtreaks of brown; the head and back are of a greeniſh aſh-colour, marked with brown. It is common in Germany and England, which it viſits at uncertain times, and is kept in cages for ſinging. In winter theſe birds fly in large flocks. In Suſſex it is called the barley-bird, becauſe it comes to them in the barley-ſeed time.

SPIO, in *Natural Hiſtory*, a genus of the claſs Vermes, and order Molluſca. The generic character is as follows: Body projecting from a tube, jointed, and furniſhed with dorſal fibres; peduncles or feet rough with briſtles, and placed towards the back; two feelers, which are long and ſimple; it has two oblong eyes. There are only two

Species.

* SETICORNIS. Feelers thin and ſtriate. This ſpecies inhabits the ocean, principally where there is a clayey bottom; it is about three inches long; the tube is compoſed of agglutinated particles of earth, thin, erect, and thrice as long as the body. From this the animal projects its capillary white feelers in ſearch of food, which conſiſts of ſmall marine worms; the body is whitiſh, with a tinge of green, with a red line down the middle of the back; the hind-part is of a ſea-green; the fore-part is blackiſh-grey, with tranſverſe white ſtriæ; the head is pale.

FILICORNIS. Feelers thick and annulate. It inhabits the ſea-ſhores about Greenland, and is an inch long. Body oblong, yellowiſh or reddiſh, with a cinereous line in the middle, and at each end; the tube is fragile, erect, and greeniſh, from which it projects its feelers in ſearch of *planariæ*, and other ſmall marine worms.

SPIPOLA, in *Ornithology*, the name of a ſmall bird of the lark kind, of which there are, according to Aldrovand, three ſpecies, ſuſpected by Mr. Ray to be only varieties of the *ſpinoletta*, or *tordino* of the Venetians.

Linnæus makes two of theſe diſtinct ſpecies, under the titles of *alauda trivialis*, and *alauda pratenſis*; the laſt of which is our tit-lark.

SPIRACLE. See VENT.

SPIRACULA, in the *Hiſtory of Inſects*, are little holes or pores placed ſingly on each ſide of every ſegment of the abdomen, through which the inſect breathes; and if oil be applied ſo as to ſtop them up, it proves fatal to moſt of them.

SPIRÆA, in *Botany*, a name borrowed from Theophraſtus, whoſe *σπειραια* is ſuppoſed to be one of the ſpecies of this pretty genus.—Linn. Gen. 253. Schreb. 341. Willd. Sp. Pl. v. 2. 1055. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 535. Ait. Hort. Kew. v. 3. 254. Purſh 341. Juſſ. 339. Lamarck Illuſtr. t. 439. Gærtn. t. 69.—Claſs and order, *Icoſandria Pentagynia*. Nat. Ord. *Pomaceæ*, Linn. *Roſaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, flat at the baſe, in five acute ſegments, permanent. *Cor.* Petals five, roundiſh-oblong, inſerted into the calyx. *Stam.* Filaments more than twenty, thread-ſhaped, inſerted into the calyx, ſhorter than the corolla; anthers roundiſh. *Piſt.* Germens five or more; ſtyles as many, thread-ſhaped, the length of the ſtamens; ſtigmas capitate. *Peric.* Capſules oblong, compreſſed, pointed, each of one cell and two valves. *Seeds* few, pointed, ſmall, inſerted into the inner margins of the valves.

Obſ. *S. Filipendula* and *Ulmaria* have numerous germens and capſules; *S. Aruncus* is dioecious; *S. opulifolia* has only three germens and ſtyles.

Eſſ. Ch. Calyx five-cleft. Petals five. Capſules ſuperior, of two valves, with ſeveral ſeeds.

Sect. 1. *Stem ſhrubby.*

1. S. *lævigata*. Smooth-leaved Spiræa. Linn. Mant. 244. Willd. n. 1. Ait. n. 1. (S. altaica; Pall. Roſſ. v. 1. p. 1. 37. t. 23.)—Leaves obovato-lanceolate, entire, ſeſſile, ſmooth. Cluſters ſtalked, corymboſe.—Native of Siberia. The Engliſh gardens are obliged to Dr. Solander for this ſhrub, which is quite hardy, flowering copiouſly in ſummer, and diſtinguiſhed by its very ſmooth, willow-like, rather glaucous *leaves*. *Flowers* pure white, in cluſters, collected into corymboſe tufts at the ends of the branches. The *leaves* are deciduous in all the ſpecies.

2. S. *ſalicifolia*. Willow-leaved Spiræa. Linn. Sp. Pl. 700. Fl. Brit. n. 1. Engl. Bot. t. 1468. Ait. n. 2. Purſh n. 1. Pall. Roſſ. v. 1. p. 1. 36. t. 21, 22. (S. Theophraſti fortè; Ger. Em. 1601.)—Leaves ovato-lanceolate, bluntiſh, ſerrated, ſmooth. Cluſters terminal, compound.—Native of mountain thickets, near water, in Siberia, Tartary, and North America, as well as in Scotland and the north of England. It is common in ſhrubberies, flowering in July. The *ſtem* is four or five feet high, erect, buſhy. *Leaves* ſtalked, from one to two inches long, various in breadth, deeply ſerrated. *Flowers* pink, with a dark red *calyx*. In America there is a white variety.

3. S. *calloſa*. Callous Spiræa. Thunb. Jap. 209. Willd. n. 3. (S. japonica; Linn. Suppl. 262.)—Leaves lanceolate, acute, ſerrated, rather villous. Stem downy. Panicle doubly compound, ſomewhat level-topped.—Native of Japan, flowering in June. *Leaves* longer and more acute than

than in the laſt, more villous than in the following, and not downy. The panicled *inﬂoreſcence* diſtinguiſhes it from both. *Flowers* red, on villous ſtalks.

4. S. *tomentoſa*. Scarlet Spiræa. Linn. Sp. Pl. 701. Ait. n. 3. Purſh n. 2. "Schmidt Arb. v. 1. 52. t. 51." (Ulmaria pentacarpos, &c.; Pluk. Phyt. t. 321. f. 5.)—Leaves ovate, unequally ſerrated; downy and white beneath. Cluſters compound, downy.—Native of North America; a hardy ſhrub in our gardens, flowering towards autumn, and juſtly admired for its bright red *flowers*, and the white downineſs of the backs of its *leaves*. In other reſpects it much reſembles *S. ſalicifolia*.

5. S. *argentea*. Silvery Spiræa. Linn. Suppl. 261. Willd. n. 5.—Leaves wedge-ſhaped, furrowed, ſomewhat plaited; ſilky on both ſides; ſerrated at the extremity. Cluſters compound. Capſules fringed.—Sent from New Granada by Mutis to Linnæus. The copious ſilvery *leaves*, about an inch long, render this a very elegant ſhrub. The *cluſters* are numerous at the ends of the branches, but do not conſiſt of many *flowers*. The *germens* and *capſules* are bordered with long hairs.

6. S. *alpina*. Alpine Small-leaved Spiræa. Pall. Roſſ. v. 1. p. 1. 35. t. 20. Willd. n. 6.—Leaves linear-lanceolate, partly toothed, very ſmooth. Flowers corymboſe.—Native of cold woody mountains in Siberia, near the lake Baical. A ſmall, ſpreading, branching *ſhrub*, whoſe bark ſplits into long threads. The *leaves* are hardly an inch long, and very narrow. *Flowers* white, in ſmall downy *corymbs*, ſolitary at the end of each branch.

7. S. *hypericifolia*. St. John's-wort Spiræa, or Italian May; commonly called *Hypericum frutex*. Linn. Sp. Pl. 701. Ait. n. 4. Purſh n. 3. "Schmidt Arb. v. 1. 55. t. 56." Bocc. Muſ. 137. t. 96. (Pruno ſylveſtri affinis canadenſis; Pluk. Phyt. t. 218. f. 5.)—Leaves obovate, entire. Umbels ſeſſile.—In dry ſwamps of Canada and New York, flowering in May. *Purſh*. This ſhrub, cultivated for near 200 years paſt in our Engliſh gardens, and aſſerted to be of American origin, is no leſs apparently wild on all the hills of Umbria, between Terni and Trevi, as Boccone long ago mentioned. (See Sm. Tour, ed. 2. v. 2. 322.) It is frequently called in England Italian May. The *leaves* are an inch long, reſembling ſome ſpecies of *Hypericum*. *Flowers* white, copious and very pretty, in ſmooth lateral umbels.

8. S. *chamædrifolia*. Germander-leaved Spiræa Linn. Sp. Pl. 701. Ait. n. 5. Purſh n. 4. Pall. Roſſ. v. 1. p. 1. 32. t. 15.—Leaves obovate, ſmooth, cut, and ſerrated. Corymbs ſtalked.—Native of Siberia and Hungary. Hardy with us, flowering in June and July. The *leaves* are green, or ſlightly glaucous, on both ſides, an inch, or rather more, in length. *Flowers* white, rather bigger than the laſt, nearly umbellate. *Branches* angular.

9. S. *ulmifolia*. Elm-leaved Spiræa. Scop. Carn. v. 1. 349. t. 22*. Willd. n. 9. Ait. n. 6. (S. chamædrifolia; Jacq. Hort. Vind. v. 2. 66. t. 140.)—Leaves ovate, ſmooth, doubly ſerrated; glaucous beneath. Corymbs racemoſe, elongated, on long ſtalks.—Native of Carniola and Siberia. Cultivated for about 30 years paſt in our gardens, flowering in June. A ſhrub larger in all its parts than the foregoing, eſpecially the *flowers*, which are rather racemoſe than corymboſe. The *leaves* are an inch and a half long, on ſtalks one-third that length.

10. S. *betulifolia*. Birch-leaved Spiræa. Pall. Roſſ. v. 1. p. 1. 33. t. 16. Purſh n. 5.—Leaves broadly ovate, ſmooth, deeply ſerrated, on ſhort ſtalks. Corymbs compound, level-topped.—Native of Siberia; and, according to Mr. Purſh, of the mountains of Virginia, flowering from May to July. He deſcribes it as not above a foot high; the *flowers* tinged with red, and aſſerts it to be very diſtinct from the laſt, to which Willdenow refers Pallas's ſynonym. The *leaves* appear to be much broader than in the *ulmifolia*, with ſhorter thicker *footſtalks*, and the *inﬂoreſcence* more compact.

11. S. *crenata*. Hawthorn-leaved Spiræa. Linn. Sp. Pl. 701. Ait. n. 7. Pall. Roſſ. v. 1. p. 1. 35. t. 19. (Oxyacantha anguſtifolia non ſpinoſa; Barrel. Ic. t. 564.)—Leaves obovate, acute; toothed at the extremity. Corymbs lateral, crowded, ſtalked.—Native of Siberia, Tartary, Hungary, and Spain. Cultivated by Miller in 1739, and frequently met with in curious ſhrubberies, flowering in May. The *leaves* vary much in ſize and ſhape, but are always ſtrongly toothed, or jagged, at the end. When ſmall they are often three-ribbed, but that character is not ſo conſtant as to make a ſpecific difference. *Flowers* white, in copious, ſhort, lateral, leafleſs cluſters. Willdenow ſuſpects the Spaniſh variety may be a diſtinct ſpecies, but we find our garden plant ſo variable, that the line of diſtinction is ſcarcely to be drawn. A compariſon of living ſpecimens muſt decide the queſtion.

12. S. *trilobata*. Three-lobed Spiræa. Linn. Mant. 2. 244. Willd. n. 11. Ait. n. 8. Pall. Roſſ. v. 1. p. 1. t. 17.—Leaves roundiſh, ſomewhat heart-ſhaped, bluntly lobed, toothed. Umbels terminal.—Native of mountains in Siberia. A hardy ſhrub with us, introduced by ſir J. Banks in 1801, but not yet come into general culture. It flowers in May. The *leaves* are ſmooth, not unlike thoſe of a gooſeberry in ſhape. *Flowers* white, copious, and handſome.

13. S. *thalictroides*. Meadow-rue-leaved Spiræa. Willd. n. 12. Ait. n. 9. Pall. Roſſ. v. 1. p. 1. 34. t. 18.—Leaves obovate, obtuſe, ſomewhat three-lobed. Umbels lateral, ſeſſile.—Native of the alps of Dauria. Flowering at Kew in May. A pretty ſpecies, with ſmall *leaves*, very glaucous beneath. *Flowers* white, ſmaller than the laſt, and lateral, not terminal.

14. S. *opulifolia*. Virginian Guelder-roſe. Linn. Sp. Pl. 702. Ait. n. 10. Purſh n. 6. "Schmidt Arb. v. 1. 52. t. 52." (Euonymus virginiana, ribeſii folio, capſulis eleganter bullatis; Comm. Hort. v. 1. 169. t. 87.)—Leaves ovate, three-lobed, ſerrated, ſmooth. Corymbs terminal, denſe, bracteated. Capſules poliſhed, inflated.—On the banks of rivers, particularly among the mountains, from Canada to Carolina, flowering in June and July. Generally known by the name of Nine-bark. *Purſh*. Cultivated by biſhop Compton, and now common in ſhrubberies, forming a ſmall tree, with much reſemblance to the Common Guelder-roſe. *Flowers* white, ſomewhat like Hawthorn. *Capſules* tumid, ſmooth, of a ſhining brown. *Calyx* more or leſs downy.

15. S. *capitata*. Capitate Spiræa. Purſh n. 7.—"Leaves ovate, ſomewhat lobed, doubly toothed; reticulated and downy beneath. Corymbs terminal, denſe, ſomewhat capitate, on very long ſtalks. Calyx downy."—Found by Mr. Menzies, on the north-weſt coaſt of America, flowering in June. Gathered alſo on the Columbia river by governor Lewis. *Purſh*.

16. S. *ariæfolia*. Beam-tree-leaved Spiræa.—Leaves elliptic-oblong, ſomewhat lobed, toothed; pale and villous beneath. Cluſters compound, panicled, terminal, downy.—Gathered on the north-weſt coaſt of America, by Mr. Menzies, to whom we are obliged for ſpecimens. It ſeems not noticed by Mr. Purſh. Perhaps this ſpecies ought, on account of its panicled very compound *inﬂoreſcence*, to be ranged near *ſalicifolia* and *tomentoſa*. The *leaves* are lobed

like *Pyrus Aria*, but rather ſmaller, and villous, not cottony, beneath. The dried *flowers* look as if they had been reddiſh.

17. S. *diſcolor*. Folded-leaved Spiræa. Purſh n. 8.—"Leaves ovate, lobed, toothed, ſomewhat plaited; ſnow-white and downy beneath. Panicles terminal, ſtalked, very much branched."—On the banks of the Kooſkooſky, gathered by governor Lewis, flowering in June and July. A ſhrub about five feet high. *Purſh*. Can this be the ſame ſpecies with our laſt? We have not had an opportunity of comparing ſpecimens.

18. S. *ſorbifolia*. Service-tree-leaved Spiræa. Linn. Sp. Pl. 702. Ait. n. 11. Purſh n. 9. Pall. Roſſ. v. 1. p. 1. 34. t. 24, 25. (S. n. 51; Gmel. Sib. v. 3. 190. t. 40.)—Leaves pinnate; leaflets uniform, ſharply ſerrated. Stem ſhrubby. Flowers panicled.—Native of Siberia and the north-weſt coaſt of America, flowering in July and Auguſt. Frequent in gardens, and diſtinguiſhed by the elegance of its bright-green, finely ſerrated *leaves*, as well as its large panicles of cream-coloured *flowers*. The *root* creeps in ſome degree. The *ſtems* are three or four feet high, not very woody.

Sect. 2. *Stem herbaceous.*

19. S. *Aruncus*. Goat's-beard Spiræa. Linn. Sp. Pl. 702. Ait. n. 12. Purſh n. 10. Pall. Roſſ. v. 1. p. 1. 39. t. 26. (Barba capri; Fuchſ. Hiſt. 181. B. capræ; Camer. Hort. 26. t. 9.)—Leaves doubly compound. Spikes panicled. Flowers dioecious.—Native of Siberia, Auſtria, Switzerland, the Pyrenées, and the mountains of North America. A hardy perennial in our gardens, of great elegance, about a yard high, with ample light-green *leaves*, and innumerable white feathery *flowers*, produced in June and July.

20. S. *Filipendula*. Common Dropwort Spiræa. Linn. Sp. Pl. 702. Willd. n. 16. Fl. Brit. n. 2. Engl. Bot. t. 284. Fl. Dan. t. 635. (Filipendula; Ger. Em. 1058. Camer. Epit. 608. Matth. Valgr. v. 2. 217.)—Leaves interruptedly pinnate; leaflets uniform, ſerrated, ſmooth. Stem herbaceous. Flowers cymoſe, with many ſtyles.—Native of high chalky or gravelly paſtures in England, and other parts of Europe, flowering in July. Commonly double in gardens. The *root* is perennial, furniſhed with oval woody knobs. *Stem* one or two feet high. *Leaflets* ſmall, oblong, ſharply cut. *Flowers* cream-coloured, with here and there a tinge of red.

21. S. *Ulmaria*. Meadow-ſweet Spiræa. Linn. Sp. Pl. 702. Willd. n. 17. Fl. Brit. n. 3. Engl. Bot. t. 960. Curt. Lond. faſc. 5. t. 33. Fl. Dan. t. 547. (Regina prati; Ger. Em. 1043.)—Leaves interruptedly pinnate; downy beneath: the terminal leaflet lobed. Flowers cymoſe, with many ſtyles.—Common in wet meadows, bogs, and the borders of rivers and pools throughout Europe, flowering in June and July. The *root* is fibrous, perennial. *Stems* three or four feet high. *Leaves* broad, ſerrated; white underneath. *Flowers* cream-coloured, copious, with a very ſweet, but oppreſſive, fragrance. *Germens* twiſted.

22. S. *digitata*. Fingered Spiræa. Willd. n. 18. (S. palmata; Linn. Suppl. 262. Pall. Roſſ. v. 1. p. 1. 40. t. 27.)—Leaves pinnate; downy beneath: the terminal leaflet largeſt, in ſeven deep lobes; ſide ones in five. Corymb compound, denſe.—Native of moiſt mountainous ſituations, in the eaſtern part of Siberia. This has the habit of the laſt, but the palmate deeply divided *leaflets* abundantly diſtinguiſh it.

23. S. *lobata*. Palmate Red Spiræa. Jacq. Hort. Vind. v. 1. 38. t. 88. Willd. n. 19. Purſh n. 11.—Leaves pinnate, ſmooth: the terminal leaflet largeſt, ſeven-lobed: ſide ones three-lobed. Corymbs proliferous.—In fertile wet meadows of Virginia and Carolina, flowering in July and Auguſt. A beautiful perennial; *flowers* red, in large cluſters. *Purſh*. The Linnæan herbarium ſhews that authors have here miſapplied the reference to the *Supplementum*, which belongs to the laſt ſpecies.

24. S. *camtſchatica*. Broad-leaved Siberian Spiræa. Pall. Roſſ. v. 1. p. 1. 41. t. 28. Willd. n. 20.—Leaves five-lobed, with auricles on the ſtalks. Corymbs proliferous. Stem ſomewhat hairy.—Native of Camtſchatka and Beering's iſland. The *root* is perennial. *Leaves* very broad, ſmooth, with acute lobes. *Flowers* white.

25. S. *palmata*. Palmate Japan Spiræa. Thunb. Jap. 212. Willd. n. 21.—"Leaves palmate, ſerrated. Panicle repeatedly compound. Stem ſmooth."—Native of Japan. The ſtalks of the *leaves* ſeem to have no auricles, and the *ſtem* is ſmooth; otherwiſe the deſcription of this ſpecies bears ſome reſemblance to the laſt. *Flowers* red or white.

26. S. *trifoliata*. Common Three-leaved Spiræa. Linn. Sp. Pl. 702. Ait. n. 16. Purſh n. 12. Curt. Mag. t. 489.—Leaves ternate, ſerrated, nearly equal. Stipulas linear. Flowers terminal, looſely panicled. Calyx tubular.—In ſhady woods and on bogs, chiefly in the mountainous parts of North America from Canada to Florida, flowering in June and July. *Purſh*. A hardy perennial in our gardens, of ſingular elegance, with large drooping *flowers*, whoſe *petals* are white, *calyx* deep red.

27. S. *ſtipulacea*. Auricled Three-leaved Spiræa. Willd. Enum. 542. Purſh n. 13.—Leaves ternate, ſerrated, nearly equal. Stipulas ovate, leafy, cut. Flowers terminal, looſely panicled. Calyx bell-ſhaped.—In the ſhady woods of Kentucky and Tenaſſee, flowering in June and July. *Purſh*. We received it from the choice garden of James Vere, eſq. in Auguſt, 1814. The general appearance of this ſpecies is very like the laſt, but the very large *ſtipulas*, and perhaps the ſhorter greener *calyx*, diſtinguiſh it.

SPIRÆA, in *Gardening*, contains plants of the ſhrubby and herbaceous kinds, among which the ſpecies cultivated are, the willow-leaved ſpiræa (S. ſalicifolia); the ſcarlet-leaved ſpiræa (S. tomentoſa); the hypericum-leaved ſpiræa (S. hypericifolia); the ſilver-leaved ſpiræa (S. argentea); the germander-leaved ſpiræa (S. chamædrifolia); the hawthorn-leaved ſpiræa (S. crenata); the three-lobe-leaved ſpiræa (S. triloba); the currant-leaved ſpiræa (S. opulifolia); the ſervice-leaved ſpiræa (S. ſorbifolia); the goat's-beard ſpiræa (S. aruncus); the common dropwort ſpiræa (S. filipendula); the common meadow-ſweet ſpiræa (S. ulmaria); and the three-leaved ſpiræa (S. trifoliata).

In the firſt ſpecies there are ſeveral varieties; as the fleſh-coloured willow-leaved, the Alpine willow-leaved, the panicled willow-leaved, and the broad willow-leaved ſpirææ. The tough, ſtraight, pliant, young ſhoots of this plant are ſometimes uſed to top fiſhing-rods, &c.

The fifth ſpecies varies very much, with larger or ſmaller leaves, more or leſs cut, but more commonly quite entire and ovate-acute.

The eighth ſort is commonly known in the nurſeries by the name of Virginian guelder roſe.

The eleventh ſort is an elegant plant, which in gardens grows very luxuriantly, and has often double flowers.

In the twelfth ſort there are varieties with double flowers, and with variegated leaves.

Method of Culture.—In all the ſhrubby ſorts, this may be performed by ſuckers, layers, and cuttings. The ſuckers ſhould be taken off in the autumn, and planted out where they are to remain, or in nurſery-rows, to attain a fuller growth. The firſt ſort requires to be cleared of theſe ſuckers every two years at fartheſt. The layers ſhould be put down in the autumn, or in the ſpring, and may be taken off and planted as above, in the autumn or ſpring following. All the ſorts may be raiſed in this way; but it is moſt proper for ſuch ſorts as do not ſend off ſuckers. The cuttings may be made from the ſhoots of the preceding ſummer, and be planted out in a ſhady border, in the early autumn. When they have become well rooted, they may be removed, and managed as the others. They ſucceed in this way with more difficulty than in either of the others.

All the herbaceous ſorts may be increaſed by ſeeds, or parting the roots. The ſeed may be ſown in the autumn, or early in the ſpring, but the firſt is the better mode, on a bed of fine mould. When the plants appear, they ſhould be kept clear from weeds till the autumn, when they may be planted where they are to remain, or in the nurſery for a year or two. The roots ſhould be parted in the autumn or ſpring, when the ſtems decay, before they ſhoot out new ones, being planted immediately where they are to grow. The double-flowered and ſtriped varieties can only be preſerved in this way.

They all afford variety and ornament in the ſhrubbery, and other parts of pleaſure-grounds.

Spiræa, *African*, in *Botany*. See Diosma.

SPIRAL, in *Geometry*, a curve line of the circular kind, which, in its progreſs, recedes from its centre; as in winding from the vertex, down to the baſe of a cone.

It is called, from its inventor, *Archimedes's ſpire*, or *helix*, and is thus deſcribed: divide the periphery of a circle A P *p* A (*Plate* XIV. *Geometry*, *fig*. 4.) into any number of equal parts, by a continual biſection in the points *p*. Into the ſame number of parts divide the radius C A, and make C M equal to one part, C *m* to two parts, &c. Then will the points, M, *m*, *m*, &c. be points in the ſpiral; which, connected, will give the ſpiral itſelf.

This is more particularly called the *firſt* ſpiral; and the ſpace included between its centre and the point A, the ſpiral *ſpace*.

The firſt ſpiral may be continued to a *ſecond* ſpiral, by deſcribing another circle with double the radius of the firſt; and the ſecond may be continued to a *third*, by a third circle, &c.

Hence, 1. Ap is to the periphery, as Cm to the radius: wherefore, if the periphery be called p, the radius $AC = r$, $Ap = x$, $pm = y$; then will $Cm = r - y$: conſequently, as $p : r :: x : r - y$, we ſhall have $pr - py = rx$.

2. If $Cm = y$, then will $rx = py$; which equation the ſpiral has in common with the quadratrix of Dinoſtrates, and that of Tſchirnhauſen: and, therefore, $r^n x^m = p^n y^m$ will ſerve for infinite ſpirals and quadratrices. See Quadratrix.

The ſpiral line may be conceived to be thus generated: If a right line, as A B (*Plate* XIV. *Geometry*, *fig*. 5.) having one end fixed at B, be equally moved round, ſo as, with the other end A, to deſcribe the periphery of a circle; and, at the ſame time, a point be conceived to move forward equally, from B towards A, in the right line A B, ſo as that the point deſcribes that line, while the line generates the circle; then will the point, with its two motions, deſcribe the curve B, 1, 2, 3, 4, 5, &c. which is called a ſpiral line; and the plain ſpace contained between the ſpiral line and the right line B A, is called the ſpiral ſpace.

Again, if the point B be conceived to move twice as ſlow as the line A B, ſo that it ſhall get but half way along B A, when that line ſhall have formed the circle; and if then you imagine a new revolution to be made of the line carrying the point, ſo that they ſhall end their motion at laſt together, there will be formed a double ſpiral line, as in the figure: from the manner of which may be eaſily drawn theſe corollaries:

1. That the lines B 12, B 11, B 10, &c. making equal angles with the firſt and ſecond ſpiral (as alſo B 12, B 10, B 8, &c.) are in arithmetical proportion.

2. The lines B 7, B 10, &c. drawn any how to the firſt ſpiral, are to one another as the arcs of the circle intercepted betwixt B A and thoſe lines; becauſe, whatever parts of the circumference the point A deſcribes, as ſuppoſe 7, the point B will alſo have run over 7 parts of the line A B.

3. Any lines drawn from B to the ſecond ſpiral, as B 18, B 22, &c. are to each other as the aforeſaid arcs, together with the whole periphery added on both ſides: for at the ſame time that the point A runs over 12, or the whole periphery, or perhaps 7 parts more, ſhall the point B have run over 12, and 7 parts of the line A B, which is now ſuppoſed to be divided into 24 equal parts.

The area C A B D E of the ſpiral of Archimedes (*Plate* XIV. *Geometry*, *fig*. 6.) is equal to one-third part of the circle, deſcribed with the radius C E.

In like manner, the whole ſpiral area, generated by the ray drawn from the point C to the curve, when it makes two revolutions, is the third part of a ſpace double of the circle deſcribed with the radius 2 C D; and the whole area, generated by the ray from the beginning of the motion, till after any number of revolutions, is equal to the third part of a ſpace that is the ſame multiple of the circle deſcribed with the greateſt ray, as the number of revolutions is of unit.

Any portion of the area of the ſpiral, terminated by the curve C *m* A, and the right line C A, is equal to one-third of the ſector C A G, terminated by the right lines C A and C G, the ſituation of the revolving ray, when the point that deſcribes the curve ſets out from C. See Maclaurin's Fluxions, Introd. p. 30, 31. See Quadrature *of the Spiral of Archimedes*.

Spiral, *Logiſtic*, or *Logarithmic*. See Logistic and Quadrature.

Spiral *of Pappus*, a ſpiral formed on the ſurface of a ſphere, by a motion analogous to that by which the ſpiral of Archimedes is deſcribed in plano.

This ſpiral is ſo called from its inventor Pappus. Collect. Mathem. lib. ii. prop. 30.

Thus, if C be the centre of the ſphere (*fig*. 7.), A R B A a great circle, P its pole; and while the quadrant P M A revolves about the pole P with an uniform motion, if a point proceeding from P move with a given velocity along the quadrant, it will trace upon the ſpherical ſurface the ſpiral P F *a*.

Now if we ſuppoſe the quadrant P M A to make a complete revolution in the ſame time that the point, which traces the ſpiral on the ſurface of the ſphere, deſcribes the quadrant, which is the caſe conſidered by Pappus; then the portion of the ſpherical ſurface terminated by the whole ſpiral, the circle A R B A, and the quadrant P M A, will be equal to the ſquare of A B. In any other caſe, the area P M A *a* F Z P is to the ſquare of the diameter A B, in the ſame proportion as the arc A *a* is to the whole circumference A R B A. And this area is always to the ſpherical triangle P A *a*, as the inſcribed ſquare is to the circle. See Maclaurin's Fluxions, Introd. p. 31—33.

The portion of the ſpherical ſurface, terminated by the quadrant P M A, the arcs A R, F R, and the ſpiral P Z F, admits of a perfect quadrature, when the ratio of the arc A *a* to

A *a* to the whole circumference can be aſſigned. See Maclaurin, ibid. p. 33.

SPIRAL, *Parabolic.* See HELICOID.

SPIRAL, *Proportional,* is generated by ſuppoſing the radius to revolve equably, and a point from the circumference to move towards the centre with a motion decreaſing in a geometric progreſſion. See LOGISTIC.

From the nature of a decreaſing geometric progreſſion, it is eaſy to conceive that the radius C A (*fig.* 8.) may be continually divided; and although each ſucceſſive diviſion becomes ſhorter than the next preceding one, yet there muſt be an indefinite number of diviſions or terms before the laſt of them becomes of no finite magnitude. Whence it follows, that this ſpiral winds continually round the centre, and does not fall into it till after an indefinite number of revolutions: and alſo that the number of revolutions decreaſes, or the number of the equal parts into which the circumference is divided increaſes.

It is alſo evident, that any proportional ſpiral cuts the intercepted radii at equal angles: for, if the diviſions A *d*, *de*, *ef*, *fg*, &c. of the circumference be very ſmall, the ſeveral radii would be ſo cloſe to one another, that the intercepted parts A D, D E, E F, F G, &c. of the ſpiral might be taken as right lines; and the triangles C A D, C D E, C E F, &c. would be ſimilar, having equal angles at the point C, and the ſides about thoſe angles proportional: conſequently, the angles at A, D, E, F, &c. being equal, the ſpiral muſt neceſſarily cut the radii at equal angles. Robertſon's Elem. of Nav. book ii. p. 87.

Proportional ſpirals are ſuch ſpiral lines as the rhumb lines on the terreſtrial globe, which, becauſe they make equal angles with every meridian, muſt alſo make equal angles with the meridians in the ſtereographic projection on the plane of the equator, and therefore will be, as Dr. Halley obſerves, proportional ſpirals about the polar point. From whence he demonſtrates, that the meridian line is a ſcale of log. tangents of the half meridian complements of the latitudes. See RHUMB, LOXODROMY, and MERIDIONAL *Parts.*

SPIRAL, in *Architecture* and *Sculpture,* denotes a curve that aſcends, winding about a cone, or ſpire, ſo that all the points of it continually approach the axis.

By this it is diſtinguiſhed from the helix, which winds, after the ſame manner, around a cylinder. Ignorant architects confound the two, but the more knowing diſtinguiſh them carefully.

SPIRAL *Pump.* See *Archimedes's* SCREW.

SPIRAL *Stairs,* in *Building.* See STAIRS.

SPIRAL *Veſſels,* in *Vegetable Phyſiology,* are found ranged concentrically round the pith in the tender branches or ſtalks of numerous plants, particularly the Elder, Syringa, Cornel, Peony, and many of the Liliaceous order. If a branch be partly cut tranſverſely, or gently broken, and the portions ſlowly drawn aſunder, a number of fine white fibres will be perceived gradually to unroll, and theſe will often ſupport a conſiderable piece of the divided ſtalk. Theſe fibres originally formed the coat of the veſſels in queſtion. After the plant has acquired a certain firmneſs of texture, or has finiſhed its growth for the ſeaſon, ſuch can no longer be unrolled. Mirbel has delineated many ſpecimens of theſe veſſels, in which the ſpiral fibre of each is more or leſs imperfect, ſhewing that, probably as they advance in age, the veſſels become entire tubes.

The uſe of theſe ſpiral-coated veſſels has been much diſputed. They being commonly found on diſſection to contain ſcarcely any fluid but air, Malpighi, Grew, and others, have called them air-veſſels, ſuppoſing they were the lungs of plants, and imbibed air from the atmoſphere, through another more external ſet of roundiſh or oval air-veſſels, of which leaves, petals, &c. are full. But the experiments of Darwin and Knight rather ſhew the ſpiral-coated tubes to be the true ſap-veſſels, in which light we have conſidered them in the article CIRCULATION *of Sap,* to which we refer the reader. No ſuch ſpiral veſſels are found in the bark of plants, at any period of its growth.

SPIRATION. See EXPIRATION, INSPIRATION, PERSPIRATION, RESPIRATION, and TRANSPIRATION.

SPIRATION, in *Scholaſtic Theology,* a term uſed by the popiſh ſchoolmen to ſignify the manner in which the perſonality of the Holy Spirit was derived from the Father and the Son. See PROCESSION and *Holy* SPIRIT.

SPIRDING SEE, in *Geography,* a large lake of Pruſſia; 30 miles S. of Bartenſtein.

SPIRE, in *Agriculture,* a term ſignifying to ſprout, as grain in the malting proceſs, &c. The ſpiring in this proceſs ſhould neither be carried too far nor ſtopped too ſuddenly, as in both caſes the malt ſuffers injury. See MALT.

SPIRE, *Spira,* in the *Ancient Architecture,* is ſometimes uſed for the baſe of a column, and ſometimes for the aſtragal, or tore.

The word is formed from the Latin *ſpiræ,* the *folds of a ſerpent,* which bear ſome reſemblance to it; or from the Greek σπειρα, the *coil of a rope.*

SPIRE is alſo a pyramidical termination of the tower of a church or other building. This ornament, being the genuine offspring of the pointed arch, and not occurring in the monuments of Greece or Rome, ought to be confined to its proper ſtyle. It is an incongruity to introduce it into Grecian architecture.

SPIRE, in *Geography,* a city of France, and principal place of a diſtrict, in the department of Mont Tonnerre, containing 3744 inhabitants, (its canton having 7894,) in 9 communes. This was, before the French revolution, an imperial city of Germany, and the capital of a biſhopric of the ſame name. Spire is an ancient city, ſaid to have been founded before the commencement of the Chriſtian era, and receives its name from the ſmall river Spirebach, which runs into the Rhine, about 500 paces below it. It contains a cathedral, three collegiate churches, and ſeveral convents, beſides two churches belonging to the Lutherans, of which claſs the magiſtrates and greater number of the inhabitants conſiſt. The Franks took this city from the Romans, and it became one of the original imperial cities. In the year 1529, a diet was held here, in which the reformers firſt obtained the name of Proteſtants. It was deſtroyed by the French in 1689, and lay waſte for ten years, nor was it rebuilt till after the peace of Ryſwick. Before this diſaſter, it was the ſeat of the imperial chamber. In December 1793, it ſurrendered to the republican troops of France. The biſhopric of Spire is of conſiderable antiquity. Its territories were ſituated on the Rhine, between the Palatinate, the duchy of Wurtemburg, the margraviate of Baden, and the principality of Deux-Ponts, about 18 leagues in length, and 12 in breadth. It is mountainous, and covered with foreſts; nevertheleſs it produces corn, wine, cheſnuts, and almonds. The biſhop was ſuffragan of Mentz, and reſided at Bruchſal. The territories on the left bank of the Rhine have been united to France, and in 1802, thoſe on the right were given as indemnities to the margrave of Baden; 12 miles S.W. of Heidelberg. N. lat. 49° 18′. E. long. 8° 30′.

SPIRES, in *Rural Economy*, a term provincially uſed to ſignify timber-ſtands.

SPIRINCHUS, in *Ichthyology*, a name by which ſome authors have called the ſmelt.

SPIRIT, Spiritus, in *Phyſiology*, the moſt ſubtle and volatile part, or juice of the body; by means of which its functions and operations have been ſuppoſed to be performed.

The ancients made a fourfold diviſion of ſpirits; into *vital, animal, natural,* and *genital;* the firſt of which they placed in the heart; the ſecond, in the brain; the third, in the ſtomach and liver; and the laſt, in the teſticles: but as this diviſion is founded on a falſe hypotheſis, it is now deſervedly ſet aſide.

The moderns have uſually divided ſpirits into *vital* and *animal:* the former being only the fineſt and moſt agitated parts of the blood, on which its motion and heat depend: and the latter an exceedingly thin, ſubtle, moveable fluid, juice, or humour, ſeparated from the blood in the cortex of the brain, and thence received into the minute fibres of the medulla, and by them diſcharged into the nerves; by which it is conveyed through every part of the body, to be the inſtrument of ſenſation, muſcular motion, &c. See Animal *Spirits,* and Nervous *Fluid, Juice,* and *Syſtem.*

Spirits, *Low,* in *Medicine.* See Melancholy.

Spirit, *Spiritus,* in the *Newtonian Phyſics,* denotes a moſt ſubtle penetrative ſubſtance, which ſome have ſuppoſed to pervade all, even the denſeſt bodies, and to lie hid in them; and by the force and action of which, the particles of bodies attract each other, at very ſmall diſtances, and, when contiguous, cohere; and by which electrical bodies act at greater diſtances, both attracting and repelling the neighbouring corpuſcles; and light is emitted, reflected, and inflected, and warms bodies; and all ſenſation is excited, and the members of the animals move at the inſtance of the will, *viz.* by vibrations of this ſpirit, propagated through the ſolid capillaments of the nerves, from the external organs of ſenſe to the brain, and from the brain to the muſcles.

Spirit, in *Antiquated Chemiſtry,* is one of the hypothetical principles of natural bodies, called alſo *mercury.*

The chemical principle ſpirit was defined to be a fine, ſubtle, volatile, penetrating, pungent liquor, which riſes, ordinarily, before the phlegm, or water, and ſometimes after it.

The great properties of this liquor were imagined to be, that it penetrates and opens ſolid bodies; corrodes, breaks, and even diſſolves certain mixed bodies; coagulates others; and produces an infinity of other effects, many of them even contrary to one another.

In the general, the early chemiſts gave the denomination of ſpirits to all the fine, ſubtle, not aqueous, particles raiſed from bodies by heat, and reduced into liquors by diſtillation. Such are ſpirit of vitriol, of nitre, of ſalt, &c.

They alſo applied the name ſpirits to thoſe aqueous liquors which are drawn by liquefaction, when they are impregnated with ſalts or other active principles, raiſed, together with them, by the violence of the fire.

In this ſenſe, the chemiſts were ſaid to draw a ſpirit from ſulphur, ſalt, and other bodies, when they extract the eſſence, or the ſubtileſt part of them, by diſtillation, or otherwiſe. Accordingly, ſpirits were diſtributed into three principal kinds, *viz. inflammable* ſpirits, *acid* ſpirits, and *alkaline* ſpirits.

To the firſt claſs belong the moſt volatile and thinneſt part of eſſential oils, the principle of ſmell, or *ſpiritus rector* of plants, (ſee Aroma,) and *ardent* ſpirits, or the ſpirit obtained from wine, beer, and all liquors which have undergone the ſpirituous fermentation. See Alcohol.

The ſecond claſs includes all acids obtained by diſtillation of minerals, vegetables, and animals; ſuch are, 1. The acids of ſulphur, vitriol, and alum, which are the ſame as vitriolic acid, and the acids of nitre and common ſalt. They are called ſpirit of ſulphur, ſpirit of vitriol, ſpirit of nitre, &c. without ſpecifying that they are acids. 2. The acids of vinegar, and of all liquors which have undergone the acetous fermentation, and the acids obtained in the diſtillation of vegetables, and of certain animals, as flies, ants, &c. Theſe ſpirits are commonly called *acid* ſpirits, as the acid ſpirit of guaiacum, the acid ſpirit of ants, &c. becauſe the ſubſtances which furniſh them yield alſo ſpirits that are not acid. See Acid.

To the third claſs are referred liquid volatile alkalies, obtained from ſal ammoniac, from all vegetable matters which have undergone a complete putrefaction, and from all animal matters. Theſe are generally called ſpirits, without ſpecifying their alkaline quality. Thus we ſay, volatile ſpirit of ſal ammoniac, ſpirit of hartſhorn, &c. As ſome of theſe ſubſtances, particularly ſal ammoniac, contain alſo an acid which may be obtained from them, we ought, when we mention this ſpirit, to ſpecify its acid quality, calling it acid ſpirit of ſal ammoniac.

Spirits, *Diſtilled,* a general name given among diſtillers to thoſe ardent liquors that are obtained from various materials, and by different proceſſes of diſtillation. The nature and properties of theſe liquors, and the modes of obtaining them, are detailed under the articles Alcohol, Brandy, Distillation, Fermentation, &c.; but we ſhall here ſpecify ſome particulars that more immediately relate to the common ſpirituous liquors that are, we lament to ſay it, ſo much in uſe in our own country. Theſe are, for the moſt part, prepared from fermented corn of one kind or other, with certain additions, at the pleaſure of the diſtiller, of molaſſes, carrots, and other ſubſaccharine vegetables. The principal ingredient, except in a ſeaſon of ſcarcity, is one kind or other of grain. (See Addition.) The ſpirit thus procured is rectified for ſale by being rediſtilled with juniper-berries, turpentine, and other ſubſtances, in order to modify and improve its flavour and appearance. The grain, when barley is uſed, is uſually firſt malted, and in Scotland it is dried with peat, which gives to the ſpirit diſtilled from it, called "whiſky," its peculiar flavour. It is then ground into coarſe powder, and the infuſion fermented with yeaſt in large tuns. This fermented liquor is called "waſh," and in this ſtate it is fit for diſtillation. Under the articles already referred to, the general proceſs and the implements uſed in it are deſcribed; but previouſly to the operation ſome ſubſtances are added to the waſh, for the purpoſe either of increaſing the quantity of ſpirit that is afforded by it, or of keeping down the eſſential oil derived from the malt, which would give the liquor a nauſeous flavour, or of regulating the boiling within the ſtill, and preventing it from boiling over or "running foul," or of neutralizing the acid generated during the fermentation, which would very conſiderably leſſen the product of ſpirit. For theſe purpoſes ſoap is conſidered the beſt addition, and accordingly it is uſed in large quantities. Other diſtillers uſe alkalies. At the commencement of the operation, the liquid is oily and turbid, and has a nauſeous flavour, on account of the oil of the malt which accompanies it; but by degrees it becomes clear, and runs ſo to the laſt, although its ſtrength decreaſes, and it becomes more watery, and conſequently of leſs ſpecific gravity. (See *Specific* Gravity.) The quantity intermediately obtained, omitting the firſt and the laſt products, is then rediſtilled or "rectified," (ſee Rectification); and in this ſtage of the operation, thoſe additions (ſuch as juniper-berries, &c.) which give the ſpirit its flavour, are introduced into it. The proceſs of diſtillation on a ſmall ſcale is ſimple and eaſily conducted; but the large diſtilleries, where expenſive works are carried on, require a greater degree of practical ſkill, both in the preparation of the apparatus, the adjuſtment of the materials, and the conduct of the operation. In order to expedite the proceſs, ſeveral alterations have been made in the form of the ſtill, particularly in Scotland, where it is an object of importance to be quick in the diſpatch of the operation, on account of the mode of levying the duty; and, therefore, by gradually widening the bottom and contracting the height of the ſtill, diſtillation is performed with a ſurpriſing rapidity. A ſtill is ſaid to have been conſtructed, which contains only 40 gallons in the body and three in the head, and in the uſe of it the whole time of its operation, from its commencement to its cloſe, amounts only to $2\frac{3}{4}$ minutes, when the charge of waſh is 16 gallons, or $\frac{2}{5}$ths of the whole content. In rectification, which is a ſlower proceſs, the charge is 24 gallons, and the time of diſtilling about 10 minutes.

A good ſpirit may be obtained without malting the grain, whether it be barley, or any other kind of corn which will anſwer the purpoſe. With us, a mixture of barley and malt is generally preferred; in Holland, the very beſt geneva is made from wheat and malt, though more commonly from malt and rye, the latter yielding more ſpirit than wheat.

The following proceſs is that which is practiſed by moſt diſtillers. A quantity of rye-flour, coarſely ground, is mixed with a third or fourth part of malt, and put into the fermenting tub, with cold water, ſtirring it well with the hand, to prevent the meal from clotting. Water of a blood-warmth is then added, in ſufficient quantity, after which the ferment, compoſed of the yeaſt of former operations, dried and kept for a certain time, is mixed with the whole. (See Ferment.) When the weather is favourable, and the heat well regulated, the fermentation begins in ſix hours, and terminates on the third day, when the liquor becomes tranſparent, and aſſumes a hot pungent taſte. The diſtillation is then immediately commenced, before the liquor turns ſour, which ſhould as much as poſſible be avoided. The diſtillation is conducted very ſlowly, to prevent the impregnation of the oil of the grain with the ſpirit, and of courſe the unpleaſant flavour of the ſpirits. The firſt ſpirit is then rectified by a ſecond diſtillation over juniper-berries, or in "double geneva," by a third proceſs.

In ſome of the ordinary ſorts, however, the juniper-berries are mixed with the fermenting materials, and one diſtillation ſuffices. In the common geneva or gin, vulgarly uſed in this country, the fine juniper flavour is coarſely imitated by turpentine. See Geneva.

For the proceſs of obtaining arrack, brandy, and rum, ſee Arac, Brandy, and Rum.

Spirits, *Proof*, or *common ſaleable goods*, are ſpirits of any kind of a determinate ſtrength, being the ſame with thoſe of good brandy, and the malt and ſugar ſpirits of the diſtillery, as they are uſually ſold; containing equal quantities, or definite proportions, of rectified ſpirit and water.

The beſt proof ſpirit is that diſtilled from French wine; but for common uſe, the ſpirit drawn from molaſſes may be employed.

The common method of examining whether ſpirits have this due degree of ſtrength is this:—take a long phial, fill it half way with the common malt ſpirit, and give it a ſmart ſtroke by its bottom againſt the palm of the hand, there will then appear on the ſurface a chaplet, or crown of bubbles, which will go off again in a ſtrong manner; that is, firſt remaining a while, and then going off by degrees, without breaking into ſmaller bubbles, or ſwelling into larger.

By this experiment all the traders in ſpirits judge of the ſtrength of the goods they purchaſe; yet this is a mere fallacy and deception; for if only a little vinous or ſaccharine matter, as treacle, ſyrup, muſt, rob of fruits, or the like, be added to a quantity of highly rectified ſpirit of wine, this ſlight addition will give a brandy proof to that ſpirit. See Alcohol, Brandy, and Bead *Proof*.

Whether there be any ſecret for making weaker ſpirits ſhew this proof as well as brandies, &c. is not certainly known; but the thing is practicable, ſince arrack, which is but of half the ſtrength of brandy, gives as fair a proof this way; and if a drop or two of any eſſential oil be added to a pint of brandy, it takes off its proof, and makes it appear much weaker than it is. The true ſtrength may, however, always be known, by carefully burning away a meaſured quantity of brandy, &c. ſince if it leaves one half water it is right; if more or leſs, it is too ſtrong, or too weak.

But beſide the falſe method of judging of brandies by what is called *proof*, there is another not leſs fallacious one of judging of their goodneſs, though kept as a great ſecret in the hands of ſome dealers, and imagined a certain criterion to determine whether foreign brandies are mixed with corn ſpirits. Theſe diſtillers are provided with a certain yellow liquor, a few drops of which being poured into a glaſs of right French brandy gives it a beautiful blue colour, and, by the ſtrength and goodneſs of this colour, they judge and buy; but if common malt ſpirit be tinged with oak, it would give this colour equally with French brandy, and might be purchaſed as ſuch. This proof tincture is expeditiouſly made, by diſſolving a little green vitriol, firſt calcined to a redneſs, in a weak ſpirit of ſea-ſalt, which thus becomes a yellow liquor, a ſingle drop or two of which being added to a glaſs of any inflammable ſpirit, coloured yellow or brown with oak, or with long remaining in the caſk, will inſtantly turn it of a bright and beautiful blue.

The beſt way of judging in theſe caſes is by the noſe and palate. Dilute a quantity of brandy conſiderably with water, and you will perceive the malt taſte, if mixed with malt ſpirits; or burn a little in a ſpoon, and by the ſmell and taſte of the water it leaves, you will eaſily judge whether there be malt in it.

Proof ſpirits may be diſtinguiſhed into three kinds, *perfect proof*, *more than perfect proof*, and *leſs than perfect proof*. By *perfect proof* is uſually underſtood that crown of bubbles, before mentioned, of a certain ſize, ariſing as a head upon a ſmall quantity of a well-qualified ſpirit ſhook in a ſlender phial.

Proof more than perfect, is that in which the bubbles raiſed by ſhaking the ſpirits, are larger than thoſe on the common or perfect proof, and go off more ſuddenly; that is, according as the ſpirit is higher, or approaches more to the nature of rectified ſpirit, or, as it is uſually called, *ſpirit of wine*.

Proof leſs than perfect, is that in which the bubbles are ſmaller, and go off quicker and fainter than in perfect proof; the ſpirit in this caſe being mixed with more than its own quantity of phlegm, or being too poor for ſale.

The ſureſt method of judging of the ſtrength of ſpirits, is by the hydrometer, water-poiſe, or balance; or, 2dly, by diſtillation, or finally, by deflagration. The ſpecific gravity of totally inflammable ſpirit is ſo much leſs than that of phlegm, or common water, that it is eaſily ſenſible upon the balance; whence an exact hydrometer, well balanced and graduated, and furniſhed with a proper ſcale of weights, may be of great uſe to aſſign the proportions in which pure ſpirit and water are mixed in any given liquor. (See *Specific* GRAVITY, and HYDROMETER.) Though, perhaps, a readier way than this may be that of M. Homberg's, mentioned in the Memoirs of the Paris Academy, 1718, for determining the different gravities of different fluids, by means of a bottle with a very long and ſlender neck; which being filled to a certain height with any mixture of ſpirit, is weighed againſt the ſame bottle filled with pure water.

The moſt exact of all methods of determining the ſtrength and ſpirit is by diſtillation, rectifying it up to an alcohol, or totally inflammable ſpirit; but this, though liable to no error, is too tedious to come into common uſe. And, upon the whole, the beſt method of all others, ſeems to be that of deflagration, which M. Geoffroy has been at much pains to adjuſt and improve.

In commerce, with regard to ſpirits, it would certainly be a much better method to aboliſh ſuch uncertain proofs, and to make all the goods of the ſtrength of what we call ſpirits of wine; that is, a totally inflammable ſpirit, whoſe purity is much greater, whoſe ſtrength may always be found out with exactneſs, and whoſe bulk, ſtowage, carriage, and incumbrance, would be only half in regard to that of brandy, or proof ſpirits; and it might at all times, as occaſion called for it, be mixed into a great variety of extemporaneous liquors, and the exact degree of ſtrength would be always preciſely known.

This operation, indeed, in the common way, proves ſo tedious and expenſive, and, after all, ſo ſhort of expectation, and ſo generally unſatisfactory, that it is not to be expected that the common diſtillers, till they have fallen into a better manner of working, ſhould come into the propoſal. But if, inſtead of the common way of rectifying by the hot-ſtill, they would try the uſe of a large balneum Mariæ, made of a large rectangular boiler, and a ſet of tall conical veſſels, they will find that little fire, and little attendance, and conſequently very little expence, will, in this manner, furniſh them with ſpirits reduced at once to this ſtandard, and greatly ſuperior, in all reſpects, to the common ones of the ſame ſtrength. In this caſe there would be no need of any addition of ſalts; but the diſtiller may work more perfectly, and more expeditiouſly without them, and thus preſerve the fine eſſential vinoſity of the ſpirit, which, in the common way of working, they conſtantly loſe.

The advantage of this method would be yet greater to the apothecaries, and the makers of compound cordial waters, who want only a pure ſpirit of ſuch a ſtrength, and ſuffer greatly in the fineneſs and perfection of their commodities, by the ſpirit they are obliged to uſe having in it a fulſome and nauſeous oil of its own, which will always mix itſelf with their compoſitions, and the oils of the aromatics, &c. which they add to it. If ſpirits were brought to this ſtandard for the market, there would be no poſſibility of deceit, and no farther examination need be made of it by the buyer than its burning perfectly dry in a ſpoon. Shaw's Eſſay on Diſtillery.

It is, however, to be obſerved, that though the burning of ſpirits away in a ſpoon may ſerve the trader in the common way, yet M. Geoffroy has obſerved, that they are no proofs for the philoſopher, or the chemiſt, being not at all determinate or exact, though commonly ſuppoſed ſo.

From what has been ſaid, it appears that brandy is much more inflammable than wine, and ſpirit of wine much more ſo than brandy, and ought to burn away without leaving any remainder. Hence it is vulgarly ſuppoſed, that ſuch ſpirit of wine as burns wholly away contains no phlegm, and that if two parcels of ſpirit both burn wholly away in this manner, they muſt be the ſame in ſtrength, and in all other qualities; but M. Geoffroy has proved by experiment, that ſuch ſpirit as burns wholly away, does yet contain a great deal of water, and two parcels both may burn thus away, and yet be very different; and that this trial is not determined by the entire abſence of the phlegm, but by its proportion to the oil.

If the ſame ſpirit of wine, which in the common way of burning leaves no water, be again tried, by burning it in a hollow veſſel ſet to float in a large quantity of cold water, it will then leave a conſiderable quantity of water; nay, all that is rectified only in the common way, leaves a large portion of phlegm on this experiment. The plain reaſon of which is, that this is the only fair trial, the other in the common way being fallacious. In this there is no more water left than was in the ſpirit; but in the other, the veſſel becoming heated by the burning of the ſpirit, that heat gradually evaporates the water, as the ſpirit burns away; ſo that the one is as ſoon gone as the other. But keeping the veſſel cool by external water, prevents that evaporation, and conſequently retains and diſcovers all that cannot burn of the ſpirit.

The quantity of water thus diſcovered in ſpirit of wine is very great, and it has always been found, that in proportion as the experiment has been made more and more perfect, the ſpirit has always appeared proportionably leſs and leſs ſo.

Pure alcohol, or alcohol of a ſpecific gravity of .796, at 60° Fah., which is the ſtrongeſt that can be procured, leaves no water; rectified ſpirit of moderate ſtrength, 25 *per cent.*; French brandy, 56; and common malt liquor, 65.

The teſt for aſcertaining the ſtrength of ſpirits by pouring a few drops on gunpowder, is very incorrect. A more accurate teſt than any of theſe, and ſufficient for common purpoſes, is to ſhake the ſpirit in a phial with very dry carbonate of potaſs, and obſerve the quantity of water attracted by the alkali, which indicates its ſtrength. But the only certain mode of aſcertaining the relative ſtrength of ſpirits, is by determining the ſpecific gravity of the ſpirit at a given temperature; thus, at 60° Fahr. the ſpecific gravity of rectified ſpirit is .83599, at 65° it is .83362, and at 70° the gravity of the ſame ſpirit is .83134; while the gravity of the proof ſpirit of the London College, at the ſame degree of temperature, is .93002, .92794, and .92580, (ſee the table under SPIRITS, in the *Materia Medica*,) the weakeſt ſpirit having the greateſt ſpecific gravity, and this diminiſhing as the temperature increaſes. For ordinary purpoſes, the relative ſtrength of ſpirits may be known by weighing the ſample to be tried in a phial capable of holding exactly 500 grains of water. An equal bulk of rectified ſpirit weighs 418 grains, and of proof ſpirit 465; hence the number of grains above or below theſe ſums will indicate the relative ſtrength of the ſpirit.

The quality of the phlegm that is left is alſo of uſe to judge of the ſpirit by; if that were perfectly fine, this ought to be perfectly limpid and clear, and without taſte or ſmell: as it wants either of theſe properties, it is a proof of the want of perfection of the ſpirit it is obtained from; but the greateſt of all defects, is its having a coarſe oil ſwimming upon it, and giving the colours of the rainbow in different lights. Mem. Acad. Par. 1718. See BRANDY.

SPIRITS, *Colouring of*, the art of giving to diſtilled liquors a colour, which takes off their watery appearance, and gives them a reſemblance of the foreign brandies, &c.

The colouring is not only neceſſary on this account, but as we uſually eſteem the ſpirits by the proof of the crown of bubbles, it is found that the clean rectified ſpirit will not afford this proof till it has received its doſe of the colour. The diſtillers diſpenſe this colour in any proportion that they find convenient or neceſſary; it is always yellow, but, according to the degree, differs extremely in deepneſs, from the paleſt ſtraw-colour to the deepeſt orange. This art of colouring was firſt introduced, from obſerving that all the fine and ſoft foreign brandies, that had the mellowneſs neceſſary to their perfection to the taſte, had alſo a yellow colour. The colour, in this caſe, has indeed nothing to do with the flavour; but that being kept in caſks the ſame age that was neceſſary to give them this mellowneſs, would alſo give them a colour from the wood. It was hence ſuppoſed, that the particular excellence of the foreign brandies depended on the woody colour, and accordingly pains have been taken to give the ſame colour to our ſpirits by various methods.

The way of obtaining it, by many years ſtanding in the caſk, proved too tedious for our haſty workmen, and accordingly they provided means of giving it extempore by ſtrong tinctures of ſeveral ingredients; the chief of which are logwood, ſaffron, Japan earth, treacle, burnt ſugar, and oak-chips; the three former of theſe have but little to recommend them, but the others are found very ready, and very proper for the uſe.

Treacle gives a fine colour not much unlike that of the foreign brandies, and being neceſſarily uſed in a large quantity, as its colour is but dilute, it not only mends the bubble, or bead-proof, impaired by the rectification, but alſo gives it a fulneſs in the mouth; both which properties are very agreeable to the vulgar, who are the chief retail conſumers of theſe coarſe goods.

Burnt ſugar, that is, ſugar diſſolved in a little water, and ſcorched over the fire till it turns black, goes much farther in the colouring than treacle, and at the ſame time gives no ſweetneſs, but rather an agreeable bitterneſs; and thus recommends itſelf to the nicer palates, that are not for a luſcious ſpirit. Indeed ſugar, thus treated, tinges to a great perfection, and that without loſs of time, and with as much cheapneſs as can well be deſired.

The laſt article mentioned, namely oak-chips, is of all others the moſt natural for imitating the dye of foreign ſpirits, as it is the very wood of which the caſks they come over in are made, and from which they take that colour of which we are ſo fond. The colouring with oak has alſo this farther advantage in ſpirits meant as ſophiſtications of the foreign ones, that it will ſtand ſome teſts uſually had recourſe to on the occaſion, which the others will not ſtand.

Common ſpirit poured on oak-chips, and digeſted in a moderate heat, eaſily fetches out the reſinous part of the wood on which the colouring depends; but then it does not go near ſo far as the burnt ſugar; a large quantity of oak being required to colour a ſmall parcel of brandy, or ſpirits. It is adviſeable not to make the tincture every time, but to have recourſe to an extract of this wood in a liquid form: this extract is beſt made in two menſtruums, alcohol and water, and may be evaporated to any ſtrength, ſo that a very ſmall doſe of it will tinge a great quantity of liquor. The two liquid extracts will be mixed together, and as they will be apt to ſeparate in ſtanding, it will be proper to add to them, when newly made, a quantity of fine ſugar; this will give a body to the whole, and it will keep better from mouldineſs than it would without it. Shaw's Eſſay on Diſtillery.

Spirits, *Convertibility of.* This is a doctrine that has obtained among many of the moſt curious experimenters, and, indeed, the moſt intelligent of our chemiſts have always allowed, that provided proper care were taken in the getting together of the material, one ſpirit may always be changed into another, as brandy into rum, malt-ſpirit into brandy and brandy into malt-ſpirit. The principles on which this is believed are theſe.

All ſimple ſpirits (as they are called) conſiſt of four parts, water, oil, phlegm, and alcohol; the laſt of theſe is the eſſential part, and is what conſtitutes the whole a ſpirit. In reducing ſpirits, therefore, to their utmoſt degree of ſimplicity and purity, it is evident that the three ſuperfluous parts are to be got rid of, and the fourth left alone; by this means the alcohol is procured diſtinct, and is a liquor *ſui generis* of many peculiar qualities, not to be found in any other fluid.

Among others, it has theſe remarkable properties: 1. When abſolutely purified, it is an uniform and homogene liquor, capable of no farther ſeparation, without loſs or deſtruction of ſome of its homogeneous parts. 2. It is totally inflammable, leaving no ſoot nor any moiſture behind. 3. It has no peculiar taſte or flavour, any more than pure water, except what is owing to its nature as alcohol, or perfectly pure ſpirit. 4. It is an unctuous and criſpy fluid, running veiny in the diſtillation, and its drops rolling on the ſurface of any other fluid, like peaſe upon a table, before they unite. 5. It appears to be the eſſential oil of the body it is obtained from, broken very fine, and intimately and ſtrongly mixed with an aqueous fluid, which is aſſimilated, or changed in its nature in the operation. 6. And laſtly, it ſeems to be a kind of univerſal fluid, producible with the ſame properties from every vegetable ſubject; but to produce it thus requires ſome care in the operation. See Alcohol.

On theſe principles is founded the opinion, that all ſpirits may be reduced to a perfect ſimilarity, or ſameneſs, from whatever ſubject they were procured, and on this depends their convertibility into one another; for when once they are brought to this ſtandard of ſimplicity, there needs nothing more than to add the oil of ſuch of the finer ſpirits as is required to convert the ſpirit into that particular kind. By this means the ſame taſteleſs ſpirit, whether obtained from malt, ſugar, or grapes, may be made either into malt-ſpirit, brandy, or rum, by adding the eſſential oil of the grape, ſugar, or malt; and thus, what was once malt-ſpirit, ſhall become brandy, or whatever elſe the operator pleaſes.

Many methods have been attempted to obtain the firſt point, that is, the reducing of the ſpirit to perfect and pure alcohol. The moſt practicable means ſeem to be long digeſtion, and the repeated diſtillation from water into water, where the eſſential oil will at once be left upon two ſurfaces, and the acid imbibed. The ſhorter ways are thoſe by rectifying from neutral abſorbent ſalts and earths; ſuch as ſugar, chalk, and the like. And laſtly, the uſe of fixed alkalies may be tried, for theſe very forcibly keep down both the phlegm and oil; inſomuch that this laſt method promiſes to be the ſhorteſt of all, if the art were known of utterly aboliſhing the alkaline flavour, which the alcohol is apt to acquire in this operation, and which, for this purpoſe, is by no means ſuitable, as abſolutely deſtroying all vinoſity, which univerſally conſiſts in a fine volatile pungent acidity. The diſtillers are the only people whoſe buſineſs would lead them to make the experiment. This method of converting one ſpirit into another, would be of immenſe profit to them if they could perfectly ſucceed in it; but as it would require time and ſlow proceſſes to bring it about, there is but little hope of its ever being brought to bear among them, while they are in their preſent ſcheme of doing every thing with diſpatch and hurry.

Dr. Shaw has ſaid a vaſt deal in the praiſe of a taſteleſs ſpirit, which is producible from a vegetable ſubſtance, only overlooked, as he tells us, becauſe it is too common, with which all the foreign ſpirits might be imitated to the utmoſt perfection by means of their eſſential oils, all thin fine wines raiſed to any due degree of ſtrength, without giving them the brandy flavour, and many other things of great uſe performed; but he has not told us what the vegetable ſubſtance is from which we are to obtain this. Shaw's Eſſay on Diſtillery.

SPIRIT, *Ardent*, called alſo *ſpirit of wine*, becauſe it can only be obtained from ſubſtances which have undergone the vinous fermentation, is a very light, very volatile, very fluid liquor, perfectly white and limpid, and of a ſtrong, penetrating, agreeable taſte and ſmell. See ALCOHOL.

Spirits drawn from wine, ſuch as French brandy, may, in a great meaſure, be purified or rectified by ſimple diſtillation, in tall veſſels with a gentle heat, the pure ſpirituous parts riſing before the phlegm: if French brandy be thus diſtilled to one-half, the diſtilled ſpirit proves tolerably pure. See BRANDY.

But wine or brandy being in this country too dear an article for diſtillation, this purification is chiefly practiſed on the cheaper ſpirits of moloſſes and malt-liquors. To ſeparate the offenſive oil with which theſe abound, after they have been freed by diſtillation from the greateſt part of their phlegm, they are mixed with an equal quantity of ſpring-water, and the ſpirit drawn off again by a gentle heat: a conſiderable portion of the oil is thus left behind in the water, which now proves túrbid and milky, and very nauſeous both in ſmell and taſte. The firſt produce is the ſtrongeſt and pureſt, and when it has come over to the amount of ¼th of the whole contents of the ſtill, forms the rectified ſpirit. By repeating this ablution with freſh quantities of water, the fouleſt and moſt offenſive ſpirits may be purified from all ill flavour. To complete the purification, or free them from their remaining phlegm or oil, or the watery vapour which is raiſed even by the gentleſt heat in which they can be diſtilled, a little fixed alkaline ſalt, thoroughly dried and powdered, or lime, or ſome other article of a like kind, is added; which, imbibing the phlegm, is thereby diſſolved into a ponderous liquid, that does not mingle with the ſpirit, but ſettles at the bottom. If the ſpirit is very phlegmatic, four pints will require a pound of the alkali; if the diſtillation has been performed with due care, half this quantity, or leſs, will be ſufficient: in either caſe, if all the ſalt diſſolves, the ſpirit is to be digeſted with a little more, till at leaſt a part remains undiſſolved. The ſpirit now poured off is to be again diſtilled, in order to ſeparate from it a portion of the ſalt which has united with it, and which, though extremely minute, may in ſome reſpects change its qualities. As ſome particles of the alkali are apt to be carried up with it, even in the diſtillation, ſo as to communicate an ill flavour, or an urinous taſte, it is adviſeable previouſly to add a ſmall portion of calcined vitriol, or burnt alum and charcoal, which will completely abſorb the alkali, without giving any new impregnation to the ſpirit. Malt-ſpirits, when properly rectified, yield as pure and as ſtrong rectified ſpirit as brandy. Lewis's Mat. Med. See DISTILLATION, and SPIRITS, in the *Materia Medica*, infra.

When only a ſmall quantity of ſpirit of wine is to be rectified, the uſual operation for this purpoſe, by means of diſtillations of the ſpirit called aqua vitæ, obtained from the firſt diſtillations of liquors that have undergone the ſpirituous fermentation, and which are overcharged with a large quantity of phlegm and light oil, is difficult. Theſe diſtillations being ſlowly conducted with a gentle fire and water-bath, yield but a ſmall quantity of that liquor, which, being the moſt volatile, riſes firſt with the leaſt heat, and which is the true or rectified ſpirit of wine. Several chemiſts, therefore, in order to obtain a larger quantity of the firſt ſpirit, propoſe to mix with the ſpirit of wine ſome intermediate ſubſtances, to abſorb and retain its phlegm and oil, ſuch as dried and calcined ſalts, very dry chalk, &c. Kunckel propoſes to ſeparate more effectually the oil, by adding to the ſpirit a large quantity of water, and by diſtilling this diluted ſpirit with a very gentle heat. But the trouble and inconvenience of depriving the ſpirit of wine of the water with which it was diluted in this proceſs, may be avoided, by rectifying at once a large quantity of aqua vitæ. Nothing more is required to obtain at once a conſiderable quantity of pure ſpirit of wine, than to ſet aſide the twelve or fifteen pints firſt drawn over from a large quantity, *e. g.* from three hundred pints of aqua vitæ, diſtilled with a very gentle fire in a large alembic. As the moſt ſpirituous, leaſt aqueous, and leaſt oily part of it always riſes firſt, theſe twelve or fifteen pints are perfectly rectified ſpirit of wine, eſpecially when the heat has been well conducted.

By thus keeping apart portions of the ſpirit obtained, at different times, we may have ſpirit of wine of the ſeveral degrees of ſtrength and purity. The weaker ſpirit may, by another diſtillation, be again rectified; and the ſpirit of moderate ſtrength may be preſerved for many uſes. The method is followed by M. Beaumé in the rectification of ſpirit of wine, and is certainly the moſt convenient and the beſt.

A perfectly rectified ſpirit of wine, or ſuch as is entirely freed from water, is undoubtedly a thing of frequent and neceſſary uſe in the nice operations of chemiſtry.

It had uſed to be prepared, either by often diſtilling the ſpirit, and every time drawing over only half of it, and repeating this till the half remaining in the cucurbit appeared as ſtrong as that drawn over; or elſe by raiſing it to a great height from the body of the veſſel, and this in a very gentle heat, ſo that ſpirit alone could riſe, the water not being capable of being driven ſo far by that degree of heat.

But the accurate Boerhaave always found upon trial, that there was ſtill remaining ſome water in theſe ſpirits, whether prepared by the firſt or ſecond proceſs, or both. Boerhaave's Chem. part ii. p. 124.

The method he therefore invented is this: fill a ſtill half full of the ſpirit prepared for alcohol in one or other of theſe ways, and add to it half a pound of pure decrepitated, and perfectly dried ſea-ſalt; put this in hot, then place on the head, and carefully lute the junctures; leave this for twelve hours in a heat ſo ſmall, as not to make the alcohol boil, then diſtil off the ſpirit; keep the firſt two ounces apart, becauſe ſome aqueous vapour may have happened to lodge in the head or worm of the ſtill, which this certainly waſhes off; after this receive two-thirds of the following alcohol into a pure dry glaſs veſſel, and keep it perfectly ſtopped; then draw off the remainder, and keep that by itſelf: there will remain a moiſt ſalt in the ſtill, which has attracted the aqueous matter of the alcohol, and held it ſo down, that it could not riſe by the heat of boiling water, which is all that muſt be uſed in this diſtillation; and the ſalt having been firſt decrepitated, never makes any change in the alcohol by adding any thing to it. By this means an alcohol is prepared perfectly pure, and fit for all the uſes of chemiſtry.

For the teſts and properties of pure alcohol, ſee ALCOHOL.

M. Reaumur diſcovered, that a mixture of ſpirit of wine and water acquired a ſpecific gravity greater than that which would arithmetically reſult from the proportions employed of each of theſe liquors. Thus, fifty meaſures of ſpirit of wine, and fifty meaſures of water, mixed together, were found to make only ninety-eight meaſures; but in what progreſſion the denſity is increaſed by mixing various proportions of the two liquors, had not been determined till M. Briſſon made a ſet of experiments with that view; an account of which is given in the Memoirs of the Academy of Sciences of Paris, for the year 1769.

From his experiments he has conſtructed the following table, which ſhews this progreſſion, and alſo enables us to diſcover the proportion of ſpirit of wine and water, in any given mixture of theſe (as brandies, rums, &c.), the ſpecific gravity of which is found to correſpond with any of the ſpecific gravities in the table. Thus, for inſtance, if we find upon accurate trial, that the ſpecific gravity of the rum, brandy, or other mixture, whoſe ſtrength is required to be known, be to that of water as $942\frac{1}{2}$ to 1000, we learn, by inſpection of the table, that this ſpirituous mixture conſiſts of equal parts of water and ſpirit of wine, of which ſpirit the ſtrength is ſuch, that its denſity is to that of the water as 837 to 1000. The firſt column ſhews the proportion of well rectified ſpirit of wine in the mixture; the ſecond column ſhews the proportion of the water in the mixture; the third column ſhews the ſpecific gravity of the mixture; the fourth column ſhews the difference between the ſpecific gravity of the mixture and that of the preceding mixture; and the fifth column ſhews the proportion which the ſeveral augmentations of denſity, cauſed by penetration of the two liquors, have to each other, that is their progreſſion.

Spirit of Wine.	Water.	Specific Gravity.	Differences.	Proportionable Augmentations of Denſity from Penetration.
Parts.	Parts.			
16	0	837	0	0
15	1	$852\frac{1}{2}$	$15\frac{1}{2}$	$4\frac{51}{128}$
14	2	$867\frac{1}{3}$	$14\frac{5}{6}$	$8\frac{99}{128}$
13	3	$881\frac{1}{3}$	14	$11\frac{11}{128}$
12	4	$894\frac{1}{2}$	$13\frac{1}{6}$	$13\frac{108}{128}$
11	5	$907\frac{1}{3}$	$12\frac{5}{6}$	$15\frac{127}{128}$
10	6	$919\frac{2}{3}$	$12\frac{1}{3}$	$17\frac{34}{128}$
9	7	$931\frac{2}{3}$	12	$19\frac{921}{128}$
8	8	$942\frac{1}{2}$	$10\frac{5}{6}$	$19\frac{104}{128}$
7	9	$951\frac{2}{3}$	$9\frac{1}{6}$	$18\frac{123}{128}$
6	10	$959\frac{2}{3}$	8	$17\frac{14}{128}$
5	11	$967\frac{1}{4}$	$7\frac{7}{12}$	$15\frac{1}{128}$
4	12	$973\frac{1}{6}$	$5\frac{11}{12}$	$11\frac{69}{128}$
3	13	979	$5\frac{5}{6}$	$7\frac{119}{128}$
2	14	985	6	$4\frac{74}{126}$
1	15	$991\frac{3}{4}$	$6\frac{3}{4}$	$1\frac{93}{128}$
0	16	1000	$8\frac{1}{4}$	0

Spirit of wine is uſed in dyeing, as a non-colouring drug, and though it gives no colour itſelf, it ſerves to prepare the ſtuffs to receive other colours. Its conſumption is alſo very conſiderable in ſeveral other works and manufactures, particularly the making of varniſh.

Proof-ſpirit cannot be uſed for burning in lamps, for diſſolving reſins, and for making varniſh; and there is alſo a great number of tinctures, ſolutions, and mixtures, for which it cannot ſerve; but rectified ſpirit, or alcohol, beſides its ready uſe for medicinal purpoſes, may, when the ſpirit is of a proper kind, be made into punch, and all other mixtures, with greater purity, and much greater certainty and exactneſs in point of ſtrength. See next article and ALCOHOL.

SPIRITS, in the *Materia Medica*, "rectified ſpirit" of the London Pharmacopeia; "alcohol," "ſpiritus vinoſus rectificatus ſive puriſſimus," Edinb.; "ſpiritus vinoſus rectificatus," Dub.; is alcohol nearly in the higheſt ſtate of concentration in which it can be eaſily prepared in the large way for the purpoſes of trade. The London and Edinburgh colleges ſtate its ſpecific gravity to be to that of water as 835 to 1000, while the Dublin college ſtates it at 840. The Edinburgh college names this ſpirit alcohol; but directions being given both by the London and Dublin colleges, for the preparation of a ſtill ſtronger ſpirit, the name of alcohol, in their pharmacopeias, is judiciouſly retained for the ſtronger ſpirit, while that of rectified ſpirit is applied to the preſent preparation.

The alcohol of the Lond. Ph. is prepared by taking of rectified ſpirit a gallon, and of ſubcarbonate of potaſs, three pounds: add a pound of the ſubcarbonate, previouſly heated to 300 degrees, to the ſpirit, and macerate for 24 hours, frequently ſhaking the mixture; then pour off the ſpirit, and add the remainder of the ſubcarbonate, heated to the ſame degree; and laſtly, diſtil the alcohol from a water-bath, and preſerve it in a well-cloſed veſſel. The ſpecific gravity of this alcohol is to that of diſtilled water as .315 to 1,000.

The alcohol of the Dub. Ph. is prepared by taking of rectified ſpirit of wine, a gallon; pearl-aſhes, dried at a heat of 300°, and ſtill hot, a pound; cauſtic kali, in powder, an ounce; muriate of lime, dried, half a pound. Mix the ſpirit and the kali; add the pearl-aſhes, previouſly reduced to powder, and digeſt the mixture for three days in a cloſed veſſel, frequently ſhaking it; then pour off the ſpirit; mix with it the muriate of lime; and laſtly, diſtil with a moderate heat, until the reſidue begins to thicken. The ſpecific gravity of this ſpirit is to that of diſtilled water as 315 to 1000.

Rectified ſpirit of the ſpecific gravity of 835, contains about 15 *per cent.* of water; and to free it from this is the intention of the above proceſſes. The Edinburgh college has no proceſs for the preparation of pure alcohol, which may be eaſily diſpenſed with; but it has very improperly given this title to the rectified ſpirit of the other pharmacopeias. The theory of the operation is ſufficiently obvious. The affinity of the alkali and the muriate of lime for water is much greater than that of the ſpirit: it is, therefore, attracted by theſe ſubſtances, and prevented from riſing with the ſpirit during the diſtillation, by which means the alcohol comes over in a very highly concentrated ſtate. Of the two proceſſes, that of the Dublin college is to be preferred; muriate of lime being a much more powerful agent for ſeparating the water, which is the object in both, than ſubcarbonate of potaſs.

Dr. Black thus obtained alcohol of the ſp. gr. of 800°, and Richter procured it ſo low as 0.792, in the temperature of 68° Fahr. at which degree of concentration it may be regarded almoſt as pure alcohol, or alcohol perfectly free from water. That of the pharmacopeias is not free from water, though more than ſufficiently concentrated for all the purpoſes of pharmacy.

The following Table, drawn up by Lowitz, with an additional column by Dr. Thomſon, ſhews the ſpecific gravity of different mixtures of pure alcohol, of a ſpecific gravity .791, and diſtilled water, at the temperatures of 60° and 68° of Fahrenheit.

100 Parts by Weight.		Sp. Gravity.		100 Parts by Weight.		Sp. Gravity.	
Alcohol.	Water.	At 68°.	At 60°.	Alcohol.	Water.	At 68°.	At 60°.
100	—	791	796	49	51	917	920
99	1	794	798	48	52	919	922
98	2	797	801	47	53	921	924
97	3	800	804	46	54	923	926
96	4	803	807	45	55	925	928
95	5	805	809	44	56	927	§930
94	6	808	812	43	57	930	933
93	7	811	*815	42	58	932	‖935
92	8	813	817	41	59	934	937
91	9	816	820	40	60	936	939
90	10	818	822	39	61	938	941
89	11	821	825	38	62	940	943
88	12	823	827	37	63	942	945
87	13	826	830	36	64	944	947
86	14	828	832	35	65	946	949
85	15	831	†835	34	66	948	951
84	16	834	838	33	67	950	953
83	17	836	‡840	32	68	952	955
82	18	839	843	31	69	954	957
81	19	842	846	30	70	956	958
80	20	844	848	29	71	957	960
79	21	847	851	28	72	959	962
78	22	849	853	27	73	961	963
77	23	851	855	26	74	963	965
76	24	853	857	25	75	965	967
75	25	856	860	24	76	966	968
74	26	859	863	23	77	968	970
73	27	861	865	22	78	970	972
72	28	863	867	21	79	971	973
71	29	866	870	20	80	973	974
70	30	868	871	19	81	974	975
69	31	870	874	18	82	976	
68	32	872	875	17	83	977	
67	33	875	879	16	84	978	
66	34	877	880	15	85	980	
65	35	880	883	14	86	981	
64	36	882	886	13	87	983	
63	37	885	889	12	88	985	
62	38	887	891	11	89	986	
61	39	889	893	10	90	987	
60	40	892	896	9	91	988	
59	41	894	898	8	92	989	
58	42	896	900	7	93	991	
57	43	899	903	6	94	992	
56	44	901	904	5	95	994	
55	45	903	906	4	96	995	
54	46	905	908	3	97	997	
53	47	907	910	2	98	998	
52	48	909	912	1	99	999	
51	49	912	915	—	100	1000	
50	50	914	917				

* Alcohol of the London and the Dublin Pharmacopeias. † Ditto (Edinburgh); rectified ſpirit (London). ‡ Rectified ſpirit (Dublin). § Proof ſpirit (Lond. Dub.) ‖ Ditto (Edinburgh).

In the extract from Mr. Gilpin's table (ſee *Specific* GRAVITY), the ſtandard ſpirit was of the ſpecific gravity of 0.825, or contained 89 pure alcohol, and 11 water, in 100 parts.

Pure rectified ſpirit has a fragrant odour, and a hot highly pungent taſte. It is colourleſs; always fluid; cannot be congealed at any known degree of cold; evaporates ſpeedily at the ordinary temperature of the atmoſphere; boils at 163° Fahrenheit; and is extremely inflammable, burning with a blue lambent flame, without any ſenſible ſmoke. Like alcohol, it combines with water in every proportion; and, on account of its affinity for water, precipitates many of the neutral ſalts from their aqueous ſolutions. It is capable of diſſolving many ſaline bodies, and is the proper ſolvent of the greater number of the proximate principles of vegetables. Its conſtituents are 85 of pure alcohol and 15 of water, in 100 parts, when its ſpecific gravity is 835, at a temperature of 60° of Fahrenheit; but 83 only of pure alcohol, and 17 of water, when it is 840, as deſignated by the Dublin college.

Rectified ſpirit is a very powerful ſtimulant. In its undiluted ſtate it is never exhibited as a remedy; and is merely employed for forming the diluted ſpirit, and as a pharmaceutical agent.

The "ſpiritus tenuior," or "weaker ſpirit," of the Lond. Ph.; the "diluted alcohol," the "ſpiritus vinoſus tenuior ſive dilutus" of Edinb. Ph.; and "ſpiritus vinoſus tenuior" of Dub. Ph., or "proof ſpirit," is merely rectified ſpirit diluted with a certain proportion of water. According to the London and Dublin colleges, its ſpecific gravity ſhould be to that of diſtilled water, as 930 to 1000; while the Edinburgh college orders it of the gravity of 935. The former may be formed by mixing four parts by meaſure of rectified ſpirit with three of water, and contains 44 parts of pure alcohol, and 55 of water, in 100 parts; the latter is obtained from equal parts of rectified ſpirit and water, and contains 42 of pure alcohol, and 58 of water, in 100 parts. Alcohol, diluted to the degree of proof-ſpirit, is ſtill a very powerful diffuſible ſtimulant, and too ſtrong for internal uſe. Externally applied, it is recommended in burns; to reſtrain bleeding in paſſive hæmorrhagies; and as a friction or fomentation to relieve muſcular pains; and in a more diluted ſtate it forms a good collyrium in the latter ſtage of ophthalmia. Proof-ſpirit diluted with water is employed as a remedy in the form of tinctures and ſpirits; and the ardent ſpirits in common uſe may be regarded as nearly of the ſame nature. Theſe taken in moderation, increaſe the general excitement, communicate additional energy to the muſcular fibres, ſtrengthen the ſtomach, and exhilarate the mind. Hence they are often and advantageouſly uſed in caſes of debility and low typhoid fevers, in which the uſe of wine is indicated; and in habits diſpoſed to create acidity, they are even preferable to wine; ſome of them, particularly brandy, proving gratefully ſtomachic, when wine is nauſeated and rejected. As an article, however, of daily or dietetical uſe, particularly if taken in immoderate doſes, or long continued, ardent ſpirits, beſides being the ſource of much moral evil, and debaſing the human character nearly to a level with that of brutes, are apt to occaſion diſeaſe, and are commonly the origin of dyſpepſia, hypochondriaſis, and hepatic and viſceral obſtructions. The hurtful effects of ardent ſpirits, however, are obviated in a conſiderable degree by diluting them with water, and adding lemon-juice and ſugar to the mixture, ſo as to form what is generally known by the name of punch. Although all the varieties of ardent ſpirits may be regarded as diluted alcohol, yet each has a peculiar operation: thus, brandy is ſimply cordial and ſtomachic; rum, heating and ſudorific; gin and whiſky, diuretic; and arrack, ſtyptic, heating and narcotic, and ill adapted to European conſtitutions.

Vinous ſpirits, therefore, in ſmall quantity, and properly diluted, may be applied to uſeful purpoſes in the relieving of ſome diſorders; whilſt in larger ones, or imprudently continued, they act as a poiſon of a particular kind. The moderate uſe of them is moſt ſerviceable to thoſe who are expoſed to heat and moiſture, to corrupted air, or to other cauſes of colliquative and putrid diſeaſes; and they are the moſt pernicious in oppoſite circumſtances, and to thoſe who are afflicted with hyſterical and hypochondriacal complaints: for whatever temporary relief theſe ſpirituous cordials may afford in the lowneſſes to which hyſterical and hypochondriacal perſons are ſubject, there are none, as Dr. Pemberton obſerves, who feel ſo ſoon the ill effects ariſing from the habitual uſe of them. Lewis's Mat. Med.

The power of brandy, or any thing of this kind, in killing worms, is evident from this, that the children of the people in the northern iſlands of Scotland, who are accuſtomed from their infancy to drink that coarſe ſort of brandy which they call aqua vitæ, never are troubled with worms. It is a dangerous practice to uſe brandy in this general manner, but on ſome occaſions it may be very ſerviceable. Philoſ. Tranſ. N° 233.

SPIRITS, *Laws relating to Foreign and Britiſh.* By a variety of ſtatutes, which it would be too tedious here to enumerate, duties both permanent and temporary, of the cuſtoms and the exciſe, have been impoſed on brandy, rum, arquebuſade, geneva, arrack, and ſpirits, the amount of which is very conſiderable in proportion to the original price. By 43 Geo. III. c. 69. (ſched. A), and 43 Geo. III. c. 81. ſeveral duties are impoſed upon ſpirits imported; but by 49 Geo. III. c. 98. ſeveral duties of cuſtoms are impoſed: the ſaid duties are payable by the importer, before landing. If any perſon ſhall land any French brandy, before the duty be paid or ſecured, or without licence from the proper officer, and conceal the ſame when landed, he and his aider ſhall not only forfeit the ſame, but alſo double value; and if any officer of the cuſtoms or exciſe ſhall connive at it, he ſhall forfeit 500*l.*, and be incapable of holding any office in the revenue. (1 Ann. ſtat. 2. c. 14.) The officers of exciſe may go on board any ſhip and ſearch, as officers of the cuſtoms may do, for any exciſeable liquors, and ſeize ſuch as ſhall be forfeited, and ſuch as ſhall be unſhipped before entry and payment of the duties, together with the caſks and other package. (11 Geo. I. c. 30.) Any officer of the exciſe may ſearch for concealed foreign ſpirits, and ſeize, &c.; and the penalty of obſtruction is a forfeiture of 100*l.* By a general clauſe in 8 Geo. I. c. 18. all brandy, arrack, rum, ſpirits, and ſtrong waters, and all foreign exciſeable liquors, forfeited, together with the caſks and package, may be ſeized by any officer of the cuſtoms or exciſe, or perſons deputed from the lord treaſurer, or under-treaſurer, or by ſpecial commiſſion under the great or privy ſeal, and no other perſon; and the penalty of obſtruction is 40*l.* If any foreign brandy, arrack, rum, or ſtrong waters, or ſpirits of any kind, ſhall be imported in any veſſel of 100 tons burden, or under, (except for the uſe of ſeamen, not exceeding two gallons each,) ſuch veſſel, with its tackle, and alſo the ſpirits, ſhall be forfeited (5 Geo. III. c. 43.): except rum or other ſpirits of the growth and manufacture of the Britiſh ſugar plantations, which may be imported in any veſſel of not leſs burden than 70 tons. (6 Geo. III. c. 46.) If any veſſel of 50 tons, or under, partly or fully laden with brandy, be at anchor or within two leagues of the ſhore, and not proceeding on her voyage, if wind and weather permit, ſuch veſſel may be compelled by the commander of any man of war, or armed ſloop appointed to guard the coaſt, or the commander of any veſſel in the ſervice of the cuſtoms, to come into port; and the caſe is the ſame with ſhips hovering near the coaſts. (6 Geo. I. c. 21.) If any veſſel come from foreign parts, and have on board any foreign brandy or ſpirits, in caſks under ſix gallons, (except for the uſe of ſeamen, not exceeding two gallons each,) ſhall be found at anchor, &c. as in the former caſe, all ſuch ſpirits, with the caſks and package, or value, ſhall be forfeited, and the ſame may be ſeized, or value ſued for by the officers; and if the veſſel do not exceed 50 tons in burden, the ſaid veſſel, with her tackle and furniture, ſhall be forfeited: and if any perſon, having charge of the veſſel, ſhall ſuffer any brandy to be put into lighters or boats, in order to be landed, he ſhall, beſides other penalties, ſuffer ſix months' impriſonment. No brandy ſhall be imported in any veſſel not containing 60 gallons at the leaſt, on pain of forfeiting the ſame, or value. (4 W. c. 5.) And no geneva or rum ſhall be imported in any veſſel or caſk, not containing 60 gallons at leaſt, (except for the uſe of ſeamen, not exceeding two gallons each,) on pain of forfeiture. (5 Geo. III. c. 43.) If any officer ſhall find any increaſe of rum or ſpirits, (except ſuch as have been imported and lodged in a warehouſe, according to law,) above the quantity found on the laſt ſurvey, or any decreaſe, (beyond the quantity legally delivered or allowed for leakage,) the proprietor or importer ſhall forfeit 500*l.*; and opening the warehouſe, except in the preſence of the warehouſe-keeper or exciſe officer, incurs a forfeiture of 500*l.* If any rum or ſpirits remain in the warehouſe above twelve calendar months (6 Geo. III. c. 47.), without paying the duty, the commiſſioners of exciſe may ſell them by auction, and pay the duty and charges, transferring the overplus to the proprietor or importer. A permit ſhall be obtained for removal of the quantity ſold; nor ſhall any liquor, exceeding one gallon, be carried away without ſuch permit, on pain of forfeiting the ſame, with the caſks and veſſels. If the liquor be not removed, and the permit not returned, the perſon that took it out ſhall forfeit treble value. No perſon ſhall receive a permit, without direction in writing of the perſon (or his ſervant) from whoſe ſtock the goods are to be removed, on pain of 50*l.*; and in default of payment, three months' impriſonment. No foreign ſpirits, although under one gallon, ſhall be received into the cuſtody of any retailer, without a permit, ſignifying that the duties were paid, or that they had been condemned, on pain of forfeiting the ſame. (8 Geo. I. c. 18.) No ſeller or dealer ſhall be allowed to take out more than one permit in one day; provided that ſeveral permits may be taken out, and caſks containing foreign ſpirituous liquors ſent to the ſame perſons the ſame day, ſo that each caſk may be ſent under different permits, and by different conveyances; and provided dealers ſhall not be prevented from ſending with one permit by one and the ſame conveyance any number of caſks, containing 60 gallons each, or upwards, of the ſame kind. Foreign ſpirits, not being caſks of 60 gallons, or upwards, ſhall not be removed, unleſs at the following times; that is, from September 29th to March 25th, yearly, between the hours of ſeven in the morning and five in the evening; and from March 25th to September 29th, between the hours of five and ſeven, (except the ſame is carrying by a known common ſtage-coach, waggon, or other ſtage carriage, uſually travelling out of theſe hours,) on pain of forfeiture, with or without a permit. (23 Geo. III. c. 70.) No foreign ſpirits more than 60 gallons ſhall be brought to London by one permit, or one conveyance, at the ſame time, from any part of England by land or water, (except by Graveſend, in the ordinary courſe of commerce,) on pain of being ſeized and forfeited. (26 Geo. III. c. 73.) If any perſon ſhall counterfeit a permit, or give or receive any falſe permit, or alter any granted by the proper officer, he ſhall forfeit 500*l.* 23 Geo. III. c. 70.

For the conditions, regulations, and reſtrictions, under which rum imported from the Weſt Indies may be ſecured in warehouſes, without payment of duty, ſee 43 Geo. III. c. 132. 45 Geo. III. c. 87. 46 Geo. III. c. 137. and 48 Geo. III. c. 126; and for thoſe under which brandy, geneva, and other ſpirits, may be ſecured in warehouſes, without payment of duty, ſee 43 Geo. III. c. 132. 45 Geo. III. c. 87. 46 Geo. III. c. 137. and 48 Geo. III. c. 126. For other laws and regulations, ſee CUSTOMS, DISTILLER, EXCISE, SMUGGLING, and WINE.

SPIRIT *of Ammonia*, in the *Materia Medica*, is prepared, according to the directions of the Lond. Ph., by mixing two pints of rectified ſpirit with a pint of ſolution of ammonia. The "ammoniated alcohol," formerly *ſpirit of ammonia*, of the Ed. Ph., conſiſts of 32 oz. of alcohol (835), 12 oz. of lime recently burnt, and 8 oz. of muriate of ammonia; and is prepared in the ſame manner as water of ammonia. (See AMMONIA.) The *ſpirit of ammonia* of the Dub. Ph. is prepared by mixing three pints of proof-ſpirit, 4 oz. of muriate of ammonia, and 6 oz. of potaſhes; and diſtilling, with a moderate heat, two pints. This ſpirit, properly prepared, has the pungent odour and acrid taſte of ammonia, with which it coincides in its medicinal properties. (See AMMONIACAL *Preparations.*) It is chiefly uſed for pharmaceutical purpoſes. The officinal preparations are "ſpiritus ammoniæ compoſitus," "ſpiritus ammoniæ fœtidus," "tinctura caſtorei compoſita," "tinctura guaiaci compoſita," and "tinctura opii compoſita."

SPIRIT *of Ammonia, Aromatic*, is prepared, according to the Lond. Ph., by mixing two pints of ſpirit of ammonia with oil of lemon and oil of cloves, of each two fluid-drachms. The "aromatic ammoniated alcohol," formerly *aromatic ſpirit of ammonia*, of the Edinb. Ph., is compoſed of 8 oz. of ammoniated alcohol, 1½ drachm of volatile oil of roſemary, and a drachm of volatile oil of lemons, which are mixed ſo as to diſſolve the oils. The *aromatic ſpirit of ammonia* of the Dub. Ph. is formed by digeſting two pints of ſpirit of ammonia, two drachms of eſſential oil of lemons, and half an ounce of bruiſed nutmegs, in a covered veſſel for three days, frequently ſhaking the veſſel; and then diſtilling a pound and a half. This ſpirit is an uſeful ſtimulant in languors, and flatulent colic; and the oils render it more grateful to the ſtomach than the ſimple ſpirit of ammonia. The doſe is from fʒſs to fʒj, in any convenient vehicle. The officinal preparations are "tinctura guaiaci ammoniata," and "tinctura valerianæ ammoniata."

SPIRIT *of Ammonia, Fœtid*, is prepared, according to the Lond. and Dub. Ph., by macerating two pints of ſpirit of ammonia, and 2 oz. of aſſafœtida (1½ oz. Dub.), for 12 hours (for three days, in a covered veſſel, with frequent agitation, Dub.); and then by a gentle fire diſtilling a pint and a half into a cold receiver. The "fœtid ammoniated alcohol," formerly *fœtid ſpirit of ammonia*, of the Edinb. Ph., is prepared by digeſting 8 oz. of ammoniated alcohol, and ½ oz. of aſſafœtida, in a cloſe veſſel for 12 hours, and then diſtilling 8 oz. by the heat of boiling water. The medicinal properties of this ſpirit, and the doſe, are the ſame with thoſe of the preceding. It acquires colour from age.

SPIRIT *of Ammonia, Succinated*, of the Lond. Ph., is prepared by macerating three drachms of maſtich in nine fluid-drachms of alcohol, ſo that it may be diſſolved, and pouring off the clear tincture; then adding fourteen minims of oil of lavender, four minims of oil of amber, and ten fluid-ounces of ſolution of ammonia, and mixing them by agitation. This ſpirit is employed as a ſtimulant and antiſpaſmodic, in the ſame caſes as the oil of amber, and has been uſed with ſucceſs in India againſt the bite of the rattle-ſnake. The doſe is from ♏x to fʒſs, in any convenient vehicle. See AMBER.

SPIRIT *of Aniſe-ſeed* of the Lond. Ph. is formed by macerating for 24 hours half a pound of aniſe-ſeeds bruiſed, a gallon of proof-ſpirit, and a ſufficient quantity of water to prevent empyreuma, and diſtilling by a gentle fire. The *compound ſpirit of aniſe-ſeed* of the Dub. Ph. is obtained by diſtilling one gallon from aniſe-ſeeds and angelica ſeeds bruiſed, of each half a pound, a gallon of proof-ſpirit, and water ſufficient to prevent empyreuma. In flatulent colic, and ſimilar affections, theſe are pleaſant carminatives. The doſe is from fʒſs to fʒiv, in water.

SPIRIT *of Horſe-radiſh, Compound*, "ſpiritus armoraciæ compoſitus," of the Lond. Ph., is prepared by macerating freſh horſe-radiſh ſliced and orange-peel dried, of each a pound, half an ounce of nutmegs bruiſed, a gallon of proof-ſpirit, and water ſufficient to prevent empyreuma, for 24 hours, and diſtilling a gallon by a gentle fire. (See COCHLEARIA.) The "compoſitus ſpiritus raphani," of the Dub. Ph., is formed by diſtilling two gallons from horſe-radiſh dried and peel of Seville oranges, of each two pounds, four pounds of freſh garden ſcurvy-graſs, one ounce of nutmegs bruiſed, two gallons of proof-ſpirit, and water ſufficient to prevent empyreuma. Theſe ſpirits, which were formerly uſed as antiſcorbutics, are now held in little eſtimation in that intention. They are chiefly uſed in dropſies, attended with much debility. The doſe is from fʒj to fʒiv, combined with infuſion of fox-glove or juniper-berries.

SPIRIT *of Camphor* of the Lond. Ph. is prepared by mixing four ounces of camphor with two pints of rectified ſpirit, that the camphor may be diſſolved. The "tincture of camphor," commonly called the "camphorated vinous ſpirit," is obtained by mixing one ounce of camphor with one pound of alcohol (ſp. gr. 835), ſo that the camphor may be diſſolved. It may be alſo made with double or triple the quantity of camphor. This ſpirit is too ſtrong to be given internally; and if water be mixed with it, the camphor is ſeparated. It is an uſeful ſtimulant and diſcutient application to chilblains, and in chronic rheumatiſm, paralytic numbneſs, and gangrene. See CAMPHOR.

SPIRIT *of Carraway* of the Lond. and Dub. Ph. is obtained by macerating a pound and a half (half a pound, Dub.) of carraway ſeeds bruiſed in a gallon of proof-ſpirit, and water ſufficient to prevent empyreuma, for 24 hours, and diſtilling a gallon by a gentle fire. The *ſpirit of carraway* of the Edinb. Ph. is prepared by macerating half a pound of carraway ſeeds bruiſed in nine pounds of proof-ſpirit, for two days in a cloſe veſſel, adding water enough to prevent empyreuma, and diſtilling nine pounds. This ſpirit is an uſeful carminative, and an adjunct to griping purgatives. See CARUM.

SPIRIT *of Cinnamon* of the Lond. and Dub. Ph. is prepared by macerating one pound of cinnamon bark bruiſed in a gallon of proof-ſpirit, and water ſufficient to prevent empyreuma, for 24 hours, and diſtilling a gallon by a gentle fire. The *ſpirit of cinnamon*, "ſpiritus corticis lauri cinnamomi," of the Edinb. Ph., is prepared with a pound of cinnamon bark, in the ſame manner as the ſpirit of carraway.

This ſpirit is an agreeable cordial in diſeaſes attended with much languor and debility. The doſe is from fʒj to fʒiv, in any ſuitable vehicle. The officinal preparation is "infuſum digitalis." See CINNAMON.

SPIRIT, *Coal.* See COAL.

SPIRIT *of Sulphuric Ether* of the Lond. Ph. is obtained by mixing half a pint of ſulphuric ether (ſee ETHER) with a pint of rectified ſpirit. The "ſulphuric ether with alcohol," of the Edinb. Ph., is prepared by mixing one part of ſulphuric ether with two parts of alcohol. The ſpecific gravity of this mixture is .816. It may be uſed for the ſame purpoſes as the ether, but it is much leſs active. The doſe is from fʒj to fʒiij. An uſeful gargle for ſlight inflammation of the fauces is prepared by adding fʒj of this ſpirit to f℥vi of boiling water, ſweetened with fʒiv of ſyrup of marſh-mallows. The ſulphuric ether, of which this is an officinal preparation, is ſtimulant, narcotic, and antiſpaſmodic. In its operation it reſembles alcohol, but is more diffuſible, and its effects are leſs permanent. It is beneficially employed as a cordial in typhoid and low fevers, particularly when nauſea, ſubſultus tendinum, and other ſpaſmodic ſymptoms are preſent. As an antiſpaſmodic, it relieves the paroxyſm of ſpaſmodic aſthma, whether it be taken into the ſtomach, or its vapour only be inhaled into the lungs; in which latter form it is alſo uſeful in ſimple dyſpnœa and in catarrh. It is employed with advantage in hyſteria, tetanus, cramp of the ſtomach, hiccough, and in cholera morbus to check the vomiting; and alſo allays the violence of ſea-ſickneſs. The uſual doſe of ſulphuric ether is from fʒſs to fʒij; but it has been given in much larger doſes with the moſt beneficial effects; and in all caſes, the doſe muſt be repeated at ſhort intervals, to produce the full effect of the remedy. As an external application, ether acts either as a ſtimulant or a refrigerant, according to the mode in which it is applied. The firſt takes place when it is prevented from evaporating, by being confined over the ſpot to which it is applied; in which caſe it often proves uſeful in relieving head-ache, and other muſcular pains: and from its refrigerant effect produced by its rapid evaporation, it is applied to burns, and to aſſiſt in the reduction of ſtrangulated hernia. It has produced, ſays Thomſon (Lond. Diſp.), almoſt immediate relief in ear-ache, when dropped into the external meatus.

SPIRIT *of Ether, Aromatic,* of the Lond. Ph., is obtained by macerating three drachms of cinnamon bark bruiſed, a drachm and a half of cardamom ſeeds powdered, long pepper powdered and ginger-root ſliced, of each a drachm, in a pint of ſpirit of ſulphuric ether, for 14 days, in a ſtopped glaſs-bottle, and ſtraining. The "aromatic ſulphuric ether with alcohol," of the Edinb. Ph., is made with the ſame aromatics, and in the ſame manner as the compound tincture of cinnamon, except that ſulphuric ether with alcohol is employed inſtead of proof-ſpirit. The medicinal properties of theſe preparations are the ſame with thoſe of the former; the aromatics rendering them in a ſlight degree more grateful.

SPIRIT, *Ethereal, of Frobenius, Spiritus Etherius Frobenii,* a name given by Frobenius, and others, to a liquor famous for its extreme volatility, and many other qualities; for which ſee *Sulphuric* ETHER.

The uſe of this liquor in medicine is now well known: as a very thin and volatile inflammable matter, it acts powerfully on the nervous ſyſtem. Frederic Hoffman was one of the firſt who employed it as a ſedative and antiſpaſmodic. See LIQUOR *Mineralis Anodynus,* and SPIRIT *of Ether,* infra.

It is now often preſcribed ſingly, in the doſe of ſeven or eight drops upon a bit of ſugar, which is to be eat, or to be diſſolved in ſome proper liquor, and drank. It is given in flatulent colics, obſtinate hiccoughs, convulſive hyſterical affections, and other diſorders of this kind. This ether is ſaid to take ſpots of greaſe from ſilk, without affecting their colours.

We have ſeveral curious obſervations on this ether of Frobenius by Mr. Groſſe, who has deſcribed three different methods of making it in the Memoirs of the Academy of Sciences, for the year 1734.

SPIRIT *of Ether, Compound,* of the Lond. Ph., is prepared by mixing a pint of ſpirit of ſulphuric ether with two fluid-drachms of ethereal oil. (See *Sulphuric* ETHER.) This is intended as a ſubſtitute for the anodyne liquor of Hoffman (ſee the preceding article); for, beſides being ſtimulant and antiſpaſmodic, it is ſuppoſed to poſſeſs anodyne properties. It is an uſeful addition to tincture of opium, when given for the purpoſe of procuring ſleep; and it often prevents the opium from exciting the nauſea which it is apt to produce in ſome habits. The doſe is from fʒſs to fʒij, in any appropriate vehicle.

SPIRIT *of Juniper, Compound,* of the Lond., Dub., and Edinb. Ph., is prepared by macerating one pound of juniper-berries bruiſed, carraway ſeeds and fennel ſeeds bruiſed, of each an ounce and a half, in a gallon (nine pounds, Edinb.) of proof-ſpirit, for 24 hours (two days, Edinb. and Dub.); and then diſtilling a gallon (nine pounds, Edinb.) by a gentle heat. This ſpirit is a grateful and uſeful addition to infuſions of fox-glove, and other diuretics, in dropſy. See JUNIPERUS.

SPIRIT *of Lavender.* See LAVANDULA.

SPIRIT *of Libanus, Smoking.* See LIQUOR.

SPIRIT *of Malt.* See MALT-*Diſtillery.*

SIPRIT *of Mindererus.* See ACETITE *of Ammonia,* LIQUOR, and VINEGAR.

SPIRIT, *Moloſſes.* See MOLOSSES-*Spirit.*

SPIRIT *of Nitre.* See NITRIC *Acid,* and *Nitrat* POTASSÆ.

SPIRIT *of Nitric Ether* of the Lond. Ph. is obtained by taking two pints of rectified ſpirit, and three ounces (by weight) of nitric acid. Add the acid gradually to the ſpirit, and mix them, taking care that the temperature, during the mixture, does not exceed 120°; then diſtil, by a gentle heat, 26 fluid-ounces. *Spirit of nitrous ether* of the Edinb. Ph. is prepared by pouring three pounds of alcohol into a large phial placed in a veſſel full of cold water, and adding one pound of nitrous acid gradually, with frequent agitation. Slightly cork the phial, and place it in a cool place for ſeven days; then diſtil the liquor, by the heat of boiling water, into a receiver kept cool with ſnow or water, as long as any ſpirit comes over. The *nitrous ethereal ſpirit* of the Dub. Ph. is prepared in the following manner: Add to the matter which remains after the diſtillation of nitrous ether, the rectified ſpirit of wine, employed in that operation for condenſing the elaſtic vapour, and diſtil to dryneſs, with the greater heat of a water-bath. Mix the diſtilled liquor with the alkaline liquor which remains after the ſeparation of the nitrous ether, and alſo add as much dry ſubcarbonate of kali as ſhall be ſufficient to ſaturate the predominant acid; which is to be determined by the teſt of litmus. Laſtly, diſtil by the medium heat of a water-bath, as long as any fluid comes over. The ſpecific gravity of this liquor is to that of diſtilled water, as 850 to 1000. The ſpirit of nitric ether, as procured by the London or Edinburgh proceſs, has an extremely fragrant odour, and a pungent acidulous taſte. It is very volatile and inflammable, ſoluble in water and alcohol, and ſtrikes a deep olive with ſolution of green ſulphate of iron. See *Nitrous* ETHER.

Spirit of nitric ether is refrigerant, diuretic, and antiſpaſmodic. It has been long known and uſed, under the title of "ſweet ſpirit of nitre," as a grateful refrigerant, and for quenching thirſt in febrile affections; for which purpoſe the doſe is from ♏xx to ♏xl, given in a cupful of water, or any other appropriate vehicle. In larger doſes it acts as a gentle ſtimulant to the ſtomach, relieving nauſea and flatulence; and alſo determines to the kidnies, increaſing the flow of urine; on which account it is advantageouſly preſcribed as an auxiliary to other diuretics in dropſical complaints. The dulcified ſpirit of nitre is added by drops to potions and juleps, till it has given them an agreeable acidity.

It is alſo much uſed by our diſtillers to give a vinoſity to thoſe ſpirits, whoſe natural flavour of that kind they have deſtroyed by the improper uſe of alkaline ſalts in the rectifications. Nothing can be more proper for this purpoſe than this ſpirit, as it really gives the brandy-flavour, and is not at all prejudicial to health, but very well falls in with the nature of the ſpirit, and promotes its medicinal properties as a diuretic, deobſtruent, and lithontriptic.

It has been ſuggeſted, that the method of making it for this purpoſe is improveable, by uſing in the preparation a ſpirit of wine impregnated with ſome fine flavoured ingredient, which has not much oil, for acids do not readily mix where there is much oil.

In the preparation of this dulcified ſpirit of nitre, the longer it ſtands in digeſtion with the ſpirit of wine, the milder it grows; and by the ſame means alſo, the violently corroſive oil of vitriol may be ſo blunted, as to be rendered ſcarcely perceptible to the taſte. In fine, it has been ſaid that a ſpiritus nitri dulcis may be made, by a ſlow digeſtion, greatly ſuperior to that commonly uſed, and of ſo fixed a nature, that it will not be ſubject to have its flavour fly off from the ſpirit with which it is mixed, any ſooner than the native vinoſity of brandy will of itſelf fly off from that ſpirit, as it always will in time. A proper care in the preparation of this acid might free the diſtillers from that troubleſome neceſſity they are under of adding their ſpirit of nitre, juſt before they ſend their goods away, for fear the flavour ſhould be loſt before the ſpirit is wholly uſed, and ſo the ſophiſtication be found out. There is no fixing any certain proportion in which the acid is to be mixed with the ſpirit, but in general it is beſt not to over-do it; for though it will give an agreeable vinoſity to any tolerable clean ſpirit, the perſon will be much deceived who attempts to drow the bad flavour of a foul one by it. Shaw's Eſſay on Diſtillery.

Mr. Woulfe deſcribes an apparatus by which *nitrous ether* (in the article under ETHER) may be expeditiouſly obtained by diſtillation, with the heat only occaſioned by mixing together the nitrous acid and the ſpirit of wine. This diſtillation is performed in a matraſs with a high neck, to which is fitted a head with a ſpout, communicating with the receiver by means of a long tube. The vapours that are not condenſed in this receiver, or in a bottle joined to a ſpout in its bottom, are conveyed from the receiver through a bent tube into ſpirit of wine contained in a bottle. If any vapours paſs uncondenſed through this ſpirit of wine, they are conveyed through another bent tube into more ſpirit of wine contained in another bottle. The liquor collected in the bottle annexed to the receiver, being ſlowly rectified with ſlaked lime, furniſhes very fine ether. The ſpirit of wine in which the vapours were condenſed, contains ſo much ether, that this fluid may be ſeparated from the ſpirit by adding water. This ſpirit of wine is by the operation changed into good dulcified ſpirit of nitre. Phil. Tranſ. vol. lvii. art. 59.

SPIRIT *of Sal Ammoniac.* See AMMONIACAL *Preparations.*

SPIRIT *of Salt.* See MURIATIC *Acid.*

SPIRIT *of Sulphur*, or *of Vitriol.* See SULPHURIC *Acid.*

SPIRIT *of Turpentine.* See TURPENTINE.

SPIRIT *of Venus.* See ACETIC *Acid.*

SPIRIT *of Vinegar.* See ACETOUS *Acid*, and VINEGAR.

SPIRIT *of Vitriol.* See SULPHURIC *Acid*, and VITRIOL.

SPIRIT *of Wine.* See ALCOHOL and WINE.

SPIRIT is alſo uſed for any incorporeal being, or intelligence. In which ſenſe God is ſaid to be a ſpirit, angels are ſpirits; and the devil is an evil ſpirit.

In this ſenſe the human ſoul is alſo called a ſpirit, from its thinking and reflecting powers, which cannot be conceived to reſide in any thing material. See SOUL.

F. Malebranche obſerves, it is extremely difficult to conceive what it is that ſhould make the communication between the body and the ſpirit; for if the ſpirit have no material parts, it cannot move the body. But the argument muſt be falſe ſomehow or other; for we believe that God can move bodies, and yet do we not attribute any material parts to him.

SPIRIT, in *Theology*, is uſed, by way of eminence, for the third perſon in the Holy Trinity, called *the Spirit, the Holy Spirit*, or *Holy Ghoſt.*

Concerning the nature and even the perſonality of the Holy Spirit, very different opinions have been entertained by theological writers, both ancient and modern. It has been ſaid, indeed, that no mention occurs of any difference of opinion on this ſubject, that attracted any notice, till after the commencement of the Arian controverſy, and even till after the council of Nice. It has been alſo aſſerted, that even after the riſe of the Arian controverſy, many perſons expreſſed themſelves concerning the Spirit as if it had no proper divinity, at leaſt of a perſonal nature, without cenſure; and that this could not have been the caſe, if it had been the uniform doctrine of the orthodox, that the Holy Spirit was a proper *divine perſon*, equal to the Son, or the Father. Clement, one of the apoſtolical fathers, makes no particular mention of the Holy Spirit. Ignatius, allowing his epiſtle to the Epheſians to be genuine, ſeems to have conſidered the Holy Spirit rather as a "power" than as a "perſon." Juſtin Martyr ſays but little concerning the Holy Spirit; nor is it eaſy to conclude what was his real opinion. But ſome have imagined that he regarded him as a created being, ſince he repreſents him as inferior to Chriſt. Irenæus ſeems to have conſidered the Holy Spirit as a divine influence, and no proper perſon; calling him, in reference to the words of Iſaiah (ch. lxi. 1.), the unction. Athenagoras conſidered the Holy Spirit as an efflux from the Deity. Tertullian ſeems to have thought, that the Holy Spirit was derived from Chriſt, in the ſame manner as Chriſt was derived from God, that is, by a kind of prolation. Novatian, who was as orthodox in his notions with regard to the Trinity as any perſon in his age, could not believe in the divinity of the Holy Spirit, whom he repreſents as inferior to the Son, whom he alſo makes inferior to the Father. Lactantius is complained of for not mentioning the Holy Spirit, and for denying his perſonality. Dionyſius of Alexandria is cenſured by Baſil for not admitting the divinity of the Holy Spirit, and reducing him to the rank of a created being. Hilary alſo ſeems to have conſidered the Spirit as a divine influence. After the council of Nice, the ſentiments and language of the fathers appear to have undergone a material change. Athanaſius contended ſtrenuouſly and effectually, not only for the divinity of Chriſt, and his conſubſtantiality with the Father, but alſo in behalf of that of the Holy Spirit, whoſe divinity was denied by Macedonius. Being in Egypt when this hereſy prevailed, he procured a ſynod to be called, at which he attended, and where the Holy Spirit was, for the firſt time, decreed to be conſubſtantial with the Father and the Son. Soon after this, the divinity of the Holy Spirit was more ſolemnly determined at a council held in Conſtantinople, and from that time it was decreed no leſs heretical to deny the divinity of the Spirit, than that of the Son.

At this time the doctrine of the perfect equality of the Spirit and the Son, as well as that of the Son and the Father, was fully eſtabliſhed; and it was not long before the forms of public worſhip were accommodated to this opinion; for inſtead of the cuſtomary doxology of “Gloria Patri,” Flavianus of Antioch made an alteration, for which purpoſe he is ſaid to have aſſembled a number of monks, and to have firſt chanted out “Glory to the Father, to the Son, and to the Holy Ghoſt.” Whereas, before his time, ſome had ſaid “Glory to the Father through the Son, in the Holy Spirit,” which was the moſt cuſtomary form; and others, “Glory to the Father in the Son, and the Holy Spirit.”

The doctrine avowed and maintained by Athanaſius, was ſupported by the influence of Baſil, the two Gregories, Chryſoſtom, and Cyril of Alexandria. The latter ſays, “the Holy Spirit is the Spirit of the unbegotten God, and comes forth from him, has perſonality and life, and always exiſts, being from that which exiſts.” At this time the doctrine of the inferiority of the Spirit to the Son, and of his having been created by him, was ſeverely reprobated. Baſil maintained, that to deny the divinity of the Holy Spirit, is to be guilty of blaſphemy againſt the Holy Spirit; and Chryſoſtom obſerves, “it cannot be that he who halts with reſpect to the Spirit, can walk upright with reſpect to the Son.” However, though it was admitted, that the Spirit was a divine perſon as well as the Son, and yet, like the Son, not abſolutely underived, there was ſome difficulty in ſettling the mode of his derivation. At length, the term “proceeding” was adopted, as expreſſing the manner of the emiſſion of the Spirit from the fountain of Deity, and was deemed to be different from that of “generation,” which had been appropriated to the Son: nevertheleſs, the difference between the two terms could not be eaſily adjuſted. Auſtin ſays that the Holy Spirit, being the Spirit both of the Father and the Son, proceeds from them both; and this he makes to be the difference between the generation of the Son and the proceſſion of the Spirit. Cyril of Alexandria thought that he had ſome idea of the nature of the proceſſion of the Spirit from the ſubſtance of God, when he ſays, that “Chriſt breathed upon his diſciples, to ſhew that the Holy Spirit proceeds from the divine ſubſtance, as the breath of man proceeds from him.”

In proof of the divinity of the Holy Spirit it has been alleged, that divine names, titles, attributes, works and worſhip, are or ſeem to be aſcribed, in various paſſages of ſcripture, to the Holy Spirit. Many plead that the Holy Spirit is called Jehovah in the Old Teſtament, by comparing Acts, xxviii. 25. with Iſaiah, vi. 9; and Heb. iii. 7—9. with Exod. xvii. 7; Jer. xxxi. 31—34. with Heb. x. 15, 16. In adverting to the firſt of theſe cited paſſages, in which the words ſpoken by God to Iſaiah are by St. Paul ſaid to be ſpoken by the Holy Ghoſt, it has been concluded, that God and the Holy Ghoſt are one and the ſame individual perſon. But in Rev. xi. 43, an inferior angel is introduced as ſpeaking in the perſon of God, and therefore this mode of reaſoning has not been allowed by the oppugners of this doctrine. It is alleged further, that the Holy Spirit is, probably, called God v. 4, to which paſſages ſome add 1 Cor. iii. 16. vi. 19. 2 Cor. iii. 17. Moreover, divine perfections are ſaid to be aſcribed to the Spirit of God; particularly omniſcience, 1 Cor. ii. 10, 11. Iſ. xl. 13, 14; to which ſome add 1 John, ii. 20; — omnipreſence, Pſ. cxxxix. 7. Eph. ii. 17, 18. Rom. viii. 26, 27; — omnipotence, Luke, i. 35. 1 Cor. xii. 11; — eternity, Heb. ix. 14. Again; divine works are aſcribed to the Spirit, Gen. i. 2. Job, xxvi. 13. xxxiii. 4. Pſ. xxxiii. 6. civ. 30, &c. Some perſons likewiſe add thoſe texts in which miracles, inſpiration, and ſaving operations upon the heart of man, are aſcribed to the Spirit. The chief texts produced to prove that divine worſhip is given to the Spirit are, Iſ. vi. 3. compared with v. 9, and Acts, xxviii. 25, &c. Rom. ix. 1. Rev. i. 4. 2 Cor. xiii. 14; and above all, Matth. xxviii. 19. Upon the whole it is alleged, that the bleſſed Spirit is ſpoken of in ſuch a manner, as it cannot be imagined would be uſed in ſpeaking of a mere creature, and, conſequently, muſt be poſſeſſed of a nature properly divine. On the other hand it is maintained, that the proofs taken from the attributes and operations of the Spirit are of no more force than in the caſe of the Son's ſupreme deity; both Son and Spirit, being agents under God at his will, are concerned in his glorious works, and partakers of his power and wiſdom; ſo that it is no wonder if moſt of theſe be aſcribed to the Spirit, but ſtill as to one ſent of God. Moreover, theſe arguments bear leſs evidence in relation to the Holy Spirit, becauſe of the different ideas which the word Spirit ſtands for. The Spirit, and Holy Spirit, very often ſignify not a perſonal Spirit, but the attributes and operative efficacious virtue of God, the energy of his power, wiſdom, and holineſs, exerted in powerful operations, afflatus, and inſpiration. The name of God is never once given to the Spirit, nor is direct worſhip or invocation, prayer or praiſe, glory or dominion, once given to him, in precept or practice, in the New Teſtament; though his communications are wiſhed and prayed for to Chriſtians, 2 Cor. xiii. 14.

The chief controverſy on this head is, whether the ſpirit of God be a perſon in the *philoſophical ſenſe*, or merely a divine *power* or energy. That he is a *perſon*, is argued from his being deſcribed as having underſtanding, 1 Cor. ii. 10, 11; willing, 1 Cor. xii. 11; ſpeaking and ſending meſſengers, Iſ. vi. 8, compared with Acts, xxviii. 25. viii. 19. x. 19, 20. xiii. 1—4. 1 Tim. iv. 1; as Dr. Barrow interprets it, ſending Chriſt, Iſ. xlviii. 16; as pleading, Rom. viii. 26; as being grieved, Iſ. lxiii. 10. Eph. iv. 30; as teaching and reminding, John, xiv. 26; as teſtifying, John, xv. 26; as reproving, John, xvi. 8, &c.; as executing a commiſſion received from God, John, xvi. 13, 14.

Among thoſe who grant the Spirit to be a perſon, it is debated whether he be the ſame philoſophical perſon with the Father, or another diſtinct from him; to ſuppoſe the latter (ſuppoſing him at the ſame time equal with the Father) is making him *another God*. Some, therefore, have repreſented him as a created Spirit, in his own nature inferior both to Father and Son; againſt which the paſſages above enumerated have been ſtrongly urged; as it has alſo been, that the Spirit is never mentioned as a creature called upon to praiſe God, when a large enumeration of ſuch is made. Others conſider him as a created Spirit, (called as one thinks Michael the archangel), ſo united to God, and ſo actuated by him, as by virtue of this union to become capable of ſuch repreſentations and regards as the Son is, though acting in ſome ſubordination to him in the economy of our redemption;—while many others have contented themſelves with aſſerting, that there is only a *political*, *modal*, or *economical* diſtinction, in the perſonality of the Father, Son, and Spirit. Others again have maintained, that the Spirit is a third diſtinction in the Deity; and when he is called a *perſon*, the word is to be taken in ſuch a ſenſe below the philoſophical and above the modal; though what determination is to be affixed to it, they do not more particularly ſay.

Thoſe, and they form a numerous claſs, who aſſert the Spirit to be a divine *power*, plead chiefly the ſenſe of the word in the Old Teſtament, where they ſay it has generally that ſignification: and that it would be abſurd to ſuppoſe, that the idea ſhould be ſo greatly changed, when Chriſt and his apoſtles addreſſed thoſe who had been bred up in the Jewiſh religion, and muſt, therefore, have been uſed to conceive of the Spirit according to the repreſentation made in their ſacred oracles. It is alſo pleaded, that the *pouring out* one *perſon* on another, is both unſcriptural and unintelligible language, but not ſo, if it relates to a divine *power*, influence, or operation. They urge in favour of the explication of the doctrine, Luke, i. 35; and reply to the paſſages of ſcripture above cited, by obſerving, that nothing was more common among the ancients, and more eſpecially the Eaſtern nations, than to repreſent powers, properties, and attributes, by perſonal characters; thus, wiſdom is repreſented as contriving, rejoicing, inviting, pleading, reproving, &c. Prov. i. 20, &c. iii. 13, &c. iv. 6, &c. viii. 1. ix. 1, &c.; charity, as believing, rejoicing, &c. 1 Cor. xiii.; and death, as being plagued, Hoſ. xiii. 4; the ſcripture, as foreſeeing and preaching, Gal. iii. 8; the ſun, as rejoicing, Pſ. xix. 5; a famine, as coming at God's call, 2 Kings, viii. 1; righteouſneſs, as walking before him, compare Pſ. lxxxv. 10—13; and the wind, as willing, John, iii. 6. To thoſe who allege theſe paſſages, it is replied, that none of them come up to the preceding texts; more eſpecially conſidering how frequently the perſonal term ἐκεῖνος is uſed, when ſpoken of the Spirit, and that not merely in poetical, but moſt plain and ſimple diſcourſes, which, indeed, as it might be argued, is neceſſary to render the perſonification complete; but the ſtrongeſt objection againſt this opinion is ſaid to ariſe from the form of baptiſm, and the forementioned John, xvi. 13, 14.

Dr. Lardner examines the different ſenſes in which the words Spirit, Spirit of God, and Holy Ghoſt, are uſed in the Old and New Teſtament; and he finds, 1. That Spirit is in many places equivalent to God himſelf. 2. That it often means the power or wiſdom of God, or his will and command. 3. That it often means an extraordinary gift from God of power, wiſdom, knowledge, and underſtanding. In Heb. ii. 14. gifts of the Holy Ghoſt ſhould be diſtributions of the Holy Ghoſt; an expreſſion plainly declaring, that by the Holy Ghoſt or Holy Spirit were meant thoſe ſpiritual gifts, which came down upon men from heaven immediately, or were communicated in great variety by laying on the hands of the apoſtles. 4. In the epiſtles of the New Teſtament, there are at the beginning and elſewhere wiſhes of peace from God the Father and the Lord Jeſus Chriſt, but none from the Spirit diſtinctly; nor are there any doxologies or aſcriptions of glory to the Spirit diſtinctly, though there are ſeveral ſuch aſcriptions to God and Chriſt, or to God through Chriſt.

But it may be ſaid, as our learned and impartial author ſtates the objections of thoſe who maintain a different opinion, that the Spirit or the Holy Ghoſt is oftentimes ſpoken of as a perſon, and eſpecially in St. John's goſpel. To which he replies, 1. It is not uncommon in the language of ſcripture, as we have already ſtated at large, to perſonalize many things to which we do not aſcribe intelligence; thus, *e. g.* wiſdom is perſonified in the book of Proverbs, and ſin and death in the New Teſtament. 2. There is not in the Acts of the Apoſtles, or in any other book of the New Teſtament, any account of the appearance and manifeſtation of a great agent or perſon after our Saviour's aſcenſion; therefore no ſuch thing was promiſed or intended by our Saviour, nor expected by his apoſtles, who could not but know his meaning. 3. In other texts of ſcripture, and particularly in St. John's goſpel, by the Spirit or Holy Ghoſt is meant a gift, or plentiful effuſion of ſpiritual gifts. 4. Our Saviour himſelf explains what he meant by the Comforter, *i. e.* the divine influence or effuſion of ſpiritual gifts. 5. Our bleſſed Lord, in ſpeaking of this matter, has made uſe of a variety of expreſſions, by attending to which we may clearly diſcern his true meaning, in what he ſays of the Comforter. All which ſeem to ſhew, that by the Spirit is to be underſtood that ſpecial influence, which, in different meaſures and proportions, God vouchſafes to men through Jeſus Chriſt for their own comfort and eſtabliſhment, and for ſpreading the great truths of religion in the world. This power or divine influence, this effuſion of knowledge and other ſpiritual gifts, our Lord calls the Comforter or the Advocate, παρακλητος, as thereby their cauſe would be pleaded with men, and they would be juſtified in preaching boldly in the name of Jeſus Chriſt. This gift, this divine influence, he calls alſo the ſpirit of truth, becauſe by this wonderful influence on their minds, the apoſtles would be led into the knowledge of all the truths of the Goſpel, and would be enabled to teach them to others with perſpicuity. And our Lord ſpeaks of the Spirit's bringing to their remembrance the things which he had ſaid, and of his receiving of his and ſhewing it unto them; becauſe by his miraculous influence upon their minds, thoſe prejudices would be removed, which had obſtructed their clear diſcernment of what Chriſt had ſaid unto them, when he was with them. By the Holy Ghoſt in Matth. xxviii. 19, where we have the form of baptiſm, we are to underſtand the miracles of our Saviour's miniſtry, and likewiſe the miracles wrought by his apoſtles, and the ſpiritual gifts beſtowed upon the apoſtles and other diſciples of Jeſus, and all believers in general, ſoon after our Lord's aſcenſion, and all the miraculous atteſtations of the truth, and divine origin of the doctrine taught by Jeſus Chriſt. On the ſubject of this article, we refer our theological readers to Calamy on the Trinity, Serm. vi. Emlyn's Tracts, vol. ii. Burnet on the Art.—Script. Doctr. of the Trin. Diſſ. v. Watts on the Trin.—Alſo, Chriſt. Doctr. of Trin. Barrow's Works, vol. ii. Clarke on the Trin. part i. ch. 3. part ii. § 3, 4. 19, 20, 21, 22. 28—32. 40—42. 45, 46. 53. Taylor on the Trin. part iii. Owen on the Spirit, l. i. c. 3. Pearſon on the Creed. Dr. Scott's Eſſ. towards a Demonſtr. of the Script. Trin. prop. iii. Lardner's Firſt Poſtſcr. to the Letter on the Logos, apud Works, vol. xi. Prieſtley's Hiſt. of Early Opinions, vol. ii.—Corruptions, vol. i. Doddridge's Lectures.

SPIRIT, *Order of the.* See HOLY *Ghoſt*.

SPIRIT is alſo uſed, amond *Divines*, for the divine power and virtue, and the communication of it to men.

In this ſenſe, the ſpirit is ſaid to have gone out on the face of the deep (Gen. i. 2.), and the prophets to have been poſſeſſed with the ſpirit of God. Providence, in this ſenſe, is that univerſal ſpirit by which God makes all nature to act.

Thus, the holy Virgin is ſaid to have conceived of the Spirit.

Spirit, *Private*, is a term that made a great figure in the controverſies of the two laſt centuries. It ſignifies the particular ſenſe or notion each perſon has of the dogmata of faith, and the truths of religion, as ſuggeſted by his own thoughts, and the perſuaſion he is under with regard to them.

The firſt reformers denying ſtrenuouſly any infallible interpreter of the ſcripture, or any ſettled judge of controverſies, maintained, that every perſon was to interpret and judge of revealed truths by his own light, aſſiſted by the grace of God; and this was what they called *private* ſpirit or *judgment*.

Againſt this, the arguments uſed by the Romaniſts are, that revealed truths being one and the ſame for all believers; the rule God has given us for judging of them, ought to repreſent them to us uniformly, and the ſame; but the private ſpirit informs Luther one way, and Zuinglius another. It divides Oecolampadius, Bucer, Oſiander, &c. And the doctrine it diſcovers to the Confeſſionites, is quite different from that it ſhews the Anabaptiſts and Mennonites, in the very ſame paſſage of ſcripture.

Spirit, *Spiritus*, is alſo uſed, in *Proſody*, to ſignify the greater or leſs degree of breath employed in the pronunciation of the initial Greek vowels, and of the letter ρ.

In ſounding the vowels, we may obſerve every vowel has its ſound by a ſimple conformation of the mouth, in which the breath has little or no concern, as being confined in the arteria aſpera: the ſpirits, or breaths, which are placed on the initial vowels in words, are to denote the force this initial vowel is to have from the breath, when the word is pronounced. If the ſound of this vowel be ſmooth, as all the ſounds of the vowels naturally are, this is termed *ſpiritus lenis*, a mild breath; but if this vowel be to be pronounced with a more vehement expulſion of the air, this is termed *ſpiritus aſper*, or a rough breath, or aſpirate: and when the aſpirate and acute are in the ſame ſyllable, the mark of the breath, in this initial vowel, only ſignifies, that the vowel is to be pronounced with a ſtronger breath than the initial mild vowels; for aſpirates do not alter the tone of any ſyllable, but only ſtrengthen, increaſe, and ſwell the tone.

Spirit-*Level*. See Level.

Spirit-*Room*, in *Ship-Building*, a ſecure apartment built next abaft the after-hold, to contain the ſpirits. See Ship-building.

SPIRITOSO, *con Spirito*, Ital., in *Muſic*, ſeverally imply animation, ſpirit, and fire, in the performance of the movements to which either of theſe terms is prefixed.

SPIRITU SANTO, or *Eſpiritu Santo*, (which ſee,) in *Geography*, a ſea-port of Brazil, in the government of Rio Janeiro, ſituated on the ſouth ſide of a large bay, about three leagues from the ocean, but having neither walls nor fortifications, except a ſmall ruinated caſtle; ſo that its defence conſiſts in the bravery of its inhabitants, who amount to about 900. The port is a ſmall bay, opening to the eaſt, and interſected with many ſmall iſlands. At the top of a mountain, at ſome diſtance from the town, is a large white tower, which the Portugueſe call Noſtra Senhora de Pena, and near it a ſmall church, ſurrounded with a wall. At the foot of the mountain are ſtill to be ſeen a few old houſes, the melancholy remains of a place once called Villa Veja, or the Old City. S. lat. 20° 8′.—Alſo, a town of the iſland of Cuba; 155 miles E.S.E. of Havannah. N. lat. 22° 15′. W. long. 79° 47′.—Alſo, a town of Peru; 8 miles W. of Potoſi.—Alſo, a town of Chili; 60 miles from Coquimbo.—Alſo, a river of Mexico, which runs into the Pacific ocean, N. lat. 23°. W. long. 106° 40′. —Alſo, a town of Mexico, in the province of Mechoacan; 65 miles E.N.E. of Zacatula.—Alſo, a river of Braſil, which runs into the Atlantic, S. lat. 20° 10′.—Alſo, a lake of Eaſt Florida, near the ſouthern extremity.

Spiritu Santo *Bay*, called alſo Tampay bay, and Hillſborough bay, a large bay on the weſt coaſt of Eaſt Florida. N. lat. 28°. W. long. 82° 45′.

Spiritu Santo *Iſlands*, or *Andros*, a chain of iſlands, ſituated to the ſouth-weſt of the Bahamas; the largeſt about 40 miles in length, and eight in breadth. N. lat. 24° to 25° 12′. W. long. 77° to 78° 15′.

SPIRITUAL Friars. See Franciscans.

SPIRITUALITIES of a biſhop, are ſuch profits as ariſe to him from the benefit of his juriſdiction in his dioceſe, and not as a baron of parliament.

Such are thoſe of his viſitations, inſtitutions, ordinations, preſentation-money, &c.

Spiritualities, *Guardian of the*. See Guardian.

SPIRITUALIUM Custos. See Custos.

SPIRITUALIZATION, in *Chemiſtry*, the action of extracting ſpirits from natural bodies. See Spirit.

Spiritualization is an operation that belongs principally to fermented ſalts, and then to fermented juices and liquors; the fermentation rendering the ſpirits volatile and inflammable.

Spirit of wine is ſometimes ſpiritualized to that degree, that upon throwing a quantity into the air, not a drop ſhall fall down; but the whole evaporate, and be loſt.

SPIRITUS. See Spirit.

SPIRKET, in *Rural Economy*, a term applied to a hook to hang any thing upon, as the cart-geer, &c. in ſtables and other places.

SPIRKETTING, in *Ship-Building*, a thick ſtrake, or ſtrakes, wrought withinſide upon the ends of the beams or water-ways. Spirkettings under ports reach from the water-ways to the upper ſide of the lower ſill, which is generally of two ſtrakes, wrought top and butt.

SPIRTING Cucumber, in *Botany*, a ſpecies of *momordica*; which ſee.

SPISE, in *Geography*, a town of Africa, in the kingdom of Ningo, in the interior part of the Gold Coaſt.

SPISSUM, in the *Ancient Muſic*, was uſed to ſignify thoſe two ſmaller conjunct intervals of a tetrachord, which, taken together, were leſs than the third.

The Greek term for this was πυκνον. This happened in the enharmonic, and the three chromatic genera; in each of which, the interval between the hypate and the lichanos, was leſs than the interval between the lichanos and the nete. To the ſpiſſum was oppoſed the non-ſpiſſum, ἄπυκνον, or *rarum*, as Martianus Capella tranſlates it. The ἄπυκνον happened in the two diatonic genera, where the two ſmalleſt intervals were equal to, or greater than the third. They were ſuppoſed equal in the diatonicum molle, and greater in the intenſum. See Genus.

SPIT, *The*, in *Geography*, a ſhoal of the Atlantic, near the coaſt of South Carolina; 15 miles S. of Cape Fear. N. lat. 33° 34′. W. long. 78° 10′.

Spit, in *Agriculture* and *Gardening*, the quantity or depth of earth or mould which the ſpade takes up at once in digging or delving over ground. Thus, this ſort of work is performed to one, two, or more ſpits deep, according to circumſtances, and the nature of the ſoil and crops.

Spit-*Dung*, that ſort of dung manure which has undergone complete fermentation or putrefaction, and is reduced into a ſomewhat earthy ſtate, ſo as to be dug or taken up by the ſpade or ſhovel in a ſort of ſpit manner.

Spit-*Shovel*, that ſort of tool of the ſhovel kind which is employed in digging out or ſhovelling up ſuch dung, or other matters, as are in a reduced earthy condition. And the term is alſo ſometimes applied to it when uſed in taking up grain for the purpoſe of having it cleaned or removed into another ſituation.

SPITAL, in *Geography*, a town of Auſtria; 6 miles S. of Steyr.—Alſo, a town of Spain, in Catalonia, near the coaſt of the Mediterranean; 22 miles N.E. of Tortoſa.—Alſo, a town of the duchy of Stiria; 5 miles E. of Muertzenſchlag.—Alſo, a town of the duchy of Carinthia, on the Liſer, about a mile from the Drave; 8 miles E. of Saxenburg.

SPITHEAD, a ſpacious reach in the Britiſh Channel, about mid-way between the ſouthern coaſt of Hampſhire and the Iſle of Wight. It directly faces the mouth of Portſmouth harbour, and is frequently occupied by men-of-war and frigates at anchor. Sometimes a fleet of ſhips is ſtationed here. It is ſaid that 1000 ſail of veſſels may anchor at one time with ſecurity. The depth of water, at low tide, is 10, 11, 13, 14, 15, and 16 fathoms. This place is memorable for the ſhipwreck of the Royal George, of 100 guns, in Auguſt 1782. At that time the veſſel was occupied by more than 400 men and 200 women, and was hove on one ſide, for the purpoſe of repairing her keel. Not anticipating danger, the ſailors had neglected to laſh down her lower deck ports, and a ſudden ſquall coming on, ſhe was thrown with her broad-ſide on the water. The hole was filled in a few minutes, and every thing was carried to the bottom. Admiral Kempenfelt, with all the crew and viſitors, periſhed; for there was no time for boats to afford aſſiſtance. Many attempts have been made to raiſe this veſſel, but without ſucceſs; although many articles have been obtained from the cabins, &c. Some of the maſts continued to be ſeen above water for many years after the accident.

SPITHEAD *Creek*, a river of the weſtern territory of America, which runs into the Ohio, N. lat. 39° 56′. W. long. 80° 46′.

SPITTER, among *Sportſmen*, a red male deer near two years old, whoſe horns begin to grow up ſharp and ſpitwiſe.

It is otherwiſe called a *brocket* and *pricket*.

SPITTLE. See SALIVA and SPUTUM.

SPITTLE, a corruption of the word *hoſpital*.

SPITTLE, in *Agriculture*, the name of a ſpaddle or ſmall ſort of ſpade. See SPADE.

SPITTLING, a term applied to an operation performed in the cultivation of teaſle crops, in which the workman, with a tool of the ſpittle, ſhoe, or ſmall ſpade kind, turns over the ſurface-mould between every plant in a careful manner, in the firſt ſummer ſeaſon after planting, when the plants have acquired ſome degree of growth. By this means they are kept perfectly clean from weeds, and their growth promoted as much as poſſible.

The work commonly coſts about a guinea and a half the acre and drink, in moſt diſtricts where this ſort of cultivation is carried on. See TEASLE.

SPITZ, in *Geography*, a town of Auſtria, on the Danube; 10 miles above Krems.—Alſo, a town of Bohemia, in the circle of Leitmeritz; 9 miles N.E. of Kamnitz.

SPITZBERG, a conſiderable mountain of Sileſia, in the principality of Liegnitz.

SPITZBERGEN, or SPITSBERGEN. See *Eaſt* GREENLAND.

SPITZEBACH, a river of Germany, which runs into the Eltzach, near Ober Winden.

SPIZA, in *Ornithology*, a name by which the ancient naturaliſts called the chaffinch.

SPLA-BOARDS, in *Ship-Building*, boards or planks fixed to an obtuſe angle in the light-room, to throw the light into the magazine.

SPLACHNUM, in *Botany*, a name adopted by Montin and Linnæus from Dioſcorides, whoſe σπλαχνον is ſynonimous with his βρυον, and belongs to the Moſſes in general, or rather perhaps Lichens, which grow upon trees. This name becomes peculiarly appropriate, when we advert to its identity with σπλαγχνον, the Greek appellation of the principal *viſcera*, the heart, lungs, &c.; becauſe the eſſential character of the genus before us conſiſts in a peculiar fleſhy glandular organ, ſupporting the capſule; whence its Engliſh name, Gland-moſs.—Montin Diſſ. 7. Linn. Am. Acad. v. 2. 270. t. 3. Gen. 563. Schreb. 759. Hedw. Fund. v. 2. 88. t. 7. f. 33. Sp. Muſc. 51. Sm. Fl. Brit. 1169. Turn. Muſc. Hib. 15. Swartz Muſc. Suec. 22. Juſſ. 11. Lamarck Illuſtr. t. 874.—Claſs and order, *Cryptogamia Muſci*. Nat. Ord. *Muſci*.

Eſſ. Ch. Capſule cylindrical, placed on a fleſhy receptacle. Fringe ſimple, of ſixteen teeth, ſtanding in pairs.

This genus is one of the moſt remarkable of its tribe for ſize and beauty, as well as for ſingularity. Twelve ſpecies are defined in Hedwig's *Sp. Muſc.*; thirteen in the *Fl. Brit.* ſix of the latter not being known to Hedwig. Linnæus, in the original account of the genus, deſcribes but two, which are far the moſt extraordinary, natives of the moſt northern part of Europe, and not found in Britain. We ſhall deſcribe theſe, with a few of the others beſt worth notice.

S. *mnioides*. Green Tapering Gland-moſs. Linn. Fil. Meth. Muſc. 26. Hedw. Sp. Muſc. 51. Crypt. v. 2. 35. t. 11. Fl. Brit. n. 1. Engl. Bot. t. 1589.—Receptacle inverſely conical, green. Leaves elliptic-lanceolate, bearded, entire.—Native of moiſt alpine ſituations in Scotland, Wales, and other parts of Europe, generally, in Wales, growing on the dung of foxes and badgers, according to Mr. Griffith's remarks. This is one of the ſmaller ſpecies, reſembling ſome common *Bryum*; its leafy *ſtems* about an inch high; its *fruit-ſtalks* rather more. The *capſule* is cylindrical, brown, with a blunt lid. Its ſhort green *receptacle* at the baſe might almoſt be overlooked, as a ſwelling of the ſtalk.

S. *ſphæricum*. Green Globular Gland-moſs. Linn. Fil. Meth. Muſc. 33. t. 1. f. 1. Hedw. Sp. Muſc. 55. Crypt. v. 2. 46. t. 16. Fl. Brit. n. 8. Engl. Bot. t. 785.—Receptacle globular, green. Leaves ovato-lanceolate, pointed, entire. Fruit-ſtalk capillary.—Native of alpine ſituations in Lapland, Germany, Carniola, Scotland, &c. uſually on cow-dung. Dr. F. Buchanan firſt met with it at Leney near Stirling, in 1782. This forms green tufts, each plant being ſimple, apparently annual, about half an inch high in the leafy *ſtem*, which terminates in a ſtarry *bloſſom*. Some of theſe bloſſoms are moſt perfectly male, others female. The latter produce each an elegant ſlender wavy tawny *fruit-ſtalk*, from one and a half to three or four inches high, bearing a green, nearly globoſe, ſmooth *receptacle*, much larger and thicker than the little brown cylindrical *capſule*, bordered with eight pair of ſpreading brown teeth.

S. *gracile*, Dickſ. Crypt. faſc. 4. 3. t. 10. f. 5. Fl. Brit. n. 9. Engl. Bot. t. 1921, is ſuppoſed by Mr. Turner to be a variety of the laſt, rather ſmaller, with ſerrated points to the *leaves*, and a brown *receptacle*.

S. *ampullaceum*. Purple Gland-moſs. Linn. Sp. Pl. 1572. Hedw. Sp. Muſc. 55. Crypt. v. 2. 41. t. 14. Fl. Brit. n. 10. Engl. Bot. t. 144. Fl. Dan. t. 822. (S. n. 3; Linn. Am. Acad. v. 2. 280. Bryum ampullaceum, foliis thymi pellucidis, collo ſtrictiore; Dill. Muſc. 343. t. 44. f. 3.)—Receptacle inverſely conical, obtuſe, greeniſh-purple, thrice as thick as the capſule. Leaves lanceolate, acute, ſerrated.—One of the moſt common ſpecies, at leaſt in England, growing chiefly on rotten cow-dung on moiſt turfy heaths in the ſpring, ripening fruit in ſummer. It ſeems no leſs frequent in other parts of Europe. This is larger than *S. ſphæricum*, annual like that, but diſtinguiſhed by the narrower ſerrated *leaves*, ſtouter *ſtalks*, and eſpecially the large purple pear-ſhaped *receptacles*, each crowned with a little ſlender tawny *capſule*.

S. *Turnerianum*, Dickſ. Crypt. faſc. 4. 3. t. 10. f. 11. Fl. Brit. n. 11. Engl. Bot. t. 1116, is, we fear, but a ſmall, or ſtarved, variety of the laſt.

S. *vaſculoſum*. Crimſon Globular Gland-moſs. Linn. Sp. Pl. 1572. Hedw. Sp. Muſc. 53. Crypt. v. 2. 44. t. 15.—Receptacle blood-red, nearly globular. Leaves ſpatulate, bluntiſh, entire.—Native of turfy bogs near Upſal, and in other parts of Sweden. About the height of the laſt, but diſtinguiſhed by its blunt entire *leaves*, and the globular form, greater ſize, and deep rich hue of its *receptacle*. This fine ſpecies has alſo been found in Germany, but not in Britain.

S. *rubrum*. Red Umbrella Gland-moſs. Linn. Sp. Pl. 1572. Hedw. Sp. Muſc. 56. Crypt. v. 2. 51. t. 18. (S. n. 1; Montin Diſſ. 8. t. 1. f. 2. Muſcus norwegicus, umbraculo ruberrimo inſignitus; Petiv. Muſ. 11. t. 1. f. 70. Dill. Muſc. 547. t. 83. f. 9.)—Receptacle orbicular, convex, red. Leaves ovate, partly toothed.—Native of Norway, Finland, Ruſſia, and moſt parts of Siberia. The *ſtem*, like moſt of the reſt, is ſimple, leafy, about an inch high. Upper and floral *leaves* ſerrated. *Fruit-ſtalk* about ſix inches long, erect, red, bearing a ſmall cylindrical *capſule*, which is ſubtended by a moſt beautiful, large, and conſpicuous *receptacle*, like an inverted cup, half an inch wide, of a rich crimſon, finely reticulated, and certainly one of the moſt curious productions in this whole natural order.

S. *luteum*. Yellow Umbrella Gland-moſs. Linn. Sp. Pl. 1572. Hedw. Sp. Muſc. 56. Crypt. v. 2. 48. t. 17. (S. n. 2; Montin Diſſ. 9. t. 1. f. 1.)—Receptacle orbicular, flattiſh, deflexed, yellow. Leaves obovate, entire.—Native of boggy woods in Lapland and Weſtbothland. This vies with the laſt in magnitude and ſingularity, but the *receptacle* is pale yellow, and though deflexed, ſcarcely convex. By Hedwig's figures, as well as the Linnæan ſpecimens, this part ſeems to be ſmall and green till the *capſule* is fully formed, after which it expands and aſſumes its proper colour.

SPLAIT-Shoulder. See Shoulder.

SPLANCHNICA, a name given to medicines appropriated to diſeaſes of the bowels.

SPLANCHNOLOGY, formed from σπλαγχνον, *inteſtine*, and λογος, *diſcourſe*, in *Anatomy*, a diſcourſe on, or explication of, the viſcera.

Sarcology is divided into three parts, *viz*. ſplanchnology, myology, and angeiology; of theſe, ſplanchnology is that which treats of the internal parts, and particularly of the viſcera.

SPLEEN, in *Anatomy* and *Phyſiology*, (σπλην, *lien, la rate*,) a body about the ſize of a ſmall fiſt, of a texture rather reſembling that of glands, ſituated in the left hypochondriac region of the abdomen, between the great end of the ſtomach, and that portion of the diaphragm which lines the concavity of the tenth and eleventh ribs.

The organ is uſually ſingle; but occaſionally one, two, or more ſmall ſecondary ſpleens (lienes ſuccenturiati), of a round or oval figure, about the ſize of hazel-nuts, of a texture exactly ſimilar to the principal one, are found near its anterior end, in the great omentum, connected by the latter and by their blood-veſſels to the principal ſpleen.

It has been aſſerted that the ſpleen has been in ſome caſes entirely deficient. It may have been greatly diminiſhed by diſeaſe, or conſumed by ſuppuration; but we have no ſufficient teſtimony of its entire abſence as a defect of original formation.

Every thing belonging to the ſpleen is irregular, and its figure is remarkably ſo. Uſually the outline deſcribed by its circumference is elliptical: it repreſents, indeed, on the whole, the ſection of an ellipſoid carried through the axis. Its largeſt ſurface is convex, like the ſuperficies of an egg; the margin oval, with two ends, and a longer and ſhorter axis. The convex ſurface of the organ, then, is the moſt extenſive, riſing in the middle, and ſloping towards a comparatively thin edge: this is rather broader towards the back part, and grows narrower, terminating in an obtuſe point in front. The oppoſite aſpect is concave, and divided into two ſurfaces by a ſlight notch running along its long axis, at which the blood-veſſels enter, and to which the omentum is affixed. Both ends of the ſpleen are obtuſe: the poſterior or ſuperior is thicker, the inferior or anterior thinner. Sometimes the ſpleen is more rounded, or more triangular. Often the edge is notched in one or more places, and more or leſs deeply.

The ſituation of the ſpleen varies, as well as its figure. We may, however, ſtate generally, that in a healthy ſubject of the ordinary formation, it will be found in the upper and back part of the left ſide of the abdomen, covered by the falſe ribs, lying between the back of the great end of the ſtomach and the diaphragm in ſuch a way, that it is not viſible on opening the abdominal cavity until the ſtomach is drawn aſide. Its convexity correſponds to the concavity of the diaphragm, and of the tenth and eleventh ribs; its concavity to the great end of the ſtomach: one end is turned backwards; the other forwards.

In this ſituation it is cloſely tied to the ſtomach by its blood-veſſels, which ſend branches to that organ; and by the great omentum, which is attached to its notch, and to the neighbouring portion of the ſtomach. There are, beſides, certain folds of peritoneum, connecting it to the ſurrounding parts. One of theſe, ligamentum verticale, or ſuſpenſorium lienis, or phrenico-ſplenicum, paſſes from the lower part of the diaphragm to the upper end of the ſpleen. Another, ligamentum meſocolicum, or gaſtro-ſplenicum, paſſes from the meſocolon, ſtomach, and œſophagus, to the poſterior part of the notch. A fold of peritoneum may alſo be ſeen going from the ſpleen to the left renal capſule and kidney.

The changes of place in the ſtomach are attended with correſponding alterations of the ſpleen. When the former is full, the ſpleen is ſituated nearly tranſverſely, with one end turned backwards, and the other forwards, with its concavity touching the colon in front, and the renal capſule behind. As the ſtomach becomes empty, the poſition of the ſpleen is more perpendicular; with its ends upwards and downwards. The motions of the diaphragm are neceſſarily accompanied with change of poſition in the ſpleen. When that muſcle deſcends, it puſhes the ſtomach and ſpleen downwards and forwards, thruſting them from under the ribs; they are brought back again to their former place by the re-action of the abdominal muſcles.

When it is enlarged, it paſſes out of the hypochondrium, and can be felt in the umbilical region, or even the hypogaſtric: it has deſcended as low as the groin or bladder. In caſes of tranſpoſed viſcera, it has partaken the inverſion with the other thoracic and abdominal organs.

The ſize of the ſpleen, like other circumſtances belonging to this organ, is ſubject to much variety. Soemmerring ſtates its weight at from ſix to fifteen ounces; and its ſpecific gravity to that of water, as 1060 to 1000. It has been aſſerted, that the kind and the circumſtances of death influence the ſize of the ſpleen; and we may readily believe that a part of ſpongy texture, containing ſo much blood, will be ſmaller in an individual who has periſhed from hæmorrhage than in one who has died of aſphyxia. All phyſiologiſts have repreſented that the ſize of the ſpleen is influenced by the ſtate of the ſtomach, which they conceive to act on it in two ways. They ſuppoſe that the full ſtomach preſſes the ſpleen againſt the ribs, and thus mechanically forces out the contents of its cells, which are expanded again as ſoon as this preſſure is remitted. It has been alſo imagined, that when the ſtomach is full of aliment, blood paſſes in larger quantity into its veſſels, which admit it more eaſily; while, in the empty ſtomach, the veſſels fall into folds, and do not receive ſo much blood. In the former caſe, the blood which goes to the ſtomachic arteries is partly drawn away from the ſplenic veſſels, which alſo admit it leſs readily, becauſe the ſpleen is at the ſame time compreſſed: in the latter, theſe circumſtances are juſt reverſed. Theſe obſervations ſeem purely hypothetical; and they preſent a mechanical ſolution of vital proceſſes, which are certainly governed by other principles. Not a ſingle fact is adduced as a foundation of this fanciful ſuperſtructure. It ſeems, on the contrary, that there are facts ſufficient to overturn it. "Numerous comparative experiments," ſays Bichat, "made at different points of time in the digeſtive proceſs, during the plenitude and emptineſs of the ſtomach, on animals of ſimilar ſize, and under ſimilar circumſtances, have ſhewn, indeed, ſenſible variations in the volume of the ſpleen, but not that invariable coincidence, which has been aſſerted, between the contraction of the ſtomach and the increaſe of the ſpleen, and *vice verſâ*. The oppoſite relation was often noticed; ſo that we could only conclude, that the differences of volume were independent of the ſucceſſion of the digeſtive phenomena, and conſtituted permanent peculiarities of individual organization. The kidney, the liver, &c. do not exhibit an uniform ſize in all ſubjects; but we do not trouble ourſelves by endeavouring to find cauſes for ſuch variations.

"Laſtly, admitting that the volume of the ſpleen varies during life, whether theſe variations coincide or not with determined ſtates of the digeſtive organs, it is repugnant to the ſpirit in which modern phyſiology contemplates the phenomena of life, to aſſign the laxity of the ſpleen, when the ſtomach is empty, as a cauſe for the derivation of blood from the veſſels of the latter organ, or its mechanical compreſſion by the diſtended ſtomach, as a means of explaining the more rapid paſſage of the blood into the ſyſtem of the vena portarum." Anatomie Deſcriptive, t. v. p. 58.

We cannot doubt, that, independently of diſeaſe, or of ſuch natural cauſes as may produce changes in the ſtate of the ſpleen, the volume of this organ is different in different individuals. Animals of the ſame ſpecies and age, and under circumſtances in all reſpects ſimilar, exhibit ſuch differences. We frequently, too, find the ſpleen after death, in the human ſubject, conſiderably larger or ſmaller than what may be regarded as the ſtandard ſize, though alike in all other points; ſo that the kind of death, or other accidental circumſtance, will not explain the difference.

The colour of the ſpleen is red or livid, or of ſome tint between theſe. The convex ſurface is often red, while the edge and concavity are livid. The former colour is more prevalent in young, the latter in old ſubjects. When the organ is cut, its internal colour ſeems to depend on the large quantity of blood it contains; and nearly reſembles that of a coagulum, with divided blood-veſſels interſperſed through it.

It is ſpongy, ſoft, and delicate in its texture, ſo that it can be broken down by moderate preſſure with the fingers.

The ſpleen is ſurrounded externally by a ſmooth, thin, and cloſely-adhering ſerous membrane, derived from the peritoneum. This coat is ſo intimately united to the next, that they cannot be ſeparated. The proper membrane immediately incloſes the ſpleen. Although this and the former are inſeparably united, we cannot doubt that ſuch a proper membrane exiſts, becauſe the covering is much thicker than the peritoneum in any ſituation. Juſt at the notch, the peritoneum may be ſeparated for a ſhort diſtance from the proper membrane. From the internal ſurface of this covering, numerous fine filaments are continued into the ſubſtance of the ſpleen, where they form part of the peculiar tiſſue of the organ. The proper membrane is ſo thin, that its nature is not eaſily aſcertained: it ſeems, however, to belong to the fibrous claſs, as it is corrugated by boiling, and eaſily receives depoſitions of gelatine, or phoſphate of lime. Thickenings of the ſplenic coats from this cauſe are very common. This membrane is ſofter than thoſe of the fibrous kind uſually are; and it is elaſtic, ſo as to accommodate itſelf to the varying bulk of the organ.

The ſpleen is remarkable from the ſize of its artery, which is larger in proportion to the organ than in any other inſtance, although no ſecretion takes place. There are great varieties in the number of ſecondary branches, by which it penetrates the notch of the ſpleen. The hepatic artery is rather larger than the ſplenic in young ſubjects; but ſmaller in the adult; yet the liver in the latter is at leaſt five times larger than the ſpleen. The branches of the ſplenic artery are ſaid to be very large in compariſon with the trunk; and the coats of the artery are remarkably ſtrong. Its reſiſtance, compared to that of the aorta, near the emulgents, was as 1312 to 1000. The ſpleen has a large ſingle vein, which conſtitutes one of the principal trunks of the vena portarum. In a child of three months, according to Haller, the artery meaſured $\frac{12}{100}$dth of an inch, the vein $\frac{15}{100}$dth: in a child of eighteen months, the numbers were 13 and 19; at three years, 14 and 26. According to ſir Everard Home, "the trunk of the ſplenic vein, compared with that of the artery, when both are filled with wax, is found to be in the proportion of five to one in its ſize. This was aſcertained both by an accurate meaſurement of their diameters, and by weighing half an inch in length of each in a very nice balance: the diſproportion between them is greater than between correſponding veins and arteries in other parts of the body." (Phil. Tranſ. 1807. pt. ii. p. 49.) It has no valves. Injected fluids of all kinds paſs with the greateſt facility from the artery into the vein. There are numerous ſuperficial abſorbents, belonging principally to the peritoneum: of deep-ſeated abſorbents, there is little known. The abſorbents are eaſily demonſtrated in the calf. If air is impelled under the membrane of the ſpleen, numerous knotted lymphatic trunks appear, ariſing from the whole ſurface of the viſcus, and paſſing with the great blood-veſſels towards the receptaculum chyli. Many obſervers have noticed and deſcribed them in animals; but they are not ſo conſpicuous in man. The nerves are ſmall; they come from the cœliac plexus, and form a ſlender ſplenic plexus, ſurrounding the artery, and entering the ſpleen with its branches. If the organ, in its natural ſtate, poſſeſſes any ſenſibility at all, it is very inconſiderable. For further particulars on theſe points, ſee Artery, Vein, Nerve, and Absorbent.

The ſubſtance of the healthy ſpleen readily yields to any force, and is eaſily broken down. It appears, when divided, ſoft and ſpongy. Its colour is deeper than that of the ſurface. It ſeems thoroughly penetrated with blood, which is not coagulated, which may be ſqueezed out, but does not flow very readily. In ſome ſubjects, more particularly young ones, there is a granular appearance, ariſing from numerous ſmall bodies, called acini: theſe are rendered more viſible by breaking the ſpleen, and obſerving the broken ſurface. If the divided ſurface be ſcraped with a knife, blood is expreſſed, and ſome of the parenchymatous ſubſtance is uſually detached. If we ſubject it to frequent waſhings, the blood is diſcharged from it, and the organ is reduced to a looſe ſpongy tiſſue of whitiſh fibres and laminæ; many of which adhere to the internal ſurface of the fibrous membrane. If the blood is carefully preſſed out from the veſſels, and they are then waſhed out by repeated injections of water, the ſpleen, carefully inflated and dried, exhibits a mere cellular and ſpongy maſs.

This parenchyma of the ſpleen conſiſts of the blood-veſſels, ramified in the uſual way, and terminating in a capillary ſyſtem, and of certain cells, which are eaſily injected from the ſplenic vein with coarſe injection. The ramifications of the veins, and theſe cells, are of very delicate ſtructure, ſo that they eaſily give way under injection.

The cells of the ſpleen were noticed by Malpighi, who deſcribes in the organ a number of ſmall glands, hollow, and ſurrounded by arterial zones, into which he had never been able to trace any venous branches. Cuvier deſcribes ſmall corpuſcles, whoſe uſe is unknown. Sir Everard Home ſays, in his obſervations on the ſtructure and uſes of the ſpleen, "I have examined it after death, under the ordinary circumſtances, and have found the appearances deſcribed by Cuvier. I have alſo examined it frequently immediately after the ſtomach had received unuſual quantities of liquids, and in that ſtate have found invariably that the corpuſcles of Cuvier, which were the glands of Malpighi, are diſtinct cells, containing a fluid, which eſcapes when the cells are punctured, and renders their membranous coat viſible; ſo that it would appear that the diſtention of theſe cells is connected with the ſtate of the ſtomach, and therefore only takes place occaſionally; and that the elaſtic capſule, by which the ſpleen is ſurrounded, adapts the organ to theſe changes in its volume." Sir Everard ſtates farther, that "in the ſpleen of the bullock, horſe, and hog, the cells, when the arteries and veins are injected with coloured ſize, are ſeen to have numerous arterial branches ramifying in their coats, but no venal ones, which confirms the ſtatement of Malpighi: and when the cells are empty and contracted, and the blood-veſſels filled to a great degree of minuteneſs, the appearance of cells is entirely loſt, as ſtated by Cuvier. When the cells were in a diſtended ſtate, their cavities, in a great many inſtances, were very diſtinct, having been laid open in making a ſection of the ſpleen. The intermediate parts of the ſpleen are but ſparingly ſupplied with arterial branches; and the ſmaller ones (arteries?) do not appear to have any particular diſtribution. When the veins only are injected, their branches appear more numerous, and larger than thoſe of the arteries, making the whole ſubſtance of the ſpleen of a red colour. They appear to ariſe from the outſide of the cells, going off at right angles to their circumference, like radii. Where the injection has not been very minute, they are ſeen to ariſe at not many points of the capſule; but where the injection has got into ſmaller branches, their number is ſo much increaſed, that they appear to form plexuſes round the cells." Phil. Tranſ. 1808, p. 47—49.

In a ſecond paper on the ſame ſubject, ſir Everard informs us, "that the ſpleen is met with in two very different ſtates, one of which may be termed the diſtended, the other the contracted, and that in the one its ſize is double what it is in the other. In the diſtended ſtate there is a diſtinct appearance of cells containing a limpid fluid, diſtinguiſhable by the naked eye: in the contracted, theſe only become diſtinct when ſeen through a magnifying-glaſs. The diſtended ſtate takes place when the ſtomach has received unuſual quantities of liquids before the animal's death; and the contracted ſtate, when the animal has been kept ſeveral days without any drink, before the ſpleen is examined." Ibid. p. 140.

It is obſerved by Haller, that in the calf, and moſt other herbivorous quadrupeds, the ſtructure of the ſpleen is more obvious, and eaſily exhibited, than in the human ſubject. "In theſe animals, very ſtrong and evident fibres and laminæ ariſe from the external covering of the ſpleen, penetrate into the interior of the organ, are attached to the coats of the blood-veſſels, and laſtly, having decreaſed in ſize, end in all directions in the pulpy ſtructure of the ſpleen. In this way they compoſe a cellular tiſſue much more looſe than in man. If water be thrown into the vein, the organ then preſſed, and theſe proceedings repeated, until the fluid comes out clear, the whole may be diſtended, by inflation of the vein, into an appearance very much like that of the lungs. From this texture, there is a very free paſſage into the vein, which ſeems to open by very ſhort branches, as it were foramina, into the cellular tiſſues. The fibres are neither muſcular nor vaſcular, but cellular; on account of their ſtrength in the larger animals, ſome have called them ligamentous." Elem. Phyſiolog. lib. xxi. ſect. 1. § 15.

Heretofore great diſputes exiſted about the ſmall bodies called acini, which are obſerved in the ſubſtance of the ſpleen. Malpighi, who firſt noticed them, deemed them ſmall hollow glands. Ruyſch inſiſted that they were merely the minute veſſels aſſuming a peculiar arrangement; and that this ſtructure could be demonſtrated by ſucceſsful injections. The latter opinion has been gradually adopted by the beſt anatomiſts; among whom we may enumerate Albinus, Haller, and Soemmerring. "Qui nonnunquam occurrunt, acini vel glomeruli, microſcopii ope accuratiſſime explorati, nihil aliud ſunt niſi vaſorum faſciculi, vel teretes penicilli, aut cirri vaſculoſi." De Corp. Hum. Fabric. t. vi. p. 157.

The reſemblance of the ſpleen to glands in its ſtructure, has led to a very careful ſearch after an excretory duct; but nothing of this kind has ever been detected; although ſuch diſcoveries have heretofore been publiſhed. We know of no connection between the ſpleen and any other organ, except by means of blood-veſſels or nerves.

In a paper, containing experiments on the paſſage of fluids from the ſtomach into the general circulation, &c. publiſhed in the Phil. Tranſ. 1812, p. 51, ſir Everard Home advances the opinion, that a ſecretion takes place into the cells of the ſpleen, that the fluids thus ſecreted are conveyed by the abſorbents into the thoracic duct; and, conſequently, that thoſe veſſels are excretory ducts of the ſpleen. With deference to this ingenious and indefatigable inquirer, we may ſuggeſt, that the fact of the ſpleen performing any ſecretion is not yet proved; conſequently, that we need not employ ourſelves in diſcovering the means of conveying away ſuch ſecretion.

The blood of the ſpleen ſeems to be diſtinguiſhed by ſome peculiarities. It is never ſeen coagulated: Haller ſays that he never ſaw it in that ſtate; but according to Soemmerring, a true clot (polypus) has been obſerved in the ſplenic vein. (Elem. Phyſiol. t. vi. p. 404. De Corp. Hum. Fab. t. vi. p. 156.) It is ſaid to be darker coloured than other venous blood; but expoſure to oxygen gives it the ſcarlet tint.

Haller ſays alſo that it contains more water, the proportion of this element in it, compared to that in other blood, being as $\frac{34}{37}$ to $\frac{26}{39}$. The thick part ſubſiding to the bottom of the veſſel was leſs; as 3 to 6. Sir Everard Home confirms the fact of the greater quantity of ſerum in ſplenic blood. (Phil. Tranſ. 1808, p. 138.) Neither, according to the repreſentation of Haller, are theſe the only diſtinguiſhing characters of ſplenic blood. It has been found, he ſays, to contain more volatile ſalt, and leſs empyreumatic oil. The experiments on which the above obſervations are grounded afforded ſimilar reſults on repeated trials, and in various animals.

The ſpleen is very ſmall in the fœtus, and appears remarkably ſo, if compared to the kidnies or liver. It rather increaſes towards the end of pregnancy. No remarkable changes occur in it after birth: in old perſons it is often diminiſhed; and its external coat is thicker.

A ſpleen, or at leaſt a body ſo conſidered, and called by that name, exiſts in all the orders of the vertebral diviſion of animals; but, if we may judge from the ſize, its importance ſeems to diminiſh ſucceſſively from mammalia to birds, thence to reptiles, and from them to fiſhes. Mammalia reſemble man in having the ſpleen placed cloſe to the left end of the ſtomach; but they exhibit conſiderable varieties in the ſize, figure, colour, and texture of the organ. It is proportionally large in man, being twice as large as in the ox for example. In birds, reptiles, and fiſhes, the ſpleen is not only ſmaller, but firmer and more rounded; not ſo conſtantly placed near the ſtomach, but in the midſt of the meſentery for example. The relations and ſources of its blood-veſſels are alſo different. Inſtead of a large peculiar branch, it has ſmall branches from a ſtomachic artery, or from the meſenteric.

The uſe of the ſpleen ſtill remains a problem, towards the elucidation of which the inveſtigations of ſo many anatomiſts and phyſiologiſts have hitherto afforded very imperfect data. In beginning his obſervations on this ſubject, Haller very ſenſibly admoniſhes his reader that "he is plunging into the region of mere conjecture, darker than in the caſe of any other viſcus." We might have hoped to derive ſome light from the diſeaſes under which it frequently ſuffers, and from the experiments, in which it has been removed in animals. The inferences, however, to which we arrive in this way, are only of the negative kind; they enable us to deſtroy or refute, but not to build up or eſtabliſh. The ſpleen may be found conſiderably altered in texture, where the individual has enjoyed good health before death, or has died of other complaints. It is often enormouſly enlarged, without materially affecting the health; and, on the other hand, where ill effects are produced, they have no peculiar character, affording illuſtration of the uſe of the organ.

The experiment of removing the ſpleen ſeems to have been performed in very ancient times. Pliny ſays, that animals will live after this part has been torn out (lib. xi. c. 30.); and the ſame fact is noticed in the Talmud (Ginzburger, Medic. Talmud. p. 11.) Haller cites various inſtances, in which the ſpleen has been loſt in the human ſubject; particularly Leon. Fioravanti, teſoro della vita umana, l. ii. c. 8. Phil. Tranſ. N° 451. The removal of it from the dog is an experiment repeated over and over again. (See Haller, t. vi. p. 421.) We find that animals, and even human ſubjects, have lived without a ſpleen, and enjoyed tolerable health. Sometimes the experiment has been fatal, but not from the loſs or interruption of any function, that could be aſcribed to the ſpleen. We find that dogs have been lively, fat, and even plethoric; that they have had good appetites; that bitches have produced young. Some thought they were more ſalacious; others, that they made water more frequently. In ſome caſes appearances were noticed, that might be referred to imperfection in the digeſtive proceſs, as borborygmi. The liver is ſaid to have ſuffered, in a few inſtances: in moſt, however, there ſeems to have been good bile made; and generally no particular ill effect was experienced.

The inference, then, to be collected from theſe ſources is, that the function of the ſpleen is of ſo little importance, that the alteration of its texture by diſeaſe is not marked by any unequivocal ſymptom, and even that its entire removal is hardly followed by any ſenſible effect.

It has been a generally received, and long prevalent notion, that the office of the ſpleen is related to that of the liver; that the blood, either by its retarded motion through the ſerpentine ſplenic veſſels, its ſtagnation in the ſplenic cells, or other changes wrought in it by the actions of the ſpleen, acquires peculiar properties, rendering it fit for the ſecretion of bile in the liver. It is ſuppoſed that the ſplenic blood is loaded with carbon, which the action of the liver ſeparates from it. We do not uſually meet with ſuch arrangements as theſe in the animal economy: indeed no inſtance could be adduced of the like nature;—one organ to carbonize the blood, that it may be decarbonized by another; or a part to produce changes in the blood, fitting it for the ſecretion which is to be performed by another. The tiſſue of each gland has the power of extracting its peculiar ſecretion from the common maſs. That the ſpleen produces changes in the properties of the blood is not yet clearly proved: ſtill leſs is it proved that ſuch changes, if produced, are in any way concerned with the biliary ſecretion. Further, bile is ſecreted where the ſpleen has been removed; and it was ſecreted, in the caſe recorded by Mr. Abernethy, where the vena portarum emptied its blood into the inferior vena cava. We obſerve no conſtant relation between the ſpleen and liver: the former is extremely ſmall in many birds, reptiles, and fiſhes, where the liver is large.

The cloſe neighbourhood of this organ to the ſtomach, and the connection of their blood-veſſels, have led to the conjecture that they are connected in function. It has been imagined, that when the ſtomach is empty, the ſpleen, like a ſponge, ſwells with blood, and affords a reſervoir for the quantity of that fluid, which the blood-veſſels of the ſtomach do not require in the inactive ſtate of the organ; while, on the contrary, when this bag is diſtended with food, and the proceſs of digeſtion demands a more copious afflux of fluids into the ſtomachic veſſels, the preſſure of its great extremity empties the ſplenic ſponge, and thus cauſes a greater flow in the other parts of the cœliac ſyſtem. This, again, is all imaginary: not a ſingle point of it founded in obſervation. It is quite inapplicable to the three lower claſſes of vertebral animals, where the poſition of the ſpleen in many inſtances, and its firmneſs in ſeveral, are quite incompatible with the explanation.

In two papers, publiſhed in the Philoſophical Tranſactions for 1808, on the ſtructure and uſe of the ſpleen, ſir Everard Home attempted to prove, that fluids are conveyed from the cardiac end of the ſtomach into the ſpleen, and thus arrive in the general circulation, without the intervention of the general abſorbing ſyſtem and thoracic duct. Having tied the pylorus, he injected coloured fluids into the ſtomach: they were partly abſorbed, and manifeſted their preſence in the circulating ſyſtem by changes produced in the urine. When rhubarb was uſed, the cut ſurface of the ſpleen produced a decided yellow tint on paper, and the ſerum of the ſplenic blood manifeſted the preſence of rhubarb, on the addition of potaſh; when no ſuch phenomena were

were exhibited by the cut ſurface of the liver, or in the ſerum of blood from the vena cava. There was a correſponding difference between the effects of potaſh on fluids, in which the ſubſtance of the liver and that of the ſpleen were broken up. The author abandons this notion in a ſubſequent communication to the ſame ſociety, on the paſſage of fluids from the ſtomach into the general circulation; having found that correſponding phenomena were exhibited, after the ſpleen had been removed. Phil. Tranſ. 1812.

Of numerous other dreams about this myſterious organ, ſuch as that it forms the red globules of the blood, that it is the ſeat of laughter, or of the ſentient ſoul, that it is deſigned to balance the liver, &c. &c. we can ſay no more than that thoſe who are intereſted in ſuch ſpeculations will find ample amuſement in Haller's Elem. Phyſiol. lib. xxi. ſect. 2; or in Soemmerring de Corp. Hum. Fabrica, t. vi. p. 158, et ſeq. One fact, mentioned by the latter author, may be ſtated, *viz.* that ſteel given for ſome time to animals has the effect of diminiſhing the ſize of the ſpleen.

Spleen, *Diſeaſes of the,* in *Medicine.* Much more has been written by the older writers reſpecting the diſeaſes of this organ, than by thoſe of the laſt half century. This may have ariſen partly from the greater accuracy of modern pathologiſts, but chiefly perhaps from the actual diminution of theſe maladies, in conſequence of the diminution of the prevalence of intermittent fevers, of which many of the chronic derangements of the ſpleen were the *ſequelæ,* or direct reſult. The *infarction* of the ſpleen, of which the older authors ſo often treat, was of this nature. The two principal modifications of diſeaſe, to which this viſcus is ſubject, are inflammation, and their indolent enlargement of its ſubſtance, formerly called infarction. We ſhall treat of theſe diſeaſes ſeparately; and then enumerate ſome of the other morbid conditions, with which the ſpleen has been occaſionally obſerved to be affected.

Spleen, *Inflammation of, ſplenitis* of the noſologiſts. This may occur, as in the other viſcera, in two forms; either attacking the inveſting membranes, or the ſubſtance of the gland. Under both forms, however, it is a rare diſeaſe, but eſpecially under the latter, the ſymptoms of which are apparently obſcure, and not ſatisfactorily underſtood.

The peritonæal coat of the ſpleen is, in fact, ſeldom inflamed, according to the teſtimony of that excellent anatomiſt, Dr. Baillie, unleſs when the peritonæum in the neighbourhood is alſo affected. The proper capſule of the ſpleen, he remarks, is ſo intimately connected with the peritonæum, which is reflected over it, that it muſt neceſſarily partake of any inflammation affecting that membrane. Accordingly the ſymptoms, attending this inflammation of the coats of the ſpleen, are not to be diſtinguiſhed from thoſe which characterize inflammation of that portion of the peritonæum which lies in the left hypochondrium (ſee Peritonitis); that is to ſay, there is pain in that region, more or leſs violent according to the degree of the inflammation, which is increaſed by preſſure, and is accompanied by a ſenſe of heat and tenſion in the part. There is alſo more or leſs of ſymptomatic fever, heat of ſkin, quickneſs and hardneſs of pulſe, thirſt, &c.; and, if the inflammation be conſiderable, ſome difficulty of breathing. The laſt ſymptom ariſes from the preſſure of the diaphragm, when deſcending, in the act of inſpiration, upon the inflamed parts. As the uſe of the ſpleen in health is unknown, we cannot, of courſe, look for any ſymptom characteriſtic of its diſordered function, as in the caſe of other large viſcera; but muſt infer that it is the ſeat of inflammation, from the ſituation of the pain, and from the abſence of diſturbance, in any conſiderable degree, in the functions of the neighbouring viſcera; as in that of the kidnies, exhibited in the urine; in that of the ſtomach, great inteſtine, &c.

It is probable, however, that the inveſting membrane of the ſpleen is liable to ſome degree of inflammation, which is not always noticed; for it has been remarked by the able pathologiſt juſt quoted, that it is not uncommon to find adheſions between the ſpleen and the neighbouring parts. Thoſe adheſions conſiſt of a white tranſparent membrane of more or leſs firmneſs, and generally connect the broad ſurface of the ſpleen more or leſs cloſely to the diaphragm. They often alſo connect the ſpleen to the great end of the ſtomach, and a part of the tranſverſe arch of the colon. See Baillie's Morbid Anatomy of ſome of the moſt important Parts of the Human Body, chap. xi.; and Morgagni de Sedibus et Cauſ. Morborum.

The inflammation or ſuppuration of the ſubſtance of the ſpleen is a very rare occurrence; but ſuch caſes have been occaſionally obſerved, and related by authors. (See Lieutaud, Hiſtor. Anatom.-Medica, tom. i.) This writer has even related inſtances of mortification of the ſubſtance of the ſpleen; but neither Morgagni nor Baillie have obſerved ſuch caſes. The ſymptoms which have been deſcribed, as belonging to inflammation of the ſubſtance of the ſpleen, are, a dull pain, with a ſenſe of fulneſs, in the left hypochondrium, the pain being increaſed on preſſure, and accompanied by the general diſturbance of the ſyſtem, called fever. The diſeaſe, however, is ſo rare, that ſufficient obſervations have ſcarcely been made to determine ſatisfactorily the diagnoſis of this malady. In two caſes, in which the inflammation of the ſpleen had advanced to ſuppuration, which were examined by Dr. Hunter, the patients were unable to define accurately the ſeat of their pain, which ſeemed to travel a good deal over the general cavity of the abdomen.

Although the diagnoſis be imperfectly eſtabliſhed, however, the ſame practice will be efficacious, which experience has found to be remedial in the inflammation of the peritonæal coat, or of the ſubſtance of other viſcera, and of the peritonæum lining the abdomen; that is, the early uſe of blood-letting, and purgatives, with bliſters and local bleeding, as circumſtances may require; and the ſteady adoption of the antiphlogiſtic regimen, as directed in the treatment of other viſceral inflammations. (See Peritonitis, Hepatitis, &c.) We ſhall, therefore, proceed to deſcribe the ſecond form of diſeaſe peculiar to the ſpleen.

Spleen, *Tumid.* This diſeaſe of the ſpleen conſiſts of an indolent enlargement of the ſubſtance of the viſcus, which, at the ſame time, becomes much harder than natural. It will occaſionally be enlarged to five or ſix times its natural ſize, and it then forms a tumour very capable of being diſtinguiſhed in the living body. When examined after death, the natural ſtructure ſeems to be preſerved, except that it is much more compact, the parts being much more cloſely applied together. When this tumour and induration are the conſequence of intermitting fever, the maſs is called an *ague-cake.* In general, this ſtate of the ſpleen is conſidered as ſcirrhous; but its ſtructure, as Dr. Baillie remarks, is not ſimilar to ſcirrhus in other parts of the body. It may, therefore, be doubted whether this is a proper ſcirrhous affection of the ſpleen, or whether it is not, in fact, ſomething eſſentially different.

The ſymptoms accompanying an enlarged and indurated ſtate of the ſpleen, in its early ſtages, are not very manifeſt or urgent; in fact, the exiſtence of the diſeaſe is commonly not ſuſpected, till it has made a conſiderable progreſs. It is uſually not accompanied by any pain or uneaſineſs; and will even bear a pretty ſtrong preſſure, without

out any painful ſenſation. But when the tumid ſpleen has attained a conſiderable ſize, it may be diſtinctly felt by the hand, and diſtinguiſhed by its ſituation and general ſhape. Its anterior edge may be traced under the margin of the ribs upon the left ſide, and it is ſometimes aſcertained by this examination to be notched. Under this ſtate of the diſeaſe the patient can only lie upon the left ſide; but he uſually complains of a ſenſe of fulneſs and weight, rather than of pain, dragging downwards towards the left ſide, and of ſome oppreſſion of the ſtomach after eating. The complexion is always of a dirty, ſallow, or leaden hue. The patient is alſo ſaid to be liable to hæmorrhages of the noſe. If the enlargement goes on, it reduces the body to great emaciation, and at length terminates in an incurable dropſy. Dr. Pemberton mentions a tumid ſpleen, which he ſaw, which weighed three pounds two ounces. See Baillie, loc. cit. Pemberton on Various Diſeaſes of the Abdom. Viſcera, chap. v.

The laſt-mentioned author conjectures, that the ſpleen may be thus affected with a *ſwelling* of its ſubſtance, merely from a larger quantity of blood being conveyed to it by the arteries, without theſe arteries taking on that action which is eſſential to inflammation. It is evident, indeed, that this enlarged and compact ſtate of the viſcus is ſomething entirely different from the ordinary reſults of inflammation, and is perhaps peculiar to the ſtructure of the ſpleen alone. It will not unfrequently ſubſide ſpontaneouſly, or with the aſſiſtance of medicines, to its natural ſize, and ſeems to be accelerated in that progreſs by the uſe of mercurial friction upon the abdomen, and by the adminiſtration of purgatives. The patient ſhould perſevere in the mercurial courſe, till the mouth is ſlightly affected, and then it ſhould be gradually laid aſide. Small doſes of calomel, in union with the extract of conium, anſwer the double intention of allaying the irritation of the ſtomach, and of promoting abſorption; and if there is a conſiderable degree of tenderneſs, which is ſometimes produced by an enlarged ſpleen about the articulations of the falſe ribs with the ſpine, it may be removed either by leeches or cupping. The diet of the patient ſhould conſiſt of milk, gruel, and a ſmall quantity of animal broth.

With reſpect to the prognoſis, Dr. Pemberton obſerves, the moſt favourable ſymptoms are, a diminution of the uneaſy ſenſations in the left ſide, and an improvement in the colour of the ſkin: the moſt unfavourable are, an increaſe of the ſwelling of the left ſide, and the lower part of the abdomen becoming enlarged: and if this part gives a ſenſation of fluctuation, the caſe is almoſt hopeleſs. Loc. cit.

Spleen, *Morbid Changes of the.* Among the other morbid conditions of the ſpleen, to which we have already alluded, may be mentioned, firſt, an extreme *ſoftneſs* of the organ, which is not uncommon in middle and more advanced life. In theſe caſes, the ſubſtance of the ſpleen ſeems to conſiſt of little elſe than a very ſoft browniſh-red mucus, intermixed with a ſpongy fibrous texture. This ſtate of the ſpleen is not marked by any peculiar feelings, ſo as to make the perſons conſcious of any diſeaſe, and is probably of very little conſequence in the general economy of the animal. The ſpleen, indeed, is ſaid to be occaſionally wanting, as a defect in the natural formation, and it has even been cut out, both from men and quadrupeds, without occaſioning them to ſuffer any inconvenience afterwards. Another diſeaſe of the ſpleen is the occurrence of *tubercles* in its ſubſtance, very ſimilar to the ſcrofulous tubercles of the lungs, which are placed at regular diſtances from each other, and do not run into maſſes, and ſeldom or never ſuppurate. *Hydatids*, of the ſame kind with thoſe found in the liver, are occaſionally formed in the ſpleen; but they are much more common in the former viſcus. *Calcareous concretions* have alſo been ſeen occaſionally in the ſpleen, but they are very rare. Sometimes the ſpleen has been ruptured, in conſequence of external preſſure upon that ſide of the body where it is ſituated. This accident can ſeldom take place, when the ſpleen is of the common ſize, becauſe it is well defended by the ribs; but it may readily happen, when the ſpleen is very large, ſo that a part of it paſſes below the margin of the ribs into the cavity of the flank. The only other morbid condition of any importance, which affects the ſpleen, is an occaſional converſion of its coats into a *cartilaginous* ſubſtance, which is almoſt excluſively obſerved in this viſcus. The cartilage is generally found in its convex ſurface, and rather reſembles the cartilages of the ears and noſe, than that which is found at the extremities of bones. Theſe varieties of diſeaſe are not to be diſtinguiſhed during life by any peculiar ſymptoms.

Spleen, in *Ichthyology.* The ſpleen in fiſhes is uſually ſituate near the ſtomach in the left ſide of the abdomen. Its figure is generally triangular, ſometimes oblong. Its colour is always more duſky and obſcure than that of the liver. See Fish.

Spleen *of Birds*, in *Ornithology.* See *Anatomy of* Birds.

Spleen-*Wort*, in *Botany*, &c. See Asplenium and Milt-*waſte.*

Spleen-*Wort, Rough.* See Lonchitis.

SPLENECTOMIA, the name given to the chirurgical operation of cutting out the ſpleen.

SPLENETIC, σπληνικος, a perſon affected with oppilations and obſtructions of the ſpleen.

In ſplenetic people, the ſpleen is ſwelled beyond the natural bulk; or it is hardened ſo, as to ſhew a ſchirrous tumour in it.

Splenetic people are diſtinguiſhed by a livid, lead-coloured complexion; and their character is, to be very prone to laughter; which is an expedient nature is ſuppoſed to make uſe of, to evacuate the too redundant humour the ſpleen is charged withal; whence it is, that the ancients made the ſpleen the organ of laughter; and hence that popular ſaying, of a perſon laughing heartily, that he *vents his ſpleen.*

Splenetic *Waters.* See Water.

SPLENIA, compreſſes reſembling the ſpleen in ſhape.

SPLENIC Vessel, a large artery and vein of the *ſpleen*; which ſee.

SPLENITIS. See Spleen, *Inflammation of.*

SPLENIUS, called alſo *maſtoideus poſterior*, in *Anatomy*, a flat, broad, oblong muſcle, ſituated obliquely between the back part of the ear, and the poſterior and lower part of the neck.

It is partly ſingle, and partly made up of two portions, one ſuperior, the other inferior. Theſe two portions are cloſely united backward, making only one plane, but they are divided above.

The two ſplenii repreſent a great Roman V, and the ſplenius, and ſterno-maſtoideus of the ſame ſide, form a figure like a Roman A, or the legs of a pair of compaſſes, the points of which are in an horizontal plane.

The two ſplenii ſerve to ſupport the head in an erect poſture, whether in ſtanding or ſitting; to moderate the flexion of the head forward, and to bring it back again to its natural poſture. They ſerve alternately to co-operate with either of the ſterno-maſtoidei for the rotation of the head. The complexi are aſſiſtants to the ſplenii, to keep the head ſtraight in ſitting or ſtanding, to hinder it from inclining forward, and to raiſe it when inclined. When they act together, they, as well as the ſplenii, may move the head backward, while the trunk is bent forward, or when we lie upon the belly; this latter motion is commonly called *extenſion*, the other *flexion*. See STERNO-CLEIDO-MASTOIDEUS.

SPLENIUS *Capitis*, a name given by Albinus to a muſcle, called by Winſlow, and others, the *maſtoideus ſuperior*, or upper portion of the ſplenius. Riolanus, and others, call it the *triangularis ſplenii*.

SPLENIUS *Colli*, a name given by Albinus to the muſcle, called by Winſlow, and others, *maſtoideus poſterior*, or the lower portion of the ſplenius; and by Cowper, the *muſculus inferior ſplenii*.

SPLENOCELE, a ſwelling of the hernial kind, produced by the ſpleen. Although ſuch is the meaning of this word, we believe the diſeaſe expreſſed by it is more imaginary than real. Its poſſibility may well be doubted.

SPLENT, or SPLINT, among *Farriers*, a callous, inſenſible excreſcence or griſtle, that ſometimes ſticks to a horſe's ſhank-bone, generally on the inſide below the knee. If there be one oppoſite to it on the outſide, it is called a *pegged* or *pinned* ſplent; becauſe it does as it were pierce the bone, and is extremely dangerous. Some call this a *double* ſplent, and others a *thorough* ſplent.

Some horſes are more ſubject to ſplents than others; but young horſes are moſt liable to theſe infirmities, which often wear off, and diſappear of themſelves. Team-horſes are very apt to have them. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents. A ſplent that ariſes in the middle of the ſhank-bone is no ways dangerous; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs by rubbing againſt it; the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

It may be noticed, in reſpect to the cure of ſplents, that the beſt way is not to meddle with them, unleſs they are ſo large as to disfigure a horſe, or ſo ſituated as to endanger his going lame. Splents in their infancy, and on their firſt appearance, ſhould be well bathed with vinegar or old verjuice; which, by ſtrengthening the fibres, often puts a ſtop to their growth; for moſtly the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions, purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is what often gives riſe to ſuch excreſcences. Various are the remedies preſcribed for this diſorder: the uſual way is to rub the ſplent with a round ſtick, or the handle of a hammer, and then touch it with oil of origanum. Others lay on a pitch plaſter, with a little ſublimate, or arſenic, to deſtroy the ſubſtance: ſome uſe oil of vitriol, ſome tincture of cantharides; all which methods have at times, it is ſaid, ſucceeded; only they are apt to leave a ſcar, with the loſs of hair. Thoſe applications that are of a more cauſtic nature, often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a running for ſeveral months, which often leaves an ugly ſcar. Mild bliſters, often repeated, ſhould be firſt tried as the moſt eligible method, and will generally ſucceed, even beyond expectation: but if they fail, and the ſplent be near the knee or joints, fire and bliſter, in the ſame manner as for the bone ſpavin.

Splents on the back part of the ſhank-bone are difficult to cure, by reaſon of the back ſinews covering them; the beſt way is to bore the ſplent in ſeveral places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very cloſe together.

SPLENTS, in *Surgery*, pieces of wood uſed in binding up broken limbs. See FRACTURE and SPLINTS.

The word is alſo ſometimes uſed for the pieces of a fractured bone.

SPLICE, *To*, in *Sea Language*, is to join the two ends of a rope together, or to unite the ends of a rope to any other part of it. There are ſeveral different methods of performing this operation, according to the ſervices on which it is to be employed. The *ſhort* ſplice is made by untwiſting the ends of two ropes, or the two ends of one rope, and having placed each of the ſtrands of one oppoſite to, and in the interval between two ſtrands of the other, to draw them cloſe together; and then interweave the ſtrands of the one into the alternate ſtrands of the other, by penetrating the latter with a fid or marline ſpike, parallel to the axis or length of the rope. This ſplice is uſed on the cables, ſlings, block-ſtrops, and in general all ropes which are not deſigned to run through blocks, or where the ſplice is not in danger of being looſened or ſeparated.

The *long* ſplice, being fixed in three places, occupies a greater extent of the rope; but by the diviſion of the joinings, the bulk is alſo divided into different parts of its length. Hence, it is much neater and ſmoother than the ſhort ſplice, and better adapted to run through the channel of a block, &c. for which uſe it is generally calculated.

The *eye-ſplice* being intended to make a ſort of eye or circle at the end of a rope, the ſtrands are untwiſted, and their extremities thruſt through the three ſtrands in that part of the ſaid rope on which the ſplice is to be formed, and thence paſſing over the ſurface of the ſecond ſtrand, they are again thruſt through the third, which completes the operation.

The *cut-ſplice* is conſtructed in the ſame manner as the eye-ſplice; being no other than the ends of two lines faſtened together, at a ſhort diſtance from each other, the extremities of either being interwoven into the bight of the other, ſo that the line becomes double in the extent of the ſplice. This is chiefly uſed in lead-lines, log-lines, and fiſhing-lines, where the ſhort ſplice would be liable to ſeparation, as being frequently looſened by the water. Falconer.

The *tapered* ſplice, moſtly uſed on cables, is made by unlaying a certain length of each cable, then placing them together, and interplacing the ſtrands, as in the ſhort ſplice, twice each way, and hauled tight each time; then inlay the ſtrands, or ends, ſucceſſively, and reduce them to a ſingle ſtrand, which is again thruſt through, and cut off. The ſplice is then ſerved over with ſpun-yarn, ſomething more than the whole length. *Drawing-ſplice*, uſed on cables, is made by unlaying about three fathoms of the ends; then place them together, and make a ſhort ſplice; then leave about one fathom, and from thence reduce each ſtrand to a long taper, by gradually cutting away as many yarns as neceſſary, and neatly point over the taper; then lay the ends up the cut-lines, and clap in a quarter-ſeizing at each end of the ſplice, an end-ſeizing at the beginning of the pointing, and a ſtop at the ends of the tails. This is the beſt ſplice for cables, as it may be readily taken aſunder. Another good method of making a *cable-ſplice* is to put the ends in twice each way; then to pick out the ſtrands, worm part of them round the cable, and taper away the reſt, which ſhould be marled cloſe down; then clap on a good throat and two end-ſeizings of ratline.

SPLICE, *To*, among *Gardeners*, is to graft the top of one tree into the ſtock of another, by cutting them ſloping, and faſtening them together.

SPLINTS, in *Ancient Armour*, a defence for the arms, which conſtituted part of the ſuit denominated an Almaine ryvatt.

Splints, are long pieces of thin wood, or paſteboard, uſed in *Surgery*, for affording ſupport and ſteadineſs to fractured bones.

SPLINTERS *of the Bone*, in *Fractures*. In caſes of fractures, the ſurgeon is frequently troubled with ſplinters of the bone in the way, which vellicate and prick the neighbouring parts, and render the proper execution of his office very difficult. If theſe ſplinters are looſe, and have no connection with the bone, they muſt be carefully lifted out of the wound; if they hang to the bone in ſome part by the perioſteum, that muſt be cut off with the ſciſſors; but if they adhere pretty firmly to the neighbouring parts, and do not hinder the reduction of the bone, it is beſt to replace the bone, and leave them either to looſen, and come out of themſelves by the ſuppuration of the parts, or to grow again, as they ſometimes will ſafely and firmly do, to the reſt of the bone. When they adhere pretty firmly to the principal parts of the bone, they ſhould never be extracted by force, but replaced with the greateſt exactneſs; for when this is properly performed, they will frequently unite to the reſt of the bone.

When the points of ſplinters of bones ſtick ſo far out, that they are a great hindrance to the reduction of the bone, you are diligently to conſider whether you can, by any means, contrive their reunion to the bone, which may be determined, by obſerving at what diſtance they are from the large bone, and what quantity of fleſh there is intervening: when they cannot be reduced, or reunited to the bone, they muſt be removed with a pair of ſtrong forceps, or, if they ſtick very firmly, with a fine ſaw. If the ſplinters are buried under the ſkin, and cannot be got at with hands, it is proper firſt to try if they can be reduced to their natural ſituation; and if they cannot, an inciſion muſt be made through the ſkin, that they may be taken out. See Fracture.

SPLIT, in *Botany*, a name given by ſome authors to the great *fumaria bulboſa*, or hollow root.

Split, at *Sea*. When a ſail is blown to pieces, the ſeamen ſay it is ſplit.

Split, when applied to a ſhip, denotes the ſtate of being ſtranded and bilged on a rock or ſhore.

Split *Rock*, in *Geography*, a rocky headland on the W. ſide of lake Champlain; 56 miles N. of Skeneſborough.

SPLITTING, in *Agriculture*, a term employed in the practice of paring land with the plough in ſome diſtricts. In it the plough always turns upon the left of the firſt furrow, and the coulter is held cloſe all the way to the lifted ſlice previouſly turned over, and which now covers a balk or rib of whole unmoved ground. The ſame ſort of work, in ſome of the eaſtern diſtricts of this country, is denominated wreſt-balking; but the practice has there a very different intention to that which induces it in the county of Devon and ſome others.

It is a term which is likewiſe uſed in common ploughing to ſignify the diviſion of the ridges, by making the furrow parts of the old ones the middle parts of the new ones. Thus, by beginning at the furrows, and laying the furrow ſlices of the different ridges towards each other, by continually turning in that direction, the furrows become the middles and the middles the furrows. It is uſed in oppoſition to *gathering*, which has the contrary effect.

It is uſed too in ſetting and taking up ſome ſorts of crops which are ſet in particular manners, as thoſe of the potatoe kind, when ſet in the ridge method, as by ſplitting the ridges with the plough or other tool, the ſets are uncovered, and perſons are enabled to pick and ſecure the potatoes, &c.

Splitting. To ſplit a thin piece of metal, as an old ſilver groat, place the metal on the heads of three pins ſtuck up triangularly, and let a heap of flour of brimſtone burn out upon it; then throwing it hard againſt the floor, the upper part will ſeparate from the lower. Boyle's Works, abr. vol. i. p. 134.

SPLUGEN, in *Geography*, a mountain in the county of Chiavenna; 8 miles N.W. of Chiavenna. Towards the ſummit of the mountain is an oval plain, about two miles long and one broad, encircled with craggy points: it produces no trees, but yields rich paſturage: near the ſummit are rude blocks of a whitiſh kind of marble. Above this oval plain is the ſource of the Lira, which falls into the lake of Chiavenna. On the other ſide of the higheſt ridge the torrents flow towards the Rhine. The paſſage over mount Splugen is principally uſed for the tranſport of merchandize to and from Coire; it is kept open even in winter, though not without great difficulty: in that ſeaſon the merchandize is chiefly tranſported on ſledges, of which forty or fifty paſs in a day.—Alſo, a town of the Griſons, ſituated upon the riſe of a hill, at the bottom of a rugged chain of Alps, and principal place of a juriſdiction, in the Rheinwald; 16 miles N.W. of Chiavenna. Two high roads meet at Splugen; one from Chiavenna, and the other leading over the Bernard into Bellinzone. From Splugen to Arder the road continues by the ſide of the Hynder Rhine, through a mountainous region, which preſents at every ſtep the moſt awful magnificence of ſcenery.

SPODDEN, a river of England, which runs into the Roch, at Rochdale, in Lancaſhire.

SPODIUM, in *Pharmacy*, a kind of abſorbent calx, or aſhes, eſteemed drying, and by ſome held to have the ſame virtues with coral.

The ſpodium of the ancient Greeks was a greyiſh kind of recrement, found in form of aſhes, on the hearths of furnaces in which braſs was made; and called by them σποδιον, which literally ſignifies *aſhes*.

Spodium is a metalline powder, nearly akin, both in origin and uſe, to tutia and pompholyx; only it is heavier than either.

The ſpodium of the Arabian phyſicians, as Avicenna and others, was made of the burnt roots of ruſhes and reeds. Some moderns alſo make a ſpodium of ivory burnt and calcined to a blackneſs. This is ſometimes counterfeited by burning bullocks' or dogs' bones; but theſe are of no value.

The anti-ſpodium, which the ancients ſubſtituted for their ſpodium, was made of myrtle-leaves, galls, and ſome other ingredients calcined.

SPODUMENE, in *Mineralogy*, *Triphane*, Haüy, a mineral which bears ſome reſemblance to adularia, but differs from it in the ſtructure, which is foliated, with a threefold cleavage. It divides into priſms with rhomboidal baſes, having alternate angles of eighty and one hundred degrees. It is tranſlucent and frangible, but ſomewhat harder than glaſs. The colour of ſpodumene is a greeniſh-white or grey, and ſometimes oil-green. The ſpecific gravity is from 3.192 to 3.218. It occurs, both maſſive and diſſeminated, at Uton, in Sudermanland, Sweden, at which place it has only been found at preſent. Before the blowpipe it ſeparates into ſmall gold-coloured laminæ, which melt by a continuation of the heat into a greeniſh-white glaſs.

The conſtituent parts of this mineral are given by Vauquelin as under.

Silex	-	56	to	64
Alumine	-	24	to	24.4
Lime	-	5	to	3
Potaſh	-	-		5
Oxyd of iron	-	5	to	2

SPOHREN, in *Geography*, a town of Saxony, in the circle of Leipſic; 2 miles S. of Zorbig.

SPOIL-BANK, a term expreſſing any heap of ſpare earth or ſtuff which remains, or is laid by in the cutting of a canal.

SPOILS, SPOLIA, whatever is taken from an enemy in war. See BOOTY.

Towns and lands taken from the enemy are uſually called "conqueſts;" and all moveable things conſtitute the "booty." This booty naturally belongs to the ſovereign making war, no leſs than the conqueſts; for he alone has ſuch claims againſt the enemy as warrant him to ſeize on his goods, and appropriate them to himſelf. His ſoldiers, and even the auxiliaries, are only inſtruments in his hand for aſſerting his right. He maintains and forms them. Whatever they do is in his name, and for him. Thus there is no difficulty even with regard to the auxiliaries; if they are not aſſociates in the war, it is not made for them, they have no more right to the booty than the conqueſts. But the ſovereign may grant the troops what ſhare of the booty he pleaſes. At preſent, moſt nations allow them whatever they can make on certain occaſions, when the general allows of plundering what they find on enemies fallen in the field of battle, the pillage of a camp which has been forced, and ſometimes that of a town taken by aſſault. The ſoldier in ſeveral ſervices has alſo the property of what he can take from the enemy's troops when he is on a party, or in a detachment, excepting artillery, military ſtores, magazines, and convoys of proviſion or forage, which are applied to the wants and uſe of the army. This cuſtom being once admitted in an army, it would be injuſtice to exclude auxiliaries from the right allowed to the national troops. The Roman ſoldier was obliged to bring in all the booty he had taken to the public ſtock. This the general cauſed to be ſold, and after diſtributing a part among the ſoldiers, according to rank, the reſt was conſigned to the public treaſury.

Inſtead of the pillage of the country and defenceleſs places, a cuſtom has been ſubſtituted more humane, and more advantageous to the ſovereign making war; *viz.* that of contributions. Whoever carries on a juſt war, has a right of making the enemy's country contribute to the ſupport of the army, and towards defraying all the charges of the war. Thus he obtains a part of what is due to him, and the ſubjects of the enemy, on ſubmitting to this impoſition, are ſecured from pillage, and the country is preſerved. But a general who would not ſully his reputation, is to moderate his contributions, and proportion them to thoſe on whom they are impoſed. An exceſs in this point is not without the reproach of cruelty and inhumanity: if it ſhews leſs ferocity than ravage and deſtruction, it glares with avarice. If for weakening an unjuſt enemy, or for puniſhing him, it be lawful to carry off his goods, which is allowed to be the caſe, the reaſons that juſtify the former act, may alſo be pleaded in vindication of deſtroying what cannot conveniently be carried off. Thus a country is ravaged, the proviſions or forage deſtroyed, that the enemy may not find a ſubſiſtence there. When his ſhips cannot be taken or brought off, endeavours are uſed to ſink them; all this tends to put an end to the war. But theſe means are to be uſed only with moderation, and according to the exigency. To tear up vines, or cut down fruit-trees, is accounted illegal and ſavage, except inflicted to puniſh ſome crime committed by the enemy againſt the laws of war. This is to deſolate a country for many years, and what no ſafety can require. Such a conduct is not dictated by prudence, but by hatred and fury.

However, on certain occaſions, matters are carried ſtill farther; a country is totally ravaged, towns and villages are ſacked, ſet on fire, and the inhabitants put to the ſword. Dreadful extremity, even when forced to it! Savage and monſtrous exceſſes, when committed without neceſſity! However, they are authoriſed by two reaſons. 1. The neceſſity of chaſtiſing an unjuſt and barbarous nation, for checking its brutality, and preſerving one's ſelf from its depredations. 2. A country is ravaged, and rendered uninhabitable, for making a barrier, in order to cover a frontier againſt an enemy, who cannot be ſtopped in any other way. A hard reſource indeed! ſays Vattel; but may it not be uſed againſt an enemy, when with the ſame views and purpoſes a ſovereign lays waſte his own provinces? But for whatever cauſe a country be ravaged, we ought to ſpare thoſe edifices which do honour to human ſociety, and do not contribute to the enemy's power; ſuch as temples, tombs, public buildings, and all works of a remarkable beauty. What advantage is obtained by deſtroying them? He who acts thus declares himſelf an enemy to mankind, wantonly depriving them of theſe monuments of art and models of taſte. This is the light in which Beliſarius repreſented it to Tottila, king of the Goths. We ſtill deteſt thoſe barbarians for deſtroying ſo many wonders of art, when they over-ran the Roman empire. Though the reſentment of the great Guſtavus againſt Maximilian, duke of Bavaria, was entirely juſt, he rejected with indignation the advice of thoſe who were for demoliſhing the ſtately palace of Munich; and took particular care to preſerve that admirable ſtructure.

However, if for carrying on the operations of a war, or the works of a ſiege, there be a neceſſity for deſtroying buildings of this nature; there is doubtleſs a right of ſo doing. The ſovereign of the country, or his general, makes no ſcruple when reduced to it by neceſſity and maxims of war. The governor of a town evidently threatened with a ſiege, ſets fire to the ſuburbs, that they may not be of uſe to the beſiegers for lodging themſelves in them. Nobody offers to blame him who lays waſte gardens, vineyards, or orchards, for pitching a camp or throwing up an intrenchment; if ſome fine edifice be deſtroyed thereby, it is an accident, an unhappy conſequence of the war, and the general is not at all blameable; unleſs, without the leaſt inconveniency, he might have made his diſpoſitions elſewhere.

In bombarding towns, it is difficult to ſpare the fine edifices; at preſent it is only the ramparts and defences of a place which are uſually battered. To deſtroy a place with bombs and red-hot balls, is an extremity never practiſed without great reaſons. But it is warranted by the laws of war, when an army has no other reſource for reducing a place on which may depend the ſucceſs of the war, or when it greatly annoys us. It is alſo ſometimes practiſed when there is no other expedient of facing an enemy to make war with humanity, or for puniſhing him for ſome other illegal outrage. But it is with reluctance that good princes make uſe of their rigorous rights, and never but in extremities.

Fortreſſes, ramparts, and every kind of fortification, relate ſolely to war, and as in a juſt war nothing is more natural than to raze thoſe which we do not intend to keep, ſo nothing is more lawful. The enemy is thereby weakened, and no innocent perſon is involved in the damages.

Although to ravage or burn a country is not in general againſt the laws of war, yet if an enemy of a much ſuperior ſtrength treats a town or province in this manner, which he might eaſily keep for procuring to himſelf an equitable and advantageous peace, he is generally accuſed of making war like a barbarian. Thus the voluntary deſtruction of public monuments, of temples, tombs, ſtatues, paintings, &c. is abſolutely condemned, even by the voluntary law of nations, as always uſeleſs to the lawful end of war. The pillage and deſtruction of towns, the deſolation of the country, ravages, burnings, are not leſs odious and deteſted on all occaſions, when evidently practiſed without neceſſity, or without urgent reaſons. But as all theſe enormities may be excuſed under pretence of puniſhment, which the enemy deſerves, Vattel adds, that by the neutral and voluntary law of nations, only enormous offences againſt it are to be puniſhed in this manner: and when rigour is not of an abſolute neceſſity, it is always beautiful to liſten to the voice of humanity and clemency. Cicero condemns the deſtruction of Corinth for its inſults towards the Roman ambaſſadors; becauſe Rome was able to aſſert the dignity of its miniſters, without carrying its revenge to ſuch extreme rigour. Vattel's Law of Nations, b. iii. ch. 9.

SPOKEN-CHAIN, in *Rural Economy*, ſignifies provincially a chain of great ſtrength, and ſufficiently long for fixing upon the ſpoke of the wheel of a waggon, when the team is ſet faſt in a ſlough, to draw it out by, &c.

SPOKES, the bars of a wheel that paſs from the nave to the felly.

SPOKE-SHAVE, in *Block-making*, a kind of plane to ſmooth and finiſh the ſhells, which is a piece of ſteel, four or more inches long, and one and a half broad; ſharp at one edge as a knife, and a quarter of an inch thick at the back: at each end are left about two inches of narrow ſteel, bent up as pegs, by which it is regulated and ſecured in a piece of wood ten inches long, and narrowed at each end, for handles.

SPOLETO, in *Geography*, capital of Umbria, or the duchy of Spoleto, the ſee of a biſhop, immediately under the pope. It became a Roman colony A. U. C. 512; and 22 years afterwards, withſtood the forces of Hannibal, after the battle near the Thraſymene lake. It was the reſidence of ſome of the Gothic kings, and under the government of Longinus, exarch of Ravenna, was made the capital of Umbria, with the title of duchy. It was very ill-treated by Frederic Barbaroſſa, for ſiding with pope Alexander III.; but the inhabitants of Perugia ruined it entirely. It contains 22 churches, 21 convents, and 17 hermitages. Here are ſeveral ruins of Roman antiquities, the chief of which are a triumphal arch, an aqueduct, and an amphitheatre. The cathedral is built almoſt entirely of marble, and contains ſome good pictures; 90 miles S. of Florence. N. lat. 42° 45′. E. long. 12° 48′.

SPOLETO, *Duchy of*, a province of the Popedom, bounded on the north by the Perugiano and the duchy of Urbino, on the eaſt by the marquiſate of Ancona, on the ſouth by Abruzzo Ultra and the Sabina, and on the weſt by the Orvietan and Patrimonio, about 40 miles in length, and nearly as much in breadth. It was anciently called *Umbria*, and received the name of Spoleto in the time of the Lombards, being erected into a duchy under duke Faroald. On the extinction of the Longobardian monarchy, it fell to the dominion of the Franks, ſtill retaining its former conſtitution, and afterwards was annexed to the papal territories. In 1798 this duchy was over-run by the French.

SPOLIARIUM, among the ancient *Romans*, the third part of the bath, uſed for undreſſing and dreſſing in.

Spoliarium was likewiſe a part of the gladiatorial ſchools, where their clothes and ornaments were laid, and where the wounded and killed were carried.

SPOLIATION, in *Law*, is an injury done by one clerk or incumbent to another, in taking the fruits of his benefice without any right to them, but under a pretended title. It is remedied by a decree to account for the profits ſo taken. This injury, when the *jus patronatus*, or right of advowſon, does not come in debate, is cognizable in the ſpiritual court; as if a patron firſt preſents A. to a benefice, who is inſtituted and inducted to it; and then, upon pretence of a vacancy, the ſame patron preſents B. to the ſame living; and he alſo obtains inſtitution and induction. Now, if A. diſputes the fact of the vacancy, then that clerk who is kept out of the profits of the living, whoever he be, may ſue the other in the ſpiritual court for ſpoliation, in taking the profits of his benefice. And it ſhall there be tried, whether the living were, or were not vacant; upon which the validity of the ſecond clerk's pretenſions muſt depend. But if the right of patronage comes at all into diſpute, as if one patron preſented A., and another patron preſented B., there the eccleſiaſtical court hath no cognizance, provided the tithes ſued for amount to a fourth part of the value of the living, but may be prohibited at the inſtance of the patron, by the king's writ of *indicavit*. So alſo if a clerk, without any colour of title, ejects another from his parſonage, this injury muſt be redreſſed in the temporal courts: for it depends upon no queſtion determinable by the ſpiritual law (as plurality of benefices or no plurality, vacancy or no vacancy), but is merely a civil injury. Blackſt. Comm. b. iii.

SPOLTORA, in *Geography*, a town of Naples, in Abruzzo Ultra; 12 miles S.E. of Teramo.

SPONDAULA, σπονδαυλης, formed from σπονδη, *libation*, and αυλος, *flute*, in *Antiquity*, a player on the flute, or other wind-inſtrument of that kind; who, during the offering of ſacrifice, performed ſome ſuitable air in the prieſt's ear, to prevent his hearing any thing that might diſtract him, or leſſen his attention.

SPONDE, HENRY DE, in *Biography*, a French prelate and eccleſiaſtical hiſtorian, was born in 1568. His father was ſecretary to Joan, queen of Navarre, and, being a Calviniſt, educated his ſon in the ſame perſuaſion. He diſplayed, at a very early age, a great facility in learning languages, one of which was the native tongue of Scotland, which he acquired in a journey to that kingdom in the ſuite of the French ambaſſador. Upon his return, he ſtudied the civil and canon law, and was made maſter of requeſts to the king of Navarre. In 1595 he abjured Proteſtantiſm, and in the following year declared his new opinions in a work, "De Cœmeteriis Sacris." In the year 1600, he accompanied cardinal de Sourdis to Rome, and ſome years after he was ordained prieſt. He then began to labour on his great work, *viz.* the "Abridgment of the Annals of Cardinal Baronius," to which has been added a "Continuation," brought down to 1640. In 1626 he was nominated by Louis XIII. to the biſhopric of Pamiers, which he accepted only through the command of pope Urban VIII. He publiſhed "Ordinances Synodales," which were intended to aſſiſt in the converſion of his former aſſociates. He alſo founded an eccleſiaſtical congregation, ſome ſeminaries and religious houſes, and diſtinguiſhed himſelf by all the epiſcopal virtues. He died at Toulouſe in 1643, at the age of 78. Beſides the works mentioned above, he publiſhed "Sacred Annals of the Old Teſtament to the Time of Jeſus Chriſt," which are, properly ſpeaking, an abridgment of Tormiel's Annals. His elder brother was author of "Commentaries on Homer;" "An Account of the Motives which induced him to unite himſelf with the Catholic Church;" and "An Anſwer to Beza's Treatiſe on the Marks of the Church." He died in the year 1595.

SPONDEE, SPONDÆUS, in the *Greek* and *Latin Proſody*, a foot of verſe, conſiſting of two long ſyllables; as *vertunt*, *divos*, *campos*.

The ſpondee is a grave meaſure: all Greek and Latin hexameters regularly end with a ſpondee.

There are alſo *ſpondaic verſes;* that is, verſes compoſed wholly of ſpondees, or, at leaſt, that end with two ſpondees; as,

"Conſtitit, atque oculis Phrygia agmina circumſpexit."

SPONDIAS, in *Botany*, a name borrowed from the ancient Greeks, whoſe σπονδιας, or σποδιας, was a kind of wild plum, very diſtinct, moſt aſſuredly, from the preſent Indian genus, though there may be ſome ſimilarity in their fruits.—Linn. Gen. 229. Schreb. 308. Willd. Sp. Pl. v. 2. 750. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 108. Juſſ. 372. Lamarck Illuſtr. t. 384. Gærtn. t. 103. (Monbin; Plum. Gen. 44. t. 22.)—Claſs and order, *Decandria Pentagynia*. Nat. Ord. uncertain, Linn. *Terebintaceæ?* Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, ſomewhat bell-ſhaped, ſmall, five-cleft, coloured, deciduous. *Cor.* Petals five, oblong, flat, ſpreading. *Stam.* Filaments ten, awl-ſhaped, erect, ſhorter than the corolla, the alternate ones longer; anthers oblong. *Piſt.* Germen ovate; ſtyles five, ſhort, diſtant, erect; ſtigmas obtuſe. *Peric.* Drupa large, oblong, marked with five ſcars from the fall of the ſtyles. *Seed.* Nut ovate, woody, fibrous, with five imperfect angles, and five cells.

Obſ. Juſſieu remarks, that the ſtamens are inſerted into a glandular diſk; or, in Linnæan language, receptacle of the flower; probably a nectary.

Eſſ. Ch. Calyx five-toothed. Petals five. Drupa ſuperior, with a nut of five cells.

1. S. *Mombin*. Spaniſh Plum. Linn. Syſt. Nat. ed. 10. v. 2. 1036. Syſt. Veg. ed. 14. 428. Willd. n. 1. (S. purpurea; Linn. Sp. Pl. 613. S. Myrobalanus; Jacq. Amer. 139. t. 88. S. n. 1; Browne Jam. 228. Myrobalanus minor, folio fraxini alato, fructu purpureo, oſſiculo magno fibroſo; Sloane Jam. v. 2. 126. t. 219. f. 3—5.) Common footſtalk compreſſed. Cluſters much ſhorter than the leaves.—Obſerved by Jacquin to be wild in the territory of Carthagena, South America, from whence it has been brought into the Weſt Indian iſlands, in ſome of which, particularly Hiſpaniola and Jamaica, it abounds, being known by the name of the Spaniſh Plum-tree. The *tree* is various in height, of no regularity of growth, ſometimes as tall as thirty feet, with a thick bark, and white brittle wood. *Leaves* about the ends of the branches, alternate, ſtalked, deciduous, pinnate, four or five inches long, of about ten pair of elliptical ſhining, partly ſerrated, leaflets, an inch long, with an odd one of the ſame ſize. *Flowers* ſmall, red, in ſhort cluſters, appearing before the leaves. *Fruit* ovate, purple, above an inch long, acid, with a ſingular but agreeable aromatic flavour, for which it is much eſteemed.

2. S. *Myrobalanus*. Yellow Hog Plum. Linn. Syſt. Nat. ed. 10. v. 2. 1036. Willd. n. 2. Ait. n. 1. (S. lutea; Linn. Sp. Pl. 613. S. Mombin; Jacq. Amer. 138. S. n. 2 and 3; Browne Jam. 229. Myrobalanus folio fraxini alato, fructu luteo, oſſiculo magno fibroſo; Sloane Jam. v. 2. 125. t. 219. f. 1, 2. Prunus americana; Merian Surin. t. 13.)—Common footſtalk round. Leaflets pointed, four or five pair. Cluſters compound, about as long as the leaves.—Native of South America; cultivated in the Weſt Indies. Miller had it alive at Chelſea in 1739. This is deſcribed as a *tree* reſembling a common Walnut-tree in ſize and appearance, while the ample cluſters of pale yellowiſh *flowers* are much like Elder, except in having no ſmell. The *leaves* are twice the ſize of the foregoing, with pointed, leſs ſerrated, leaflets. *Fruit* yellow, two inches long, in large cluſters, its pulp fragrant, ſweet, and agreeable, but the great ſize and fibrous nature of the ſtones render it not commodiouſly eatable. Hogs are fattened with theſe plums in Jamaica. We cannot but obſerve that Linnæus has changed his own original names of theſe two ſpecies, much for the worſe; and thoſe he has given are the more unfortunate, as they are directly contrary to what Jacquin had previouſly adopted.

3. S. *Mangifera*. Eaſt Indian Spondias. Willd. n. 3. (S. amara; Lamarck Dict. v. 4. 261. Mangifera pinnata; Linn. Suppl. 156. Retz. Obſ. faſc. 5. 4. Ambalám; Rheede Hort. Malab. v. 1. 91. t. 50, not 51.)—Common footſtalk round. Leaflets entire, pointed, about three pair. Cluſters repeatedly compound.—Native of the Eaſt Indies, flowering in January and July, and bearing two crops of fruit. This is difficult to diſtinguiſh by a ſpecific character from the laſt, though widely different in many reſpects. That they are one genus, there can be no doubt. The *trunk* is a foot in diameter. *Leaves* of three pair, beſides an odd one, of elliptical, pointed, entire, ſmooth, pliant leaflets, each four or five inches long, with one rib, and many parallel tranſverſe veins. Rheede ſays they are agreeably acid. *Cluſters* hardly ſo long as the leaves, thrice compound; their principal branches alternate, widely divaricated, ſmooth, purpliſh; flower-ſtalks crowded, bracteated, very ſhort, but much elongated and ſpreading when in fruit. *Flowers* ſmall and pale, ſometimes ſix-cleft. *Fruit* oval, of a yellowiſh-green, an inch and a half long, eatable and agreeably fragrant. The *Cat-Ambalám*, Rheede p. 93, ſeems to be the wild ſtate of the ſame tree.

4. S. *dulcis*. Otaheité Apple. Forſt. Prod. 34. Pl. Eſc. 33. Willd. n. 4. Ait. n. 2. (S. cytherea; Sonnerat Ind. Or. v. 2. 222. t. 123. Lamarck Dict. v. 4. 260. Jacq. Hort. Schoenbr. v. 3. 12. t. 272.)—Common footſtalk round. Leaflets ſerrated, about ſix pair. Cluſters repeatedly compound, ſpreading.—Native of Otaheité, from whence it has been tranſported to the Mauritius, where alſo the laſt-deſcribed ſpecies is cultivated, as appears by ſpecimens from Commerſon marked *Evia Amra;* for he diſtinguiſhed the two. The preſent is a large erect *tree*, with brittle wood. Its *leaflets* are ſerrated, twice as numerous, and not half the ſize of the laſt. *Flowers* ſmall, whitiſh. *Fruit* oval, orange-coloured, twice as big as the laſt, aromatic and eatable, reſembling an apple in flavour, and by ſome voyagers much commended. Forſter compares its taſte to a pine-apple, and praiſes its ſalubrity. Sonnerat ſays it is like a rennet apple, but not ſo good; at leaſt in the Mauritius.—This fruit has ripened in the ſtoves at Schoenbrun.

SPONDIAS, in *Gardening*, contains plants of the exotic tree kind, of which the ſpecies cultivated is the purple hog-plum, or Spaniſh plum (S. mombin).

This plant is cultivated in its native ſtate by many for the ſake of the fruit, which is pretty pleaſant. And there is a variety of this ſort of fruit called the leather-coat, from the appearance of its ſkin.

Method of Culture.—It is increaſed by ſowing the ſtones of the fruit in pots filled with light mould, plunging them in the bark-bed of the ſtove; and by planting, cuttings, or putting down layers, and managing them in the ſame way: the plants may be taken off and removed into ſeparate pots when they have ſtricken good roots, being re-plunged in the bark-bed.

They require afterwards to be kept conſtantly in the ſtove, and to have the ſame management as other woody exotics of the ſame nature.

They afford variety in ſtove collections among other ſimilar plants.

SPONDYLI, Σπονδυλοι, in *Antiquity*, pellets of braſs uſed in giving ſentence, before the κυαμοι, or *beans*, came into uſe.

SPONDYLOLITHOS, a name given by authors to a ſtone found in the country of Tyrol, and elſewhere, reſembling the vertebræ of an animal. It is in reality no other than the vertebræ of ſome ſea-fiſh petrified, as is common with us.

SPONDYLUS, σπονδυλος, a term anciently uſed for a vertebra of the ſpina dorſi.

Spondylus, in *Natural Hiſtory*, a genus of the claſs and order Vermes Teſtacea, of which the generic character is: Animal a tethys; ſhell hard, ſolid, with unequal valves; one of the valves is convex, the other rather flat; hinge with two recurved teeth, ſeparated by a ſmall hollow. There are four

Species.

Gædaropus. The ſhell of this ſpecies is ſlightly eared and ſpinous. It inhabits the Mediterranean, the Indian, and other ſeas, and is found in almoſt infinite varieties, as to ſize, thickneſs, and colours; ſometimes entirely purple, orange, white, or bloom-colour; ſometimes marked with various ſtreaks, ſpots, dots, or bands.

Regius. Shell without ears, and ſpinous. There are four varieties. One inhabits India, and one is found near Malta, which is very rare. The ſhell is ſub-globular; within it is white; without purpliſh, ſcarlet, flame-coloured, orange or white; the ſpines are uſually two inches long; it is ſometimes cylindrical, with a crenate margin.

Plicatus. Shell without ears or ſpines, plaited. It is found in India, ſome parts of America, and in the Mediterranean. The ſhell is white, with yellowiſh, reddiſh, browniſh, or violet lines and veins.

Citreus. Shell oblong, plaited, ſpinous. The ſhell is imbricate, about two inches long, and nearly as broad; it is of a citron-colour, or red, with an orange inner margin.

SPONGE. See **Spongia** and **Spunge**.

Sponge-*Tree*, in *Botany*. See **Mimosa**.

SPONGIA, *the Spunge*, in *Natural Hiſtory*, a genus of the claſs and order Vermes Zoophytes. The generic character is as follows: Animal fixed, flexile, torpid, of various forms, compoſed either of reticulated fibres, or maſſes of ſmall ſpines, interwoven together, and clothed with a gelatinous fleſh, full of ſmall mouths on its ſurface, by which it abſorbs and rejects water. There are about fifty ſpecies, of which nine or ten belong to this country.

The ſponges conſiſt of a ramified maſs of capillary tubes, that were formerly ſuppoſed to be the production of a ſpecies of worms, which are often found within theſe cavities; an idea, however, which is now generally exploded. Others have imagined them to be only vegetable productions: that they are, however, poſſeſſed of animality, appears evident, from the circumſtance of their pores alternately contracting and dilating, and from their even ſhrinking, in ſome degree, from the touch, when examined in their native ſituations. Their ſtructure enables them, it is thought, to abſorb nouriſhment from the ſurrounding fluid. Sponges are the moſt torpid of all the zoophytes. The individuals differ very much from each other in form and ſtructure. Some of them, as the S. officinalis, or common ſponge, are of no determinate figure, but others are cup-ſhaped, tubular, &c.; irregularly formed, porous, rough, lobed, and woolly.

Species.

Ventilabrum. Fan-ſhaped, regular, ſoft, with reticulate woody veins, covered with pores like thoſe of a honey-comb. It is found in the Norwegian and American ſeas; about ſix inches high, and five broad: it exactly reſembles a ſmall gorgonia flabellum in its ſhape and ramifications, except that the pores are angular, and the ſubſtance is ſpongy.

Flabelliformis. Fan-ſhaped, orbicular, cartilaginous, with ſquare articulate fibres. This ſpecies inhabits the Indian and Red ſeas. It is from ſix to eight inches in height, and four or five broad, and reſembles the ventilabrum.

Infundibuliformis. This is funnel-formed, flexile, with the ſurface more or leſs roughened. It inhabits the Mediterranean and Indian ſeas, adhering to rocks, and is from ſix to eighteen inches in diameter; in colour it is a pale brown, and leſs tenacious than common ſponge.

Fistularis. Tubular, ſimple, brittle, and growing gradually larger. It inhabits the Indian ocean, is from three to four feet long: when dry it is blackiſh fulvous.

Aculeata. Tubular, branched, tough, the tubes erect, proceeding from one ſide of the ſtem, and tapering. It inhabits the Indian ocean; is from four to ſix inches high, of a deep orange-yellow colour, and hollow through the whole inſide.

* **Coronata.** Minute, conſiſting of a ſingle tube, and crowned at the tip with a ray of ſpines. This is found in our own country, on the Suſſex coaſt: its colour is of a pale yellow; the rays that compoſe the crown are of a bright pearl yellow, hollow, and open at the top; and when ſeen through a magnifier, it appears covered with little riſing points.

Ciliata. Simple, tubular, conic, flexuous, tapering upwards, and fringed at the tip. It inhabits the Greenland ſeas, adhering to the larger ulvæ; is about eight inches long; white, ſilky, downy on the outſide, and rarely found double.

Cancellata. Tubular, porous, with cancellate fibres. It inhabits the ocean; is ferruginous, elaſtic, with a prickly ſurface; the tube as thick as the finger, with a few elaſtic perforations.

Rubra. Tough, ſimple, carious, dull red, roundiſh, depreſſed with elevated tubercles and equal pores. Inhabits the Red ſea, fixed to ſtones.

Nigra. Tough, globular, equal, inflated, black without, cinereous within. It is found on rocks in the Red ſea.

Officinalis. This ſpecies is irregularly formed, porous, tough, lobed, woolly. It is elaſtic, and very full of holes; it grows into irregular lobes of a woolly conſiſtence, and generally adheres, by a very broad baſe, to the rocks. It is chiefly found about the iſlands in the Mediterranean, where it forms a conſiderable article of commerce. A variety of ſmall marine animals pierce and gnaw into its irregular winding cavities. Theſe appear on the outſide, by large holes raiſed higher than the reſt. When it is cut perpendicularly,

cularly, the interior parts are ſeen to conſiſt of ſmall tubes, which are divided into branches as they appear on the ſurface. Theſe tubes, which are compoſed of reticulated fibres, extend themſelves every way, by this means increaſing the ſurface of the ſponge, and ending at the outſide in an infinite number of ſmall circular holes, which are the proper mouths of the animal. Each of theſe holes is ſurrounded by a few erect pointed fibres, that appear as if woven in the form of little ſpines. The tubes, with their ramifications, in the living ſtate of the ſponge, are clothed with a gelatinous ſubſtance, properly called the fleſh of the animal. When the ſponge is firſt taken, it has a ſtrong fiſhy ſmell, and the fiſhermen take great care in making it perfectly clean, in order to prevent its growing putrid. See Spunge.

* **Oculata.** Porous, ſoft, and very much branched, the branches a little compreſſed, erect, and often uniting together. This, as the aſteriſk indicates, inhabits the Britiſh ſeas. It is from five to ten inches high, of a pale yellow colour; the branches end obtuſely.

Muricata. Porous, much branched, angular, tough, the pores are cylindrical, ſubulate, prominent, equal, many-cleft, and hiſpid. It inhabits Guinea, on rocks; it is grey, corky; the branches are ſurrounded on all ſides with ſmall, obtuſe, ſhaggy tufts; the ſtem is as thick as a man's finger; the branches are about the thickneſs of a quill.

Nodosa. Porous, ſlightly branched, irregularly formed, rough and very tough, with knotty perforations on the branches. It is found on rocks in the American ocean; it is of a reddiſh-grey, or whitiſh, and about the ſize of the finger.

* **Tomentosa.** Porous, irregularly formed, brittle, ſoft, downy, interwoven with the minuteſt ſpines. This ſpecies inhabits the Britiſh, African, and Indian coaſts, adhering to marine ſubſtances; when freſh it is of a bright orange colour, and full of gelatinous fleſh; when dry, it is whitiſh, and very light; and if broken, it reſembles the crumb, or ſoft part of bread. It appears to be compoſed of a number of minute ſpines, and upon handling, it ſtings and raiſes bliſters like cow-itch.

Bacillaris. Irregularly formed, caulescent, erect, with porous branches. It is found in the Norwegian ſeas; is about eighteen inches high, and of the thickneſs of the finger. It is round, of the conſiſtence of common ſponge, but ſomewhat more compact, with very numerous pores, appearing as if perforated with a fine needle.

* **Dichotoma.** This ſpecies is dichotomous, with erect, cylindrical, elaſtic, woolly branches, proceeding from one ſide of the ſtem. It inhabits European and Indian ſeas: is from five to ſix inches high; in colour it is of a pale yellow, and full of minute pores.

* **Stuposa.** This ſpecies has round, ſoft, downy branches. It is found on the Suſſex coaſt; is three inches high, and of a pale yellow.

* **Cristata.** Flat, erect, ſoft, with rows of ſmall pores, a little projecting along the top. This is found on the Britiſh ſhores, adhering to rocks; generally about two inches high and three long; it is of a yellowiſh colour, and growing in the ſhape of a cock's-comb.

* **Palmata.** This ſpecies is, as its name imports, palmate, with finger-like diviſions round the ſurface; the pores are a little prominent, and irregularly diſpoſed. It inhabits the Suſſex coaſt; it is of a reddiſh colour, inclining to yellow, with a ſoft woolly ſubſtance, like S. oculata.

Prolifera. Flat, with numerous palmate branches, ending in finger-like diviſions. It is found in the North American ſeas; grows in large bunches, is about ſix inches high, very porous, reticulate within, and full of minute ſpines on the outſide.

* **Botryoides.** This is a very tender ſpecies, is branched, and covered with bunches of ovate tubercles, open at the top. It inhabits the Britiſh coaſts; is of a bright ſhining white colour; the bunches are made up of oblong, oval tubercles, like grapes, open at the end. The ſurface, when ſeen through magnifiers of conſiderable power, ſeems covered with maſſes of three-rayed ſpinous ſtars.

* **Panicea.** Irregularly formed, whitiſh, ſoft, very tender, and full of minute pores. It inhabits the ſeas between this country and Holland, intermixed with fuci, and other marine productions; and is thought, from the ſimilarity which it bears to the S. tomentoſa, to be a variety of that ſpecies.

Fulva. This ſpecies is irregularly formed, but ſlightly branched, fulvous, and it is very rigid. It inhabits the American ocean; is gelatinous, and brown between the fibres.

Tabularia. Compreſſed, ſeſſile, a little rigid and yellowiſh, with ſmall longitudinal tubes. This alſo is an American ſpecies, generally ſeated on rocks, frequently blackiſh within.

Fibrillosa. This ſpecies is irregularly ſhaped, a little flattened and tender, with divergent, crowded, interwoven fibres, and ſcattered toothed pores. It inhabits the Indian ocean, is grey, ſoft, fan-ſhaped, or divided, or caulescent.

Fasciculata. This is rigid, ſub-globular, compoſed of fibrous, priſmatic, branched, faſtigiate bunches. This is found in the Mediterranean ſea; is pale, fulvous, or yellowiſh-grey.

Basta. A little rigid, blackiſh, in undulate diviſions, with a round ſtem. It is an inhabitant of the Indian ocean, and found adhering to ſtones. It is as thick as the finger.

Lichenoides. This is irregularly ſhaped, with ſoft, branching, ſcattered, and ſomewhat connected fibres. It inhabits the Indian ocean, and reſembles a ſhrubby lichen.

Papillaris. Cruſtaceous, tender, ſoft, with perforated papillæ. It inhabits the American ocean, as does the next; it is of a pale grey, and gelatinous.

Cavernosa. Irregularly formed, ſeſſile, very tough, cavernous, hence its name, with numerous, prominent papillæ on the ſurface. It is about the ſize of a man's hand: yellowiſh-white, ſometimes fulvous within.

Sinuosa. Cruſtaceous, tender, tough, with a thickly porous ſurface. This is found in the Indian ocean, incruſting other bodies; it is of a yellowiſh-grey colour.

Frondosa. Grey, leafy, jagged, tough, ſub-reticulate, and ſeparated into diviſions on one ſide. This is an Indian ſpecies.

Agaricina. Compreſſed, lobed, ſeſſile, downy, reticulate and muricate with ſtiff hairs on the outſide. It is found in the Indian ocean, and is of a yellowiſh-brown.

Tupha. Branched, ſoft, with aſcending branches, every where muricate with ſtiff hairs. It inhabits the Mediterranean, and is of a woolly kind of ſubſtance.

Membranosa. Irregularly formed, ſlightly branched, cellular, muricate outwardly, purpliſh-black. This is found in the Indian ocean.

Compressa. Simple, compreſſed, conic, with a longitudinal cleft or aperture internally. It inhabits the Greenland ſeas, is an inch long; erect and tawny.

Porcillum. Cylindrical, pedicillate, with a perforated top. It inhabits the North ſeas; is not more than a quarter of an inch long; whitiſh, and ſaid to reſemble a glaſs tumbler.

Coalita. This is very much branched, ſoft, tender, yellow; the branches are a little compreſſed. It inhabits the North ſeas; as do the three following.

Plana. Expanded, cruſtaceous, fan-ſhaped.

Cruciata. White, compreſſed, with pinnatifid, obtuſe, muriate, woolly branches.

Ossiformis. White, ſlightly branched, with a thickened pitted top.

Macida. White, cruſtaceous, projecting into ſpines.

Ficiformis. This is porous, rigid, turbinate, with a perforated tip. It inhabits the Barbary coaſt.

* Lacustris. Creeping, brittle, with erect, round, obtuſe branches. It is found at the bottom of lakes in England and Sweden, covered with ſcattered pores, in which are ſometimes found, during autumn, ſmall blueiſh ſhining globules.

* Pulviatilis. Green, erect, fragile, of many irregular branches. It inhabits the freſh waters of this country, Pruſſia, and other parts of Europe. It is of a dull green, with hardly the appearance of animal life, of a fiſhy ſmell, and with the pores full of green, gelatinous granulations; it very much reſembles the laſt.

Friabilis. Cinereous, friable, ſeſſile, irregularly ſhaped, and ſlightly branched. Found in the lakes of Germany, and is the food of fiſh.

Canadium. This is known by its dichotomous, round, incurved branches. It is found in old aqueducts, and has been thought not to belong to this genus.

SPONGIOLI, a word uſed by ſome authors to expreſs the ſmall button muſhrooms, which are gathered before they expand or open their heads.

SPONGIOSUM, in *Anatomy*, ſpongy; a name given to a ſmall ſeparate bone of the noſe, and to a proceſs of the ethmoid bone. In the older writers, the ethmoid bone altogether has been called os ſpongioſum, from its complicated apparatus of bony plates, and numerous perforations. See Cranium.

SPONGY Cheese, in *Rural Economy*, ſuch as is ſoft and full of eyes, from neglect and want of attention in making. The remedies are, careful breaking, powerful ſqueezing, good ſkewring, and heavy preſſing. See Cheese and Dairying.

SPONHEIM, in *Geography*, a town of France, in the department of the Rhine and Moſelle, late capital of a county, to which it gives name; 27 miles W. of Mentz. N. lat. 49° 54′. E. long. 7° 40′.

Sponheim, or *Spanheim*, late a county of Germany, in the circle of the Upper Rhine, ſituated between the Rhine and the Moſelle, formerly governed by particular counts, at preſent divided between the elector palatine, the duke of Deux Ponts, and the margrave of Baden. The matricular aſſeſſment of the whole for a Roman month was 290 florins, and the tax to the imperial chamber 108 rix-dollars 20 kruetzers. The ſoil is in general mountainous, but fertile. Game and fiſh are plentiful, and the mutton eſteemed excellent. The hills towards the Moſelle and Nahe are covered with vineyards. Here are mines of copper, lead, iron, &c. and ſome medicinal ſprings. The principal towns were Cruetznach, Sponheim, and Traarbach; all now annexed to France

SPONSIO, in *Political Economy*, denotes an agreement relating to affairs of ſtate, made by a public perſon, who goes beyond the terms of his commiſſion, and acts without the orders or commands of the ſovereign. He who treats in this manner for the ſtate, without having a commiſſion, promiſes by this means to take ſuch meaſures, that the ſtate, or the ſovereign, ſhall approve and ratify the agreement; otherwiſe his agreement would be vain and illuſive. The foundation of this agreement can be no other, on either ſide, than the hope of the ratification. The Roman hiſtory furniſhes examples of this kind of agreements.

Sponsio *Judicialis*, in *Law*. See *Feigned* Issue.

SPONSORS. See God-fathers.

SPONSUS, one of the many names given by the chemiſts to mercury.

SPONTANEOUS, Spontaneus, formed from the Latin adverb *ſponte*, *of one's own accord*, in the *Schools*, a term applied to ſuch motions of the body and mind as we perform ourſelves without any conſtraint.

Thus, in morality, thoſe actions performed upon an inward and natural principle, conformable to our own inclinations, excluding all conſtraint, are called ſpontaneous actions.

In medicine, an evacuation, effected without any application for that purpoſe, is called a ſpontaneous evacuation. And a laſſitude or wearineſs, not occaſioned by any preceding fatigue, is called a ſpontaneous wearineſs.

Spontaneous *Generation*. See Equivocal *Generation*.

Spontaneous *Precipitation*. See Precipitation.

SPONTOON, in *Military Language*, is a weapon reſembling a halberd, now uſed inſtead of a half-pike by the officers of foot. When the ſpontoon is planted, the regiment halts; when pointed forwards, the regiment marches; and when pointed backwards, it retreats.

SPOON-BILL, Platea, in *Ornithology*, the name of a bird of the long-necked kind, approaching to the nature of the ſtork and heron, and called the ſpoon-bill from the remarkable figure of its beak, which is different from that of all other birds, being broadeſt at the extremity, and terminating in a large, rounded, flat proceſs, reſembling a ſhovel; or, if it were hollow, a ſpoon. The whole bill of this bird is of a fine ſhining black, except a bright orange-coloured ſpot juſt above the point of the upper mandible, which is a little bent downward at its extremity; at the angles of the bill, on each cheek, there is alſo a ſpot of the ſame colour; the upper ſurface of the bill is elegantly waved with dotted protuberances; a depreſſed line, extending from the noſtrils, is continued round it near its edge; its ſubſtance appears like whale-bone, being thin, light, and elaſtic; the tongue is ſhort, and heart-ſhaped, and when drawn back, ſerves as a valve to cloſe the entrance of the throat; when pulled forward, it has the appearance of a triangular button; the ears are large, and placed an inch behind the angles of the mouth; the plumage of the whole body, wings, and tail, is white; on the back part of the head is a beautiful creſt of white feathers, hanging behind the neck; the legs are black, and alſo the thighs, which are naked about half their length; and the toes are connected by a ſmall web, extending to the firſt joint on each.

This bird breeds on high trees, feeds on fiſh and water-plants, and can ſwim; it inhabits the continent of Europe, South America, and the Philippine iſlands.

A flock of theſe birds migrated into the marſhes near Yarmouth in Norfolk, in April 1774. Pennant. See Platalea.

SPOON-DRIFT, in *Sea Language*, a ſort of ſhowery ſprinkling of the ſea-water, ſwept from the ſurface of the waves in a tempeſt, and flying according to the wind, like a vapour.

SPOONING, or Spooming, was formerly uſed to denote that movement in ſailing, which is now called *ſcudding*.

SPOON-WORT, in *Botany*. See Cochlearia.

SPORADES, in *Aſtronomy*, a name which the ancients gave to ſuch ſtars as were not included in any conſtellation.

Theſe the moderns more uſually call *informes*, or *extra-conſtellary ſtars*.

Many of the ſporades of the ancients have been ſince formed into new conſtellations; *e. gr.* of thoſe between Leo and Urſa major, Hevelius has formed a conſtellation, called *Leo minor;* of thoſe between Urſa minor and Auriga, the ſame perſon has formed another conſtellation, called *Lynx;* and of thoſe under the tail of Urſa minor another, called *Canis venaticus, &c.*

SPORADIC, *σποραδικος*, formed from *σπορας*, *diſperſed*, of *σπειρω*, *I ſtrew, &c.* in *Medicine*, an epithet given to ſuch diſeaſes as have ſome ſpecial or particular cauſe, and are diſperſed here and there, affecting only particular conſtitutions, ages, &c.

Sporadic ſtands in oppoſition to epidemic diſeaſes, which are thoſe ariſing from a general cauſe, and that are common to all kinds of perſons, of what complexion and quality ſoever.

SPORÆ, in *Botany*, from the Greek *σπορα*, *ſeed*, a name given by ſome botaniſts to the ſeeds of certain cryptogamic plants; by which they ſeem to imply a doubt of their being truly *ſemina*, or exactly analogous to the ſeeds of plants in general. We know not on what ſuch doubts are founded. If the parts in queſtion be produced or perfected by ſexual impregnation, they are to all intents and purpoſes real ſeeds, nor does any peculiarity, or apparent ſimplicity in their ſtructure, invalidate the propriety of their being ſo called. Seeds of different orders of phænogamous plants differ, as is well known, in their conformation, and even in the number of internal parts, as well as external coats, of which they are compoſed. Thoſe of the more obſcure cryptogamous tribes may therefore be expected to differ from them more widely. If ſuch apparent ſeeds be not the offspring of ſexual impregnation, they are GEMMÆ, ſee that article; where, as well as in our biographical account of the great HEDWIG, we have lamented that this diſtinguiſhed philoſopher and botaniſt ſhould have been ſeduced, by leſs accurate obſervers, to adopt a term entirely ſubverſive of his own doctrines and diſcoveries.

SPORANGIUM, from *σπορα*, *ſeed*, and *αγγος*, *a veſſel*, a name uſed by Hedwig for the capſule of moſſes, to which we have the ſame objection as to the term SPORÆ for their ſeeds. See that article, and HEDWIG.

SPORLING'S ISLAND, in *Geography*, a ſmall iſland near the coaſt of New Zealand, a little to the N.E. of Gable End Foreland.

SPORLIVOI, Nos, a cape of Ruſſia, on the S. coaſt of Nova Zembla. N. lat. 70° 30′. E. long. 60° 34′.

SPOROBOLUS, in *Botany*, from *σπορα*, *ſeed*, and *βαλλω*, *to throw*, becauſe, as we preſume, of the round deciduous ſeed.—Brown Prodr. Nov. Holl. v. 1. 169.—Claſs and order, *Triandria Digynia.* Nat. Ord. *Gramina.*

This genus of graſſes is ſeparated by Mr. Brown from *Agroſtis*, by the following characters.

Calyx of two unequal unarmed valves, containing a ſingle flower; the outer valve ſmalleſt. Corolla of two rather acute valves, without awns, ſeſſile, longer than the calyx. Nectary of two ſcales. Stigmas villous. Seed obovate, tumid, naked, deciduous.

The ſpecies are found between the tropics, ſcarcely beyond the latitude of 35°. Some have only two *ſtamens.* The *flowers* are panicled. Sheaths of the *leaves* bearded, with hardly any membranous *ſtipula.* They are akin to *Agroſtis*, eſpecially to *A. virginica.* *A. diandra* of Linnæus is a *Sporobolus*, as well as *A. indica.* Beſides the latter, two new ſpecies have been obſerved by Mr. Brown in New Holland, *S. elongatus* and *pulchellus.*

SPOROW, in *Geography*, a town of Lithuania, in the palatinate of Brzeſc, ſeated on a lake to which it gives name; 28 miles W. of Pinſk.

SPORTS, in the *Cuſtoms* of Flanders, were in great vogue through Flanders and the Low Countries ſome centuries ago. Every city had a ſolemnity of this kind peculiar to itſelf: thus Bruges had that called the *Foreſter;* Valenciennes, the *Prince of Pleaſantry*, and the *Prince of the Horſe-Comb;* Cambray, the *King of Ribaldry;* and Bouchain, the *Provoſt of Sots.* Liſle, one of the richeſt towns in Flanders, was not behind hand with its neighbours in celebrating ſports, by the magnificence and diverſions of which to draw together a vaſt concourſe of people from all parts. One of the chief of theſe divertiſements was called the *King of the Spinet*, *Roy d'Epinette*, which was celebrated with great pomp and ſhow. See Hiſt. Acad. Inſcript. tom. iv. p. 452, ſeq.

SPORTULA, or SPORTELLA, in *Antiquity*, a dole, or largeſs, either of meat or money, given by princes, or great men, to the people or poor.

The ſportula was properly the pannier or baſket in which the meat was brought, or with which the poor went to beg it; thence the word was transferred to the meat itſelf, and thence to money ſometimes given in lieu of it. The baſket was ſuppoſed to contain a quantity of hot proviſions, of the value of 100 quadrantes, or $12\frac{1}{2}$ pence; and theſe baſkets were ranged in order in the hall, and diſtributed oſtentatiouſly to the hungry or ſervile crowd, which waited at the door. This indelicate cuſtom is very frequently mentioned in the epigrams of Martial, and the ſatires of Juvenal. (See likewiſe Suetonius, in Claud. c. 21, in Neron. c. 16, in Domitian. c. 4. 7.) Theſe baſkets of proviſions were afterwards converted into large pieces of gold and ſilver coin, or plate, which were mutually given and accepted, even by perſons of the higheſt rank (ſee Symmach. epiſt. iv. 55. ix. 124. and Miſcell. p. 256.) on ſolemn occaſions, of conſulſhips, marriages, &c.

Sportula was alſo frequently uſed in oppoſition to *recta cœna*, a formal or plentiful meal; as in Martial.—"Promiſſa eſt nobis ſportula, recta data."

St. Cyprian gives the denomination *ſportulantes fratres*, to ſuch clergymen as then received gifts, or gratuities, for their maintenance.

SPOT, in *Ornithology*, the name of a particular ſpecies of pigeon, called by Moore the *columba maculata.* It is of the ſize of a ſmall common pigeon, and was brought over to England from Holland. This ſpecies has always a ſpot upon its head, juſt above its beak, from whence it has its name. The feathers of the tail are always of the ſame colour with this ſpot, and the reſt of the body is all white. The ſpot and tail are black in ſome, red in others, and yellow in others. They look very beautiful when they ſpread their tails and fly, and are a diſtinct ſpecies, as they always produce young ones of their own marks.

SPOTICO, in *Geography*, an iſland in the Grecian Archipelago, of an irregular form, about four miles long, and from one to two broad; 6 miles W.S.W. of Paros. N. lat. 36° 59′. E. long. 25° 12′.

SPOTS, in *Aſtronomy*, dark places obſerved on the diſks, or faces, of the ſun, moon, and planets.

The ſpots in the ſun are only viſible through a teleſcope: ſome diſtinguiſh them into maculæ, or dark ſpots; and faculæ, or bright ſpots; but there ſeems but little foundation for any ſuch diviſion.

The ſolar ſpots have not been long obſerved. They were firſt diſcovered by Galileo, in the year 1610, ſoon after he had finiſhed his teleſcope.

In oppoſition to the received opinion of the unalterable ſtate of the heavens, he maintained, that theſe ſpots conſiſted of a kind of matter that admitted of very great and ſudden alterations; that they adhered to the ſun, which carried them round an axis of his globe in about a month; which axis he firſt ſuppoſed to be perpendicular to the plane of the earth's annual orbit, becauſe the courſe of the ſpots appeared on the ſun's diſk as ſtraight lines parallel to that plane; which then happened through a particular direction of the floating motions of the ſpots upon the ſun's ſurface, as he ſoon inferred from the viſible alterations in their ſhapes and ſituations to one another, when ſeveral of them appeared together: and thence he concluded, that the general courſe of the ſpots was frequently varied a little, in like manner as, to a perſon viewing the earth from a great diſtance, the clouds would appear to move parallel to one another, and to the equator, with the uniform velocity of the earth's diurnal revolution, unleſs diſturbed a little from that regular courſe by their floating in the atmoſphere. At firſt he took the apparent motion of the ſun's to be, as we have ſtated, rectilinear and parallel to the ecliptic; but in conſequence of a ſubſequent obſervation of the entire tranſit of a large ſpot, and of marking its place at noon, day after day, upon a circular paper anſwering to the ſun's diſk, he found its courſe was a little incurvated; and thence he concluded, that the ſun's axis was a little inclined to the plane of the ecliptic.

Since Galileo's time, the ſubject of the ſun's ſpots has engaged the attention of ſeveral aſtronomical obſervers. The poſition of the ſun's axis, and the periodical time of his motion round it, have been more exactly determined, the knowledge of which depended upon the obſervation of theſe ſpots. In the year 1639, Scheiner publiſhed his "Roſa Urſina," containing near 2000 obſervations of ſolar ſpots for 20 years; in which time he frequently ſaw above 50 at once: but for 20 years after, betwixt 1650 and 1670, ſcarcely any appeared. He found that many of his ſpots ſcarcely exceeded 25 days in making an apparent revolution from a given place on the diſk to the ſame again, that others took up 27 days, and ſome others near 28. Scheiner and Caſſini the ſon have alſo obſerved, that the periodical times of the nearer ſpots to the equator are ſhorter than thoſe of the remoter; and Caſſini the father obſerved the like property in Jupiter's ſpots. Theſe irregularities create great difficulties in determining the time of the ſun's exact revolution about his axis. Caſſini the father, however, by comparing many diſtant obſervations together, found a common meaſure of many ſuch intervals of time to be $27^d\ 12^h\ 20^m$ very nearly. Hence it has been concluded, that the periodical time of the ſun's revolution to a fixed ſtar is $25^d\ 15^h\ 16^m$.

All ſpots conſiſt of a black part in the middle, of ſome irregular figure, encompaſſed with a nebulous border of a colour leſs dark; and it often happens, after a gradual decay and diſappearing of the black part, that its place ſeems brighter than the reſt of the ſun, and continues ſo for two or three days. Theſe brighter ſpots are called *faculæ;* which ſee.

The ſun's ſpots are very changeable as to number, form, &c. and are ſometimes in a multitude, and ſometimes none at all.

Some imagine they may become ſo numerous, as to hide the whole face of the ſun, at leaſt the greateſt part of it; and to this aſcribe what Plutarch tells us, *viz.* that in the firſt year of the reign of Auguſtus, the ſun's light was ſo faint and obſcure, that one might look ſteadily at it with the naked eye.

To which Kepler adds, that in 1547 the ſun appeared reddiſh, as when viewed through a thick miſt; and hence conjectures, that the ſpots in the ſun are a kind of dark ſmoke, or clouds, floating on the ſurface of it.

Others will have them ſtars, or planets, tranſiting the body of the ſun; but it is much more probable they are opaque bodies, in manner of cruſts, formed like the ſcums on the ſurface of liquors.

Dr. Derham, from a variety of particulars which he has recited, relating to the ſolar ſpots, (ſee Phil. Tranſ. abr. vol. iv. p. 235, &c.) and their congruity to what we obſerve in our own globe, infers, that they are cauſed by the eruption of ſome new volcano therein, which, at firſt, pouring out a prodigious quantity of ſmoke, and other opaque matter, cauſeth the ſpots: and as that fuliginous matter decays and ſpends itſelf, and the volcano at laſt becomes more torrid and flaming, ſo the ſpots decay and become umbræ, and at laſt faculæ; which faculæ he ſuppoſes to be no other than more flaming lighter parts than any other parts of the ſun.

Dr. Franklin (in his Exper. and Obſerv. p. 266.) ſuggeſts a conjecture, that the parts of the ſun's ſulphur, ſeparated by fire, riſe into the atmoſphere, and there being freed from the immediate action of the fire, they collect into cloudy maſſes, and growing, by degrees, too heavy to be longer ſupported, they deſcend to the ſun, and are burnt over again. Hence, he ſays, the ſpots appearing on his face, which are obſerved to diminiſh daily in ſize, their conſuming edges being of particular brightneſs. For other ſolutions of theſe phenomena, by Wilſon, Lalande, Herſchel, &c., ſee MACULÆ and SUN.

The lunar ſpots are fixed; and aſtronomers reckon about forty-eight of them on the moon's face, to each of which they have given names. The twenty-firſt is one of the moſt conſiderable, and is called *Tycho*. See *Nature*, &c. *of the* MOON.

SPOTS, *Circular*, in *Electricity*. See CIRCULAR *Spots* and COLOURS.

SPOTS, *Planetary*. Aſtronomers find that the planets are not without their ſpots. Jupiter, Mars, and Venus, when viewed through a teleſcope, ſhew ſeveral very remarkable ones: and it is by the motion of theſe ſpots, that we conclude the rotation of the planets round their axes, in the ſame manner as that of the ſun is deduced from the motion of his maculæ. See each planet in its proper place.

SPOTS, *Lucid, in the Heavens*, are little whitiſh ſpots, of which there are ſeveral, that appear magnified, and more luminous when ſeen through teleſcopes; and yet without any ſtars in them. One of theſe is in Andromeda's girdle, and was firſt obſerved, A.D. 1712, by Simon Marius: it has ſome whitiſh rays near its middle, is liable to ſeveral changes, and is ſometimes inviſible. Another is near the ecliptic, between the head and bow of Sagittarius; it is ſmall, but very luminous. A third is in the back of the Centaur, which is too far ſouth to be ſeen in Britain. A fourth, of a ſmaller ſize, is before Antinous's right foot, having a ſtar in it, which makes it appear more bright. A fifth is in the conſtellation of Hercules, between the ſtars ζ and η, which ſpot, though ſmall, is viſible by the bare eye, if the ſky be clear and the moon abſent.

SPOTSWOOD, in *Geography*, a ſmall town of Middleſex county, New Jerſey, near the weſt ſide of South river, which diſcharges itſelf into the Rariton, in a ſouth-eaſt direction. It is well ſituated for extenſive manufactories; 9 miles S.E. of Brunſwick.

SPOTSYLVANIA, a county of the American ſtate of Virginia, bounded north by Stafford, and eaſt by Caroline county. It is hilly, and well watered by branches of the Mattapony and Rappahannock rivers. It contains 13,296 inhabitants, of whom 7135 are ſlaves. At the court-houſe is a poſt-office; 78 miles from Waſhington.

SPOTTED Island, an iſland in the North Atlantic ocean, on the eaſt coaſt of Labrador. N. lat. 53° 30′. W. long. 55° 20′.

SPOTTING, Finger, known alſo by the name of *Brocading*, in the *Manufacture of fanciful ornamented Cloths*, is a very beautiful, though rather expenſive, mode of interweaving flowers, either of the ſame or different colours, with various kinds of grounds. Of its primary origin we are totally unacquainted, as we find it practiſed alike, and with little variation of apparent effect, in the ſilks of Europe and the muſlins of India. It is probable that the whole range of fanciful cloths, with which we are acquainted, are originally Aſiatic; and that the knowledge of them has gradually reached Europe, at various times, and through various channels. In ſpots wrought with the ſhuttle, the flowers being at intervals, and the woof paſſed acroſs the whole fabric, what paſſes between the flowers, and is not interwoven with the fabric, muſt be cut away, when the cloth is taken from the loom, and before it undergoes the ſucceeding proceſſes of bleaching and dreſſing. Some ſpecimens of brocaded muſlins have been occaſionally brought from India, which are entirely effected by a continued and patient exerciſe of manual labour truly aſtoniſhing. The low price of labour paid to the natives of that country may produce theſe figured muſlins, at prices acceſſible to the opulent natives, and to the more wealthy claſſes of the European ſettlers. In this country, even at the moſt reduced prices, capable of affording to the operative the moſt penurious and ſcanty ſubſiſtence, they could not be afforded under four or five guineas *per* yard; a ſum immenſely beyond what could be expected for a commodity ſo flimſy and periſhable as a muſlin dreſs.

In finger-flowers, or brocaded muſlins, the draught through the heddles is generally ſucceſſive from the back to the front, as in moſt kinds of fanciful weaving. The treddles are moved by the feet, as in the common proceſſes, for forming the plain ground or fabric of the work. For the flowers or raiſed part, thoſe leaves which require to be raiſed are moſt commonly pulled by cords above the weaver's head, as in the diaper and patent draw-loom; and, like them, ſecured by a knot upon the cord, being fixed in a notch in the board. The weaver then proceeds to paſs the ſubſtance, which is to form the flowers, through the warp; each end being ſeparated from, and independent of, all the others. In this he is generally aſſiſted by a boy, who ſits at the loom along with him, and who manages one ſide of the web, while the weaver is employed on the other. From this tedious and laborious operation being done entirely by the fore-finger, the appellation *finger-flower* is derived. Our limits will not allow of a very lengthened detail, nor would it be of any eſſential ſervice; for, from the cauſes already aſſigned, there is no probability of its ever becoming an article of extenſive manufacture in this country.

SPOTTISWOODE, John, in *Biography*, a prelate and eccleſiaſtical hiſtorian of Scotland, deſcended from an ancient family in that country, was born in 1565. His father, who was a miniſter of Calder, ſent him to the univerſity of Glaſgow to be educated for the church; and his proficiency in his ſtudies was ſuch, that at the age of eighteen he was thought to be qualified to be his father's ſucceſſor. When Lodowick, duke of Lenox, was ſent, in 1601, on an embaſſy to France, for the purpoſe of confirming the ancient amity between the two countries, Spottiſwoode, with the hope of conciliating the two nations, accompanied him as chaplain, and returned with him to England. His reputation was at that time ſo high, that, on the acceſſion of king James to the crown of England in 1603, he was one of the perſons appointed to attend his majeſty to his newly acquired kingdom; and in the ſame year he was promoted to the archbiſhopric of Glaſgow, and nominated a privy-counſellor for Scotland. It was the favourite object of James to aſſimilate as much as poſſible the church of Scotland to the model of that of England; and archbiſhop Spottiſwoode was very eager in promoting this intention, and is ſaid to have made fifty journies to London on that account. Having held the ſee of Glaſgow eleven years, he was tranſlated, in 1615, to that of St. Andrews, the metropolitan of Scotland; and he preſided at various aſſemblies for the reſtoration of the epiſcopal form of government. He continued in high favour with king James during his whole reign; and Charles I., after his acceſſion, was crowned by him in the abbey church of Holyrood Houſe. In 1635 he was appointed chancellor of Scotland. When the civil commotions broke out in that country in 1639, the archbiſhop withdrew to England, where he died, and was interred in Weſtminſter Abbey. He was author of "A Hiſtory of the Church of Scotland," beginning with the year 203, and continued to the end of the reign of James VI., which was publiſhed in London in 1655. This work was undertaken at the command of king James, who, when Spottiſwoode told him ſome paſſages might bear hard on the memory of his mother, ſaid, "Write the truth, and ſpare not." Spottiſwoode was author of "Refutatio Libelli de Regimine Eccleſiæ Scoticanæ," written in defence of the eccleſiaſtical eſtabliſhment of Scotland.

SPOULT, in *Rural Economy*, a word ſignifying brittle, as applied to wood, &c.

SPOUT, the name of a trunk for conveying water from off the roofs of buildings, which ſhould always be attached to thoſe of the farm-kind. Spouts on ſuch buildings are not only uſeful for freeing them of water, but in collecting it for the purpoſe of the live-ſtock, &c.

Spout, or *Water-ſpout*, in *Natural Hiſtory*, an extraordinary meteor, or appearance, at ſea, and ſometimes on land, very dangerous to ſhips, &c. ofteneſt obſerved in hot, dry weather; and called by the Latins *typho*, and *ſipho*; by the French, *trompe*, &c.

Its firſt appearance is in form of a deep cloud, the upper part of which is white, and the lower black. From the lower part of this cloud there hangs, or rather falls down, what we properly call the ſpout, in manner of a conical tube, biggeſt at top. Under this tube is always a great boiling and flying up of the water of the ſea, as in a jet d'eau. For ſome yards above the ſurface of the ſea, the water ſtands as a column, or pillar; from the extremity of which it ſpreads, and goes off, as in a kind of ſmoke. Frequently the cone deſcends ſo low, as to touch the middle of this column, and continue for ſome time contiguous to it; though ſometimes it only points to it, at ſome diſtance, either in a perpendicular, or in an oblique line.

Frequently it is ſcarcely diſtinguiſhable, whether the cone or the column appear the firſt, both appearing all of a ſudden againſt each other. But ſometimes the water boils up from the ſea to a great height, without any appearance of a ſpout pointing to it, either perpendicularly or obliquely. Indeed, generally, the boiling or flying up of the water has the priority, this always preceding its being formed into a column. Generally the cone does not appear hollow till towards the end, when the ſea-water is violently thrown up along its middle, as ſmoke up a chimney: ſoon after this the ſpout, or canal, breaks and diſappears; the boiling up of the water, and even the pillar, continuing to the laſt, and for ſome time afterwards; ſometimes till the ſpout form itſelf again, and appear anew; which it ſometimes does ſeveral times in a quarter of an hour. See a deſcription of ſeveral water-ſpouts by Mr. Gordon, and by Dr. Stuart, in Phil. Tranſ Abr. vol. iv. p. 103, &c.

M. de la Pryme, from a near obſervation of two or three ſpouts in Yorkſhire, deſcribed in the Philoſophical Tranſactions, N° 281, or Abr. vol. iv. p. 106, concludes, that the water-ſpout is nothing but a gyration of clouds, by contrary winds meeting in a point, or centre; and there, where the greateſt condenſation and gravitation are, falling down into a pipe, or great tube, ſomewhat like Archimedes's ſpiral ſcrew; and, in its working and whirling motion, abſorbing and raiſing the water, in the ſame manner as the ſpiral ſcrew does; and thus deſtroying ſhips, &c.

Thus, June the 21ſt, he obſerved the clouds mightily agitated above, and driven together; upon which they became very black, and were hurried round; whence proceeded a moſt audible whirling noiſe, like that ordinarily heard in a mill. Soon after there iſſued a long tube or ſpout from the centre of the congregated clouds, in which he obſerved a ſpiral motion, like that of a ſcrew, by which the water was raiſed up.

Again, Auguſt 15, 1687, the wind blowing at the ſame time out of the ſeveral quarters, created a great vortex and whirling among the clouds; the centre of which every now and then dropped down, in ſhape of a long, thin, black pipe, in which he could diſtinctly behold a motion like that of a ſcrew, continually drawing upwards, and ſcrewing up, as it were, wherever it touched. In its progreſs it moved ſlowly over a grove of trees, which bent under it like wands, in a circular motion. Proceeding, it tore off the thatch from a barn, bent an huge oak-tree, broke one of its greateſt branches, and threw it to a great diſtance. He adds, that whereas it is commonly ſaid, the water works and riſes in a column, before the tube comes to touch it; this is, doubtleſs, a miſtake, owing to the fineneſs and tranſparency of the tubes, which do moſt certainly touch the ſurface of the ſea, before any conſiderable motion can be raiſed in it; but which do not become opaque and viſible, till after they have imbibed a conſiderable quantity of water.

The diſſolution of water-ſpouts he aſcribes to the great quantity of water they have glutted; which, by its weight, impeding their motion, on which their force, and even exiſtence, depends, they break, and let go their contents; which generally prove fatal to whatever is found underneath.

A notable inſtance of this kind we have in the Philoſophical Tranſactions, N° 363, or Abr. vol. iv. p. 108, related by Dr. Richardſon. A ſpout, in 1718, breaking on Emmotmoor, near Coln, in Lancaſhire, the country was immediately overflowed; a brook, in a few minutes, roſe ſix feet perpendicularly high; and the ground on which the ſpout fell, which was ſixty-ſix feet over, was torn up to the very rock, which was no leſs than ſeven feet deep; and a deep gulf was made for above half a mile; the earth being raiſed on either ſide in vaſt heaps. See a deſcription and figure of a water-ſpout, with an attempt to account for it, in Franklin's Exp. and Obſ. p. 226, &c.

Signior Beccaria has taken pains to ſhew that water-ſpouts have an electrical origin. To make this more evident, he firſt deſcribes the circumſtances attending their appearance, which are the following.

They generally appear in calm weather. The ſea ſeems to boil, and ſend up a ſmoke under them, riſing in a hill towards the ſpout. At the ſame time, perſons who have been near them have heard a rumbling noiſe. The form of a water-ſpout is that of a ſpeaking-trumpet, the wider end being in the clouds, and the narrower end towards the ſea. The ſize is various, even in the ſame ſpout. The colour is ſometimes inclining to white, and ſometimes to black. The poſition is ſometimes perpendicular to the ſea, ſometimes oblique; and ſometimes the ſpout itſelf is in the form of a curve. Their continuance is very various, ſome diſappearing as ſoon as formed, and ſome continuing a conſiderable time. One that he had heard of continued a whole hour. But they often vaniſh, and preſently appear again in the ſame place.

The very ſame things that water-ſpouts are at ſea, are ſome kinds of whirlwinds and hurricanes by land. They have been known to tear up trees, to throw down buildings, make caverns in the earth; and, in all theſe caſes, to ſcatter earth, bricks, ſtones, timber, &c. to a great diſtance, in every direction. Great quantities of water have been left, or raiſed by them, ſo as to make a kind of deluge; and they have always been attended with a prodigious rumbling noiſe.

That theſe phenomena depend upon electricity, cannot but appear very probable from the nature of ſeveral of them; but the conjecture is made more probable from the following additional circumſtances. They generally appear in months peculiarly ſubject to thunder-ſtorms, and are commonly preceded, accompanied, or followed, by lightning, rain, or hail; the previous ſtate of the air being ſimilar. Whitiſh or yellowiſh flaſhes of light have ſometimes been ſeen moving with prodigious ſwiftneſs about them. And, laſtly, the manner in which they terminate, exactly reſembles what might be expected from the prolongation of one of the uniform protuberances of electrified clouds, mentioned before, towards the ſea; the water and the cloud mutually attracting one another; for they ſuddenly contract themſelves, and diſperſe almoſt at once; the cloud riſing, and the water of the ſea under it falling to its level. But the moſt remarkable circumſtance, and the moſt favourable to the ſuppoſition of their depending upon electricity, is, that they have been diſperſed by preſenting to them ſharp-pointed knives or ſwords. This, at leaſt, is the conſtant practice of mariners, in many parts of the world where theſe water-ſpouts abound; and he was aſſured by ſeveral of them, that the method has often been undoubtedly effectual.

The analogy between the phenomena of water-ſpouts and electricity, he ſays, may be made viſible, by hanging a drop of water to a wire communicating with the prime conductor, and placing a veſſel of water under it. In theſe circumſtances, the drop aſſumes all the various appearances of a water-ſpout, both in its riſe, form, and manner of diſappearing. Nothing is wanting but the ſmoke, which may require a great force of electricity to become viſible.

Mr. Wilcke alſo conſiders the water-ſpout as a kind of great electrical cone, raiſed between the cloud ſtrongly electrified, and the ſea or the earth; and he relates a very remarkable appearance, which occurred to himſelf, and which ſtrongly confirms his ſuppoſition. On the 20th of July, 1758, at three o'clock in the afternoon, he obſerved a great quantity of duſt riſing from the ground, and covering a field and part of the town in which he then was. There was no wind, and the duſt moved gently towards the eaſt, where appeared a great black cloud, which, when it was near its zenith, electrified his apparatus poſitively, and to as great a degree as ever he had obſerved it to be done by natural electricity. This cloud paſſed its zenith, and went gradually towards the weſt, the duſt then following it, and continuing to riſe higher and higher, till it compoſed a thick pillar, in the form of a ſugar-loaf, and at length ſeemed to be in contact with the cloud. At ſome diſtance from this there came, in the ſame path, another great cloud, together with a long ſtream of ſmaller clouds, moving faſter than the preceding. Theſe clouds electrified his apparatus negatively, and when they came near the poſitive cloud, a flaſh of lightning was ſeen to dart through the cloud of duſt, the poſitive cloud, the large negative cloud, and, as far as the eye could diſtinguiſh, the whole train of ſmaller negative clouds which followed it. Upon this the negative clouds ſpread very much, and diſſolved into rain, and the air was preſently clear of all the duſt. The whole appearance laſted not above half an hour. See Prieſtley's Electr. vol. i. p. 438, &c.

This theory of water-ſpouts has been farther confirmed by the account which Mr. Forſter gives of one of them in his Voyage round the World, vol. i. p. 191, &c. On the coaſt of New Zealand he had an opportunity of obſerving ſeveral, one of which he has particularly deſcribed. The water, he ſays, in a ſpace of fifty or ſixty fathoms, moved towards the centre, and there riſing into vapour, by the force of the whirling motion, aſcended in a ſpiral form towards the clouds. Directly over the whirlpool, or agitated ſpot in the ſea, a cloud gradually tapered into a long ſlender tube, which ſeemed to deſcend to meet the riſing ſpiral, and ſoon united with it into a ſtraight column of a cylindrical form. The water was hurled upwards with the greateſt violence in a ſpiral, and appeared to leave a hollow ſpace in the centre, ſo that the water ſeemed to form a hollow tube, inſtead of a ſolid column; and that this was the caſe, was rendered ſtill more probable by the colour, which was exactly like that of any hollow glaſs tube. After ſome time, this laſt column was incurvated, and broke like the others; and the appearance of a flaſh of lightning which attended its disjunction, as well as the hail-ſtones which fell at the time, ſeemed plainly to indicate that water-ſpouts either owe their formation to the electric matter, or at leaſt that they have ſome connection with it.

Mr. Cavallo (Elem. of Phil. vol. ii.) has detailed the following facts, as the moſt remarkable, relative to water-ſpouts.

Two or three, or more, water-ſpouts are frequently ſeen within the ſpace of a few miles, and they are moſtly ſeen at ſea.

Their ſize is various, not exceeding, however, a few feet in diameter; and the ſame water-ſpout ſometimes increaſes and decreaſes alternately; it alſo appears, diſappears, and re-appears, in the ſame place.

The water-ſpout ſometimes proceeds a little way from a cloud, or a little way from the ſea; and often thoſe two ſhort and oppoſite ſpouts are not only directed towards each other, but they are extended, and meet each other.

When it proceeds from the ſea, the water about the place appears to be much agitated, and riſes a ſhort way in the form of a jet, or ſpray, or ſteam, in the middle of which a thick, well defined, and generally opaque body of water riſes, and proceeds to a conſiderable height into the atmoſphere, where it is diſſipated into a vapour, or it ſeems to form a cloud.

When it proceeds from a cloud, the clouds about the ſpot frequently appear much agitated, and an agitation of the water immediately under the ſpot is generally ſeen at the ſame time.

The water-ſpout is frequently ſeen to have a ſpiral or ſcrew-like motion, and ſometimes is attended with conſiderable noiſe.

Some of them ſtand in a perpendicular direction, others are inclined, and ſome water-ſpouts form a curve, or even an angle.

The water-ſpouts generally break about their middle, and the falling waters occaſion great damage, either to ſhips that have the misfortune of being under them, or to the adjoining land; for ſuch ſpouts are ſometimes formed on a lake or river, or on the ſea cloſe to the land.

Sometimes the water-ſpouts are ſeen where there is no appearance of whirlwind, or where the wind, at leaſt to a ſpectator at ſome diſtance, appears to blow regularly one way.

The oblique ſpouts almoſt always point from the wind; for inſtance, when the wind is N.E. the ſpout will point to the S.W.

The water-ſpout has been attributed principally, if not entirely, to the meeting of different winds. In that caſe, the air in its rotation acquires a centrifugal motion; whence it endeavours to recede from the axis of the whirl, in conſequence of which a vacuum, or, at leaſt, a conſiderable rarefaction of air, takes place about the axis; and, when the whirl takes place at ſea, or upon water, the water riſes into that rarefied place, for the ſame reaſon which cauſes it to aſcend into an exhauſted tube, and forms the water-ſpout or pillar of water in the air: nevertheleſs it is obſerved by Mr. Cavallo, that the various appearances of water-ſpouts do not ſeem to be quite reconcileable to the above-mentioned theory. Several ingenious perſons have conſidered the water-ſpout as an electrical phenomenon; having obſerved, that thunder-clouds and lightning have been frequently ſeen about the places where water-ſpouts appear, and likewiſe that by means of artificial electricity, a water-ſpout may in ſome meaſure be imitated. (See the preceding part of this article.) Mr. Cavallo, however, ſuggeſts, that the lightning and other electrical phenomena appear to be rather the neceſſary conſequence than the cauſe of the water-ſpout; it being well known that electricity is produced whenever water is reduced into vapour, or vapour is condenſed into water. A water-ſpout of the moſt complete form is repreſented in *Plate* XXIV. *Miſcellany*, *fig.* 8.

In Pliny's time, the ſeamen uſed to pour vinegar into the ſea, to aſſuage and lay the ſpout, when it approached them: our modern ſeamen think to keep it off, by making a noiſe with filing and ſcratching violently on the deck, or by diſcharging great guns to diſperſe it.

SPOUTING FOUNTAIN. See FOUNTAIN.

SPOUTY *Ground* or *Land*, in *Agriculture*. See SOIL, and SPRING-*Draining*.

SPRAGGE, *Sir* EDWARD, in *Biography*, a celebrated naval hero and commander, of whoſe early hiſtory nothing has been collected, but who deſerves a place in the annals of England, and whoſe ſervices will be ever remembered with graditude by his country. He is compared by Campbell to Alcibiades, who was equally able and eſteemed in the camp, in the court, and in the cloſet. "In every character which he aſſumed, he ſo far excelled as to ſeem born and deſigned for that alone. The ſame thing his contemporaries, his companions, thoſe who knew him, and the world too, perfectly well, affirm of ſir Edward Spragge, who with a fine perſon, and gentle temper, had as ſolid an underſtanding, and as bold a ſpirit, as any counſellor or captain of that age. With all theſe advantages, with the favour of the duke of York, with the merit of great ſervices which he rendered his country, and with the ſtill greater merit of dying glorioſly in his country's ſervice, which, indeed, procured his remains an interment in Weſtminſter Abbey, he was not honoured with a tomb; or any memorial, as far as treatment, however, and particularly the unmanageableneſs and imprudence of patients, who fatigue the joint in uſing it too ſoon and before the pain is over, may render a ſprain very bad even in ſubjects who are in other reſpects perfectly ſound. In this caſe, ſometimes the pain and ſwelling, after having undergone a greater or leſſer abatement, ſtill continue in a degree, ſo that a diſeaſe, which might have been cured in five or ſix weeks, laſts five or ſix months, and frequently a whole year. Sometimes the ſymptoms get worſe inſtead of becoming better. The pain and ſwelling occur in the higheſt degree, and ſuppuration itſelf, followed by caries of the bones, may follow, and even create a neceſſity for amputation in order to ſave the patient's life.

But ſymptoms of this violent nature are ſeldom remarked after ſprains, except in ſubjects who labour under ſome conſtitutional diſorder, which may extend its effects to the joints. The moſt common, and at the ſame time the moſt afflicting, is ſcrofula. In patients diſpoſed to this diſeaſe, ſprains often become the occaſional or exciting cauſe of white-ſwellings, which too frequently baffle all the efforts of the moſt ſkilful ſurgeons, and make amputation indiſpenſable.

The ſymptoms which characterize ſprains are eaſy of comprehenſion. An application of external violence, the nature and direction of which are always known; a more or leſs acute pain in the affected joint, without deformity, without any manifeſt alteration in the natural relations of the articular ſurfaces; a free power of motion immediately after the accident; and a ſudden ſwelling proportioned to the violence of the ſhock. Such are the circumſtances denoting a ſprain. A ſprain may readily be diſtinguiſhed from every other affection of the joints. Uninformed practitioners have been known, however, to miſtake its nature, and thence do conſiderable miſchief, by ill-judged attempts to remedy a ſeparation of bones, or to reduce a diſlocation which never exiſted. So groſs a miſtake may eaſily be avoided by the leaſt attention.

The prognoſis of ſprains differs according to the degree of the injury, the nature of the joint, and the particular conſtitution of the patient. A ſlight ſprain is a caſe of little importance, being generally cured in a few weeks, when properly treated, and when the patient, obedient to the advice of the ſurgeon, keeps the joint perfectly motionleſs, and avoids uſing the limb until the pain and ſwelling are entirely removed. A violent ſprain, occurring to a joint that is ſtrengthened by very ſtrong ligaments, like that of the ankle for example, is a ſevere caſe, which often laſts ſeveral months, and which, as we have already explained, may have afflicting conſequences, when it is badly treated, or the patient does not conform to the advice of his ſurgeon. Even a ſlight ſprain is always a ſevere accident in ſcrofulous ſubjects, becauſe it may become an exciting cauſe of a white-ſwelling, and produce a neceſſity for amputation.

The treatment of ſprains conſiſts in preventing the inflammatory ſwelling, diſperſing it when it has taken place, promoting the union of the torn ligaments, and re-eſtabliſhing the tone, force, and freedom of motion in the affected joint.

Experience has taught, that cold water is the beſt application which can be uſed for fulfilling the firſt indication. This diſcutient appeaſes the pain, and tends to prevent ſwelling and inflammation. Cold water is rendered more ſedative and efficacious, when a little of the liquor plumbi acetatis is added to it. Thus, when a ſurgeon is conſulted immediately after the accident, the part ſhould be immerſed in a pail of ſpring water, into which the liquid acetite of lead has been put in the proportion of a drachm to a pint. Some practitioners make the quantity greater; but, we believe, what is here mentioned is quite ſufficient. In order to derive all the advantage poſſible from the employment of cold water, the part ſhould remain immerſed ſeveral hours without interruption, and the water ſhould be changed as ſoon as it becomes warmed. Boyer does not approve, however, of uſing this application for women who have their menſes on them; or for patients whoſe lungs are weak, or who are ſubject to hæmoptyſis; or for any perſons who are in a great perſpiration. Perhaps, in ſuch inſtances, it may be as well to uſe a warm linſeed poultice.

After the part has been taken out of the water, it is to be covered with linen wet with the ſame application, and care muſt be taken frequently to wet the cloths anew, ſo that they may be as cold as poſſible, and the evaporation effectual.

When the ſprain is ſlight, diſcutients are commonly adequate to the prevention of the inflammatory ſwelling, and they may be continued till the caſe is quite well. But if the injury be too ſevere to yield to theſe means, or ſhould they not have been tried in the firſt inſtance, ſo that tenſion and ſwelling have already come on, recourſe muſt be had to the means proper for fulfilling the ſecond indication, that is to ſay, for diſperſing the pain and inflammatory ſwelling. The patient may be bled more or leſs copiouſly according to his age, ſtrength, conſtitution, and ſeverity of the accident. Low diet and abſolute reſt are to be directed, and topical emollient anodyne applications are to be made to the part affected; ſuch as linſeed poultices, and fomentations of white poppy-heads. When the pain is exceſſively ſevere, a ſmall quantity of laudanum, or of a watery ſolution of opium, may be mixed with the poultice.

The uſe of theſe local applications is to be continued as long as the pain and ſwelling exiſt; but as ſoon as they are removed, diſcutients muſt be employed; ſuch as camphorated ſpirit of wine, ſoap liniment, ammoniated oil, and many kinds of mineral waters.

During the whole treatment, and even a long while afterwards in ſevere caſes, the part affected muſt be kept ſtrictly at reſt. On one hand, moving the joint might keep up the irritation and inflammation; on the other, when the ſprain has been conſiderable and the ligaments lacerated, a firm union of them, and the return of the ſtrength which is eſſential to the perfect functions of the articulation, can only be obtained by long reſt.

When a ſprain happens to the ankle, as is moſt common, the patient ſhould not be ſuffered to walk before the pain and ſwelling are entirely removed. As there remains in the joint almoſt always a weakneſs, which ſubjects the patient to the ſame accident again, when he walks too quickly, or careleſsly, it is proper, with a view of obviating this inconvenience, to apply a moderately tight roller to the part, or to direct him to wear for ſome time a laced ſoft leather buſkin.

It frequently happens, after the cure of a ſprain, when the joint has recovered all its ſtrength and freedom of motion, that the ſurrounding cellular ſubſtance is puffy and œdematous, eſpecially in the evening, after the patient has been long in the erect poſition. The moſt efficacious means which can be uſed againſt this local infirmity, which may continue a long while, is the compreſſion of a bandage, or laced dog-ſkin ſtocking.

In other caſes, the ligaments, which have been violently diſtended and lacerated, become rigid, and the motion of the joint remains imperfect. Here fomentations, emollient baths, vapour baths, and oily liniments, are indicated.

Laſtly, when the ſtiffneſs of the joint reſiſts theſe means, the efficacy of hydro-ſulphurated waters may be tried.

In ſcrofulous ſubjects, ſprains may be followed by the moſt ſevere conſequences, as already related, and may become the exiſting cauſe of an inveterate diſeaſe of the joint. The conſideration of the treatment of the diſorder here alluded to, will be found in a future article of this publication. (See WHITE-SWELLING.) Boyer Traité des Maladiès Chirurgicales, tom. iv. ch. 1.

SPRAIN, among horſes, and other ſorts of live-ſtock, a violent extenſion of ſome tendinous part, by which ſudden lameneſs is not unfrequently produced. It is moſtly capable of being removed by ſaturnine, ſpirituous, or acid waſhes, with proper elaſtic bandages, and a little reſt. It often happens in the legs of horſes, and ſome other animals.

SPRAIN, in *Agriculture*, a term applied to the ſowing of ſeeds by hand, ſignifying to throw them into their places with a ſingle motion of the hand, at a certain diſtance from one another. It is particularly applied to beans, and ſome other kinds of feed. Spraining in crops is not unfrequently practiſed in particular places where labour is cheap.

SPRAINTS, among *Sportſmen*, a term uſed for the dung of the otter.

SPRANGENBERG, in *Geography*, a town of the principality of Heſſe Caſſel; 6 miles S. of Lichtenau.

SPRANGER, BARTHOLOMEW, in *Biography*, was the ſon of Joachim Spranger, a merchant of eminence at Antwerp, and was born there in 1546. As he exhibited an inclination for painting, he was placed as a diſciple with John Madyn, a painter of ſome reputation at Haerlem, and afterwards with Francis Moſtaert. He then went to Italy through France, and reſided ſome years at Parma as a ſtudent, under Bernardino Gatti, who had been a diſciple of Correggio. He thence went to Rome, where the cardinal Farneſe favoured him with his patronage, and engaged him to paint, in the Villa Caprarola, ſeveral landſcapes in freſco. By the cardinal he was introduced to the pope, Pius V., who appointed him his painter, and gave him apartments in the Palazzo Belvidere. His firſt work for his holineſs was a picture of the Laſt Judgment, a compoſition of five hundred figures, painted upon a copper-plate ſix feet high. This picture is ſaid to have taken him three years to complete, and to have been, of courſe, finiſhed with great care; and in conſequence of its being highly eſteemed by the pope, it was placed upon his tomb, after his deceaſe. The ſame kind patron commiſſioned him to paint twelve pictures of the paſſion of our Saviour, but did not live to witneſs their completion.

The renown of Spranger now reached the court of Vienna, to which he was invited by the emperor Maximilian II. in 1575, and appointed his principal painter. On that emperor's death in the following year, his ſucceſſor, Rodolphus II., continued to ſhew the ſame favour to Spranger, and engaged him in ſeveral works of importance both at Vienna and at Prague; reſpecting him highly, not only for his abilities as a painter, but alſo for his literary acquirements, and other accompliſhments. In 1588 he was ennobled by his imperial majeſty, who honoured him by placing round his neck, with his own hands, a chain of gold, with a medal attached to it. Spranger died at Prague, in 1623, aged 77.

The ſtyle of this painter is that which was built upon the defects of Michael Angelo, or rather in the perverſion of his ſtyle, by a crude and indigeſted adoption of its moſt prominent character, without the judicious taſte and feeling in which it originated. It was conſequently extravagant and bombaſtic, preſenting inflated muſcles, and knobby excreſcences for bones, redeemed only in ſome eyes by a lively fancy, an agreeable facility of execution, and a pleaſing colour.

SPRAT, THOMAS, biſhop of Rocheſter, a writer of conſiderable eminence in the 17th century, was born in 1636 at Tallaton, in Devonſhire, where his father was a clergyman. He received his academical education at Wadham college, Oxford, of which Dr. Wilkins was then warden, under whom he acquired a proficiency in mathematical knowledge. In 1657 he was elected a fellow of his college; and on the death of Oliver Cromwell, he gave a ſpecimen of his poetical talents in an "Ode to the happy Memory of the late Lord Protector," addreſſed to Dr. Wilkins. This ode was followed by one on the "Plague of Athens," which, as well as the former, afforded proof of a warmth and readineſs of conception. At the Reſtoration, like many others, he made a ſhort turn, and atoned for his former delinquency by zealous loyalty, and was made chaplain to the duke of Buckingham, who was his zealous friend and patron. He was choſen a member of the Royal Society, which was then in its infancy, and which had originated from the meetings of the ſcientific men held at the lodgings of Dr. Wilkins, in Wadham college. In 1667 Sprat publiſhed the hiſtory of this ſociety, and its foundation; and obtained a high reputation for the elegance of the ſtyle and ſentiment exhibited in the work. He had publiſhed, two years previouſly to this, "Obſervations on Sorbiere's Voyage to England," which were well received, and conſidered as a ſeaſonable caſtigation of a ſuperficial foreigner who had vilified the country. In 1668 he was editor of Cowley's Latin poems, to which he prefixed a life of the author, in the ſame language. This he afterwards enlarged in Engliſh, and annexed to the Engliſh works of that poet. He had now attained a degree of reputation, which, joined to his talents for converſation and ſociety, cauſed him to be rapidly advanced in the career of preferment. He was ſucceſſively made a prebendary of Weſtminſter, rector of St. Margaret's, canon of Windſor, dean of Weſtminſter, and finally, in 1684, was raiſed to the epiſcopal bench as biſhop of Rocheſter. This laſt preferment was conſidered as a reward for the ſervice of drawing up, at the command of the king, an account of the Rye-houſe plot. This was firſt printed in 1685, and was reprinted in the following year, after James II. had ſucceeded to the throne. The manner in which he had executed this taſk rendered it expedient for him to publiſh an apology, after the Revolution. He had reflected on the characters of thoſe, whoſe names have been long ranked among the martyrs to liberty. Of lord Ruſſell, Sprat obſerves, "that he was carried away into this traiterous conſpiracy from a vain air of popularity, and a wild ſuſpicion of loſing a large eſtate by an imaginary return of popery." His favour under the new reign was manifeſted by his appointment to the place of clerk of the cloſet to the king, and his nomination as one of the commiſſioners for eccleſiaſtical affairs. At the revolution he ſubmitted to the new government, and was allowed to remain unmoleſted in his ſee. His principles, however, being well known, he was involved, in 1692, with others, in an information laid before the privy council, of a pretended conſpiracy for reſtoring king James. He detected the infamy of the informers, and effectually cleared himſelf from the charge; but he was ſo much affected by the danger he had undergone, that he ever after commemorated his deliverance by annual thankſgiving. He paſſed the reſt of his life in the practice of profeſſional duties and virtues, by which he engaged the eſteem and affection ſection of thoſe with whom he was connected, and died in 1713, in the 79th year of his age. Beſides the works already mentioned, he publiſhed a relation of his examination before the privy council, two letters to lord Dorſet, and a volume of ſermons. Biog. Brit.

Sprat, in *Ichthyology*, a ſpecies of the clupea, with the lower jaw the longeſt, and the belly very acute, and the dorſal fin conſiſting of thirteen rays. See Clupea.

The ſprat, or *clupea ſprattus* of Linnæus, has generally, but erroneouſly, been ſuppoſed a herring not grown to its full ſize. Its uſual length is about four or five inches, and the body much deeper than that of a young herring of equal length; the back fin is placed more remote from the noſe than that of the herring: but one great diſtinction between this fiſh, the herring, and the pilchard, is the belly; that of the two firſt being quite ſmooth, that of the laſt very ſtrongly ſerrated; and another is, that the herring has fifty-ſix vertebræ, this only forty-eight. Beſides, ſprats viſit our coaſts, and continue with us in large ſhoals, when the others, in general, have retired to the great northern deeps. They come into the river Thames, below bridge, in the beginning of November, and leave it in March, and are, during their ſeaſon, a great relief to the poor of the capital. At Graveſend and at Yarmouth they are cured like red herrings: they are ſometimes pickled, and are little inferior in flavour to the anchovy, but the bones will not diſſolve like thoſe of the latter. Pennant.

SPRATT, in *Agriculture*, a name applied in ſome places to a plant, which is found to riſe in great abundance, in a ſpontaneous manner, in moſt watery ſituations of the more ſound boggy kind. It is ſtated in a paper in the third volume of the "Tranſactions of the Highland Society of Scotland," that though it abounds much in that part of the kingdom, the proper culture of it is by no means well underſtood. It ſhould, it is ſaid, be ſuitably manured for with compoſt manure, once in three years; or watering ſometimes anſwers the ſame intention very well, in caſes where it is grown for hay; the land being preſerved from cattle, or other ſorts of ſtock, from the month of March; and the plants cut for hay in July at the lateſt. The feeding ſtalks are alſo ſtated to have been mown, after the cattle in paſturage, to benefit.

The ſpring froſts occaſionally, however, deſtroy ſome inches of the tops of the plants.

Sheep may ſafely eat it, without danger of rotting them; and it raiſes young cattle, it is ſaid, to a great ſize of bone. But that when ſuffered to run up to ſeed, it is not palatable; though cattle not unfrequently get it for hay in that ſtate. Where manure is uſed, and it is cut in the ſap, it conſtitutes, it is obſerved, a moſt excellent and abundant kind of hay for black cattle. In this management, it has been ſeen ready for the ſcythe as ſoon as rye-graſs; and one of the beſt ſamples of meadow hay ſeen in the above part of the country was cut in the year 1804, and conſiſted of ſpratt and common poa.

Others, however, do not think ſo highly of it, as it has been noticed in ſituations in the Highlands, where cattle were often ſtinted or ſtraightened for food, and generally remained untouched by them. The ſame has likewiſe been the caſe in other places of the above diſtricts.

Its ſtrong root is alſo thought an objection to its being cultivated as a graſs-crop, even if it were capable of it, as being difficult of extirpation.

It has been farther uſed for making cuſhions, to be put under the yokes uſed by oxen in ploughing; for which purpoſe it ſeems, it is ſaid, well ſuited, on account of its toughneſs. See Juncus.

SPRAWL, *To*, in *Military Language*, is to widen out in an irregular and unſoldier-like manner: a term chiefly applicable to the cavalry.

SPRAWLING Charge, a looſe and irregular movement of cavalry, inſtead of a cloſe, compact, forward attack.

SPRAY, in *Sea Language*, denotes the ſprinkling of the ſea, which is driven from the top of a wave in ſtormy weather. It differs from ſpoon-drift, as being only blown occaſionally from the broken ſurface of a high wave, whereas the latter continues to fly horizontally along the ſea, without intermiſſion, during the exceſs of a tempeſt or hurricane. Falconer.

Spray, in *Agriculture*, the twiggy branches of any ſort of underwood, which are uſeful for many different purpoſes. The ſpray of many extenſive woods, in different places, are cut over occaſionally for burning lime, &c.

Spray-*Faggots*, ſuch as are made from the ſpray or ſmall branches, and other offal, of different kinds of wood of the undergrowth kind, and bound up in proper quantities. This ſort of faggot, as well as thoſe which are made of furze, and ſome other inflammable matters, are much employed in burning chalk into lime, in what are called flame-kilns, in ſome diſtricts, as in Suſſex, &c.

SPREADING *and ſetting out Manure*, the practice of diſperſing and diſtributing it in or upon land, and putting it on in a proper manner for the purpoſe. This ſort of work is performed ſomewhat differently on arable or graſs-land, and according to the nature of the cultivation. This can never be done in the moſt proper and complete manner, unleſs the neceſſary attention has been beſtowed in ſetting the manure out, to ſee that it is not depoſited in too large heaps, but put out in equal proportions, of a moderate ſize, at pretty exact diſtances between the different heaps. In the buſineſs of ſetting out manure to the greateſt advantage, the carts employed ſhould be rather ſmall, and conveniently formed for the purpoſe. With large carts the work is liable to be done not only with much inequality, but in far too large heaps, ſo that it is done with great trouble and loſs of time. Single-horſe carts are perhaps, in general, the moſt uſeful in this way or intention.

The writer of the corrected account of the Agriculture of the County of Perth, has noticed an ingenious contrivance for facilitating the unloading of carts filled with ſubſtances of the manure kind, which is in uſe in that diſtrict. It conſiſts in ſuſpending the box or body-part of the cart at different heights, while it is emptying; but it can only be uſed with advantage in carts which are conſtructed on a ſort of moveable frame, or thoſe which are denominated coup-carts, and where the load is to be diſcharged in ſeveral different portions. For this purpoſe a thin piece of iron, of about two inches in breadth, is fixed on the fore-part of the box or body of the cart, exactly in the middle, extending in length to the top or height of the body or box-part, in which are formed and inſerted three or four oblong holes, correſponding in ſize to a rod or pin, which is fixed with a ſtaple in the middle of the firſt bar that keeps the ſhafts of the cart together. The length of this rod or pin is moſtly about eighteen inches, but longer when neceſſary, as the height or length of that part of the body or box of the cart which reſts on the frame may require. The top part of it is formed into ſomewhat the ſhape of a creſcent, an inch in width, with the point upwards, which correſponds with the holes in the iron plate. When the rod or pin is not in uſe, in order to prevent its dangling, it is made to reſt on a hook in the front of the box, or body of the cart. When the driver wiſhes or is deſirous to unload a part of the contents of the cart, he raiſes the box or body-part of it, putting the rod or pin into the firſt nick or hole, and makes the firſt heap; and then moves on to the place or diſtance where he intends to put down the ſecond, when he again raiſes the ſame part of the cart to the ſecond nick; continuing the ſame method until the whole of the contents be diſcharged or ſet out.

In ſpreading out manure on the ſurface of arable land, where it is to be turned into the ſoil by the plough, ſo much exactneſs is not neceſſary; though it ſhould always be done in as even and regular a manner, and to as equal a thickneſs, as poſſible. And on ridges, eſpecially where they are rather narrow, care ſhould be taken that it does not fall into the ridge-furrows, by carefully ſpreading it out at firſt all along the borders of them in a regular manner. In caſes where it is to be placed and ſpread out in drills or furrows made for the purpoſe, it ſhould conſtantly be executed in as even a manner, in regard to thickneſs, as it will readily permit, and in a way which will allow of its being covered in as completely as poſſible, as it is equally waſteful and diſgraceful to have it preſenting itſelf externally.

In ſpreading different ſorts of materials of the manure kind over graſs-land, it is always neceſſary to ſee that the work be performed in an exact and even manner, as well as that all the lumps and clods be well broken down, and as much reduced as poſſible, by beating them with the fork or ſhovel, or in ſome other way. On arable as well as graſs-land, as favourably dry a ſeaſon as can be obtained ſhould moſtly be choſen for this ſort of work. In wet ſeaſons, the materials clog and hang about the feet and tools of the workman, and are never capable of being ſo divided as to be ſpread out with the neceſſary degree of evenneſs and regularity, eſpecially on graſs-land. On this ſort of land, when the heaps have been ſet out, they ſhould never be ſuffered to remain ſo long as is too frequently the caſe, before they are ſpread out, as the graſs-plants underneath them become blanched and tender, and are liable to be deſtroyed; great injury being often done to the ſurface or ſward, in ſuch caſes. In ſpreading manure from the carts, injuries of this nature are likewiſe prevented, as is found in the midland and ſome other diſtricts, where the practice prevails; but in this mode, it is probable, the work can neither be performed in ſo perfect a manner, nor with ſo much economy of time and labour. In this manner, the inconvenience of hill or heap-ſteads will, however, be avoided; and, of courſe, the diſadvantage of their getting too large a proportion of manure guarded againſt and prevented

The tools moſtly employed in this ſort of work are thoſe of the dung-fork and the ſhovel, but others are occaſionally uſed for particular ſorts of manure.

After the ſubſtances of this kind have been ſpread out in this manner on graſs-land, they may often be farther uſefully reduced and diſtributed, by paſſing a buſh-harrow over them a few times in a dry ſeaſon, ſome weeks after the ſpreading has been performed.

Where manure, in its more recent or freſh ſtate, is employed either on arable or graſs-land, more attention will be neceſſary in ſpreading it out over or into the land, ſo that it may be done in an even and perfect manner. See YARD-*Dung*.

SPREE, or SPREHE, in *Geography*, a river which riſes on the frontiers of Bohemia, croſſes Luſatia, enters the marquiſate of Brandenburg, and, after paſſing by Berlin, joins the Havel at Spandau.

SPREMBERG, or SPREHENBERG, or *Grodk*, a town of Luſatia, on the river Spree, which gives name to a circle, or diſtrict; 29 miles S.S.W of Guben. N. lat. 51° 32′. E. long. 14° 25′.—Alſo, a town of Saxony, at the ſource of the Spree; 28 miles E. of Dreſden.

SPREMONT, a town of France, in the department of the Ourte, ſeated on a brook which runs into the Ourte, and together with a ſmall country, called the "Ban of Spremont," inſulated within the biſhopric of Liege; 13 miles S.W. of Liege.

SPRENDLINGEN, a town of France, in the department of the Rhine and Moſelle; 8 miles E. of Creutznach.

SPRENGELIA, in *Botany*, received that name from the writer of this article, in honour of Mr. Chriſtian Conrad Sprengel, maſter of a grammar-ſchool at Spandow, in Brandenburgh, who publiſhed at Berlin, in 1793, a moſt ingenious work, on the manner in which inſects promote the impregnation of plants. This fact is illuſtrated by ſeveral hundred particular examples, accompanied with figures of each. Dr. Curtius Sprengel, now Profeſſor of Botany at Halle, may alſo claim his ſhare of botanical commemoration in the above name. His *Prodromus* of a work on the arrangement of Umbelliferous Plants, publiſhed in 1813, to ſay nothing of his letters on Cryptogamic Vegetables, and his edition of the *Philoſophia Botanica* of Linnæus, may well entitle him to ſuch diſtinction.—Sm. in the Stockholm Tranſactions for 1794, 260. t. 8. Tracts relating to Nat. Hiſt. 269. Willd. Sp. Pl. v. 1. 833. Ait. Hort. Kew. v. 1. 320. Brown Prodr. Nov. Holl. v. 1. 554. (Poiretia; Cavan. Ic. v. 4. 24.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Ericæ*, Juſſ. *Epacrideæ*, Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, chaffy, coloured, in five deep, equal, lanceolate ſegments, erect after flowering, permanent. *Cor.* of one petal, wheel-ſhaped, beardleſs, in five very deep equal ſegments, the length of the calyx. Nectary none. *Stam.* Filaments five, inſerted into the receptacle, linear, flat, ſmooth, ſhorter than the corolla; anthers vertical, oblong, parallel, more or leſs combined, of one cell. *Piſt.* Germen ſuperior, roundiſh, depreſſed, with five furrows; ſtyle ſimple, cylindrical, about as long as the ſtamens; ſtigma obtuſe. *Peric.* Capſule ſomewhat cylindrical, obtuſe, with five furrows, of five valves and five cells, the partitions longitudinal, from the centre of each valve. *Seeds* numerous, roundiſh, minute, inſerted into the angles of the central column, which is ſhorter than the valves.

Eſſ. Ch. Calyx in five deep ſegments, permanent, coloured. Corolla wheel-ſhaped, in five deep ſegments, beardleſs. Stamens inſerted into the receptacle. Anthers converging or combined. Nectary none. Capſule of five valves and five cells, the partitions from the middle of each valve.

1. S. *incarnata*. Fleſh-coloured Sprengelia. Sm. Tracts, 272. t. 2. Willd. n. 1. Ait. n. 1. Br. n. 1. Andr. Repoſ. t. 2. (Poiretia cucullata; Cavan. Ic. t. 343. Lamarck Dict. v. 5. 449.)—Anthers combined, hairy. Calyx entirely coloured. Points of the leaves elongated.—Native of Port Jackſon, New South Wales; found alſo by Mr. Brown in Van Diemen's iſland, and on the ſouth coaſt of New Holland. Meſſrs. Lee and Kennedy raiſed the plant in 1793, and in their greenhouſes it ſtill flouriſhes, flowering from April to June. This is a pretty and ſingular *ſhrub*, about two feet high, rigid and much branched, leafy, ever-green, very ſmooth; the branches round. *Leaves* alternate, ſheathing, ſometimes imbricated in three ranks, recurved, lanceolate, acute, concave, entire, very ſmooth, rather glaucous, without rib or veins, tawny when faded, and finally looſened at their baſe, ſo as to turn round on the branch. *Stipulas* none. *Flowers* terminating the numerous, ſhort, crowded, lateral branches, clothed with ſmaller

leaves, and making a very pretty appearance. We do not find that they have any ſcent. *Calyx* roſe-coloured, half an inch in diameter. *Corolla* and *ſtamens* fleſh-coloured. The name of *Poiretia*, given by Cavanilles, was not publiſhed till three years after our *Sprengelia*.

2. S. *montana*. Mountain Sprengelia. Br. n. 2.—"Anthers unconnected, beardleſs. Calyx partly coloured. Points of the leaves ſhort."—Gathered by Mr. Brown in Van Diemen's iſland. We have ſeen no ſpecimens of this ſpecies.

Mr. Brown's PONCELETIA (ſee that article), as well as his *Anderſonia*, Prodr. Nov. Holl. v. 1. 553. Ait. Hort. Kew. v. 1. 321, ſeems very nearly related to the preſent genus, both in aſpect and character.

SPRETZA, in *Geography*, a river of Boſnia, which runs into the Boſna.

SPREWIL, a town of North Carolina, on the ſouth coaſt of Albemarle ſound. N. lat. 35° 56′. W. long. 76° 39′.

SPRIG, a ſmall eye-bolt, ragged at the point.

SPRIG is alſo a ſmall branch or ſpray. It likewiſe ſignifies a brad.

SPRIGE, in *Geography*, a townſhip of Ohio, in the county of Adams, containing 1664 inhabitants.

SPRIGNO. See SPIGNO.

SPRING, FONS, in *Natural Hiſtory*, a fountain or ſource of water, riſing out of the ground.

The origin of ſprings or fountains has been much controverted among our late naturaliſts. Meſſrs. Mariotte and Perrault aſcribe them to rain, to which others have added dew; their doctrine is, that the rain-water penetrates the earth till ſuch time as it meets a clayey ſoil, or ſtratum; which proving a ſufficient ſolid bottom to ſuſtain and ſtop its deſcent, it glides along it that way to which the earth declines, till meeting with a place, or aperture, on the ſurface, through which it may eſcape, it forms the head of a river.

Now, that the rain is ſufficient for this effect, appears hence; that, upon calculating the quantity of rain and ſnow which falls yearly on the tract of ground, that is to furniſh, for inſtance, the water of the Seine, it is found that river does not take up above one-ſixth part of it.

Springs ordinarily ariſe at the bottom of mountains: the reaſon, they ſay, is, that mountains collect the moſt waters, and give them the greateſt deſcent the ſame way: and that if we ſometimes ſee ſprings on high grounds, and even on the tops of mountains, they muſt be brought from other remoter places conſiderably higher, along beds of clay, or clayey ground, as in their natural channels. If, then, there happen to be a valley between a mountain on whoſe top is a ſpring, and the mountain that is to furniſh it with water, the ſpring muſt be looked on as water conducted from a reſervoir of a certain height through a ſubterraneous channel, to make a jet of an equal or ſomewhat leſs height.

This theory M. de la Hire (Pariſian Mem. for 1703) has taken under examination, in its moſt eſſential article, and that where the authors ſeem to have been the leaſt diſtruſtful. He has endeavoured to find by experiment, whether rain or ſnow-water could penetrate the earth as low as the clayey ſtratum: with this view he procured a leaden veſſel eight feet deep, having a pipe at the bottom: this he buried in the earth, and filled with ſoil of ſand and loam, expoſing the ſurface to receive all the rain that fell. After fifteen years' trial, he found that no water had run through the pipe at the bottom. Again, he took another veſſel, eight inches deep, which he filled with earth, and expoſed in like manner. No rain penetrated ſo as to run out at the bottom from June to February; but after that time it yielded a quantity after moſt rains. Another veſſel of twice the depth, or ſixteen inches, gave a reſult much like that of eight inches. When herbs were planted in this laſt-mentioned veſſel, he found that as ſoon as ever any of theſe came up, and were grown to any bulk, ſo far was the rain that fell from being able to gather itſelf at the depth of ſixteen inches, that it was not ſufficient even to feed the plants, but there was a neceſſity for watering them.

With reſpect to the firſt-mentioned fact, ſays Mr. Dalton, (Mancheſter Memoirs, vol. v.) we need not wonder that no water penetrated through eight feet of earth at Paris, where the annual rain is but 20 inches, when only eight or nine inches penetrated through three feet of earth here, where the rain is 33 or 34 inches annually. But it does not follow, that rain may not deſcend down declivities of the ground into vallies or lower parts, at Paris as well as here, and being accumulated, may penetrate into the earth to a conſiderable depth, eſpecially if it meet with channels or chaſms of any kind, or declining ſtrata of earth, that are impenetrable by water. Paris, Mr. Dalton believes, however, is not very liberally ſupplied with ſprings, as might be expected. As to the experiment upon vegetation, it only proves that the rain in ſpring and ſummer is ſometimes not ſufficient to ſupport vegetable life, a fact which may readily be granted; but then in his experiment the plants were precluded from a ſupply of moiſture from the earth beneath the veſſel, which is a reſerve of the utmoſt conſequence in dry ſeaſons.

This circumſtance of water aſcending again in the earth, on whatever principle it is effected, cannot be denied. There were four inches and three-quarters of rain here in July laſt, none of which paſſed through the earth in the evaporating veſſel; this earth, however, at the end of the month, was far from that degree of dryneſs which is unfit for the ſupport of vegetation. During the firſt four days of Auguſt there fell about three inches of rain, and only half an inch penetrated through the earth in the evaporating veſſel. Conſequently three feet in depth of earth that was moderately moiſt imbibed nearly three inches of rain, before it was ſaturated; whence we may conclude, that three inches nearly had aſcended and been evaporated. This evidently ſhews, that earth is capable of holding a very great proportion of water, that in ſummer the water aſcends to ſupply the exigencies at the ſurface, and that earth far under the point of ſaturation with moiſture is ſtill fit to ſupport vegetation.

This obſervation ſuggeſted the following queſtion—How much water is there in a given depth of earth, when the ſoil is at the point of ſaturation, or in that ſtate, when it begins to yield water from the lower pipe of the evaporating gauge?

To determine this, Mr. Dalton took a quantity of garden ſoil, that had been ſoaked with rain a day before, and preſſed it into a crucible; in this ſtate he found its ſpecific gravity to that of water, as five to three. It was then expoſed to a moderate heat, till it appeared, as near as he could judge, of the ſame moiſture as garden ſoil two inches deep in dry ſummer weather; afterwards it was expoſed almoſt to a red heat, till it became a perfectly dry powder; in the former caſe it loſt one-twelfth of its weight, and in the latter one-third. When it had loſt one-ſixth, it did not appear too dry to ſupport vegetation. When it had loſt two-ninths, it appeared like the top ſoil in ſummer. Hence it follows, that every foot of earth in depth, ſo ſaturated, contains ſeven inches of water, and that it may part with a quarter of its water, or even a half, and not be too dry for ſupporting vegetation.

Clay, juſt dug out for the purpoſe of making bricks, was tried in the ſame manner. It gave the ſame ſpecific gravity as the earth, and yielded not much leſs water.

Theſe experiments and obſervations prove, that M. de la Hire's concluſions, drawn from the vegetation of plants in a given quantity of ſoil, precluded from any communication with the earth at large, are erroneous, or at leaſt unwarranted; as it does not thence appear, that the evaporation for the whole year exceeds the rain in the year, whatever it may do for a month or two in ſummer.

The origin of ſprings may ſtill, therefore, be attributed to rain, till ſome more deciſive experiments appear to the contrary.

Upon the whole it ſhould ſeem, that at the commencement of ſpring, the ground is nearly ſaturated with water for five or ſix feet in depth, as the rains and dews in autumn and winter far exceed the evaporation. There are then five or ſix inches of water at leaſt to be raiſed up again to the ſurface in caſe of exigence in the ſpring and ſummer. If this happen to be ſo, then it is at the expence of ſprings; for we find the generality of ſprings become languid, or entirely ceaſe to flow at the end of a long drought. As to the few ſprings that ſeem to be little affected by dry or wet ſeaſons, they form exceptions, which it would not be difficult to account for. See Evaporation.

Dr. Halley refers the origin of ſprings merely to vapours raiſed by the heat of the ſun, or of ſubterraneous fires, from the ſea, lakes, rivers, &c.

Now, to ſhew that vapour is a ſufficient fund to ſupply all our ſprings, rivers, &c. the ſame excellent author makes an eſtimate of the quantity of vapour raiſed from the Mediterranean ſea, by the action of the ſun: for the reſult of which, ſee Vapour.

Yet the quantity of water thus raiſed, great as it is, is only the remains of what is raiſed another way; *viz.* by the winds, which ſometimes ſweep the water off much faſter than the ſun takes it up.

To find, now, the quantity of water the Mediterranean receives, allow the moſt conſiderable rivers it receives, *viz.* the Iberus, Rhone, Tiber, Po, Danube, Neiſter, Boryſthenes, Tanais, and the Nile, each to furniſh ten times as much water as the Thames; not that any of them are in reality ſo great, but ſo to allow for the leſſer rivulets; but the Thames is found, by calculation, to evacuate 20,300,000 tons of water daily. All the nine rivers above-mentioned, therefore, will only evacuate 1827 millions of tons in a day; which is little more than a third of what is raiſed in that time in vapour. The whole Mediterranean, according to calculation, is computed to contain 160 ſquare degrees, yielding at leaſt 5280 millions of tons. (Phil. Tranſ. N° 189. or Abr. vol. ii. p. 110.) For a more correct eſtimate by Mr. Dalton, ſee River.

The prodigious quantity of water remaining, Dr. Halley allows to rains, which fall again into the ſeas, and for the purpoſes of vegetation, &c. As to the manner in which this water is collected, ſo as to form reſervoirs for the different kinds of ſprings, it ſeems to be this: the tops of mountains, in general, abound with cavities and ſubterraneous caverns, formed by nature to ſerve as reſervoirs; and their pointed ſummits, which ſeem to pierce the clouds, ſtop thoſe vapours which fluctuate in the atmoſphere, and being condenſed by them, they precipitate in water, and by their gravity eaſily penetrate through beds of ſand and lighter earth, till they are ſtopped in their deſcent by more denſe ſtrata, as beds of clay, ſtone, &c., where they form a baſon or cavern, and work a paſſage horizontally, and iſſue out at the ſides of the mountains. Many of theſe ſprings diſcharge water, which running down between the ridges of hills, unite their ſtreams, and form rivulets or brooks; and many of theſe uniting again on the plain, become a river.

After all that can be ſaid in favour both of rain and vapour, it muſt be owned, they are both ſtill encumbered with great difficulties; though by no means inſuperable.

The perpetuity of divers ſprings, always yielding the ſame quantity of water, when the leaſt rain or vapour is afforded as well as the greateſt, is a ſtrong objection to both. Dr. Derham mentions one in his own pariſh of Upminſter, which he could never perceive by his eye to be diminiſhed in the greateſt droughts, even when all the ponds in the country, as well as an adjoining brook, had been dry for ſeveral months together; nor ever to be increaſed in the moſt rainy ſeaſons, excepting perhaps for a few hours, or at moſt for a day, from ſudden and violent rains. Had this ſpring its origin from rain or vapour, there would be found an increaſe and decreaſe of its water correſponding to thoſe of its cauſes; as we actually find in ſuch temporary ſprings as have undoubtedly their riſe from rain and vapour: add to this, another conſiderable thing in this Upminſter ſpring, and thouſands of others; *viz.* that it breaks out of ſo inconſiderable an hillock, or eminence, as can have no more influence in the condenſation of the vapours, or ſtopping the clouds, than the lower lands about it have. The very higheſt ground in the country he finds is not above a hundred and thirty-three yards above the level of the ſea; and what is ſuch an inconſiderable riſe of land, to perennial condenſation of vapours, fit to afford ſo conſiderable a ſpring? or the high lands of the whole country, to the maintaining all its fountains and rivulets?

Other naturaliſts, therefore, have had recourſe to the ſea, and derive the original of ſprings immediately thence; but how the ſea-water ſhould be raiſed up to the ſurface of our earth, and even to the tops of the mountains, is a difficulty, in the ſolution of which they cannot agree. Some fancy a kind of hollow ſubterranean rocks to receive the watery vapours raiſed from channels communicating with the ſea, by means of an internal fire, and to act the part of alembics, in freeing them from their ſaline particles, as well as condenſing and converting them into water. This kind of ſubterranean laboratory, ſerving for the diſtillation of ſea-water, was the invention of Deſcartes. (Princip. part iv. § 64.) Others, as M. de la Hire (Mem. de l'Acad. an. 1703), &c. ſet aſide the neceſſity of alembics, and think it enough that there be large ſubterranean reſervoirs of water at the height of the ſea, whence the warmth of the bottom of the earth, or even the central fire (if there be ſuch a thing), may raiſe vapours; which, pervading not only the intervals and fiſſures of the ſtrata, but the bodies of the ſtrata themſelves, at length arrive near the ſurface; where, being condenſed by the cold, they glide along on the firſt bed of clay they meet with, until an aperture in the ground lets them out. M. de la Hire adds, that the ſalts of ſtones and minerals may contribute to the detaining and fixing the vapours, and converting them into water. But we have a ſtill more natural and eaſy way of exhibiting the riſe of the ſea-water up into mountains, &c. by putting a little heap of ſand, aſhes, a loaf of bread, or the like, into a baſon of water; in which caſe the ſand, &c. will repreſent the dry land, or an iſland; and the baſon of water the ſea about it. Here the water in the baſon will riſe to or near the top of the heap, in the ſame manner, and from the ſame principle, as the waters of the ſea, lakes, &c. riſe in the hills. The principle of aſcent in both is accordingly ſuppoſed to be the ſame with that of the aſcent of liquids in capillary tubes, or between contiguous planes, or in a tube filled with aſhes; all which are now generally accounted for from the doctrine of attraction. See RIVER.

Againſt this laſt theory, M. Perrault and others have urged ſeveral unanſwerable objections. It ſuppoſes a variety of ſubterranean paſſages and caverns, communicating with the ſea, and a complicated apparatus of alembics, heat and cold, &c. of the exiſtence of which we have no ſufficient proof. Beſides, the water that is ſuppoſed to aſcend from the depths of the ſea, or from ſubterranean canals proceeding from it, through the porous parts of the earth, as it riſes in capillary tubes, aſcends to no great height, and in much too ſmall a quantity, to furniſh ſprings with water, as M. Perrault has ſufficiently ſhewn. And though the ſand and earth through which the water aſcends may acquire ſome ſaline particles from it, they are nevertheleſs incapable of rendering it ſo freſh as the water of our fountains is generally found to be. Not to add, that in proceſs of time, the ſaline particles of which the water is deprived, either by ſubterranean diſtillation or filtration, muſt clog and obſtruct thoſe canals and alembics by which it is ſuppoſed to be conveyed to our ſprings, and the ſea muſt likewiſe gradually loſe a conſiderable quantity of its ſalt.

In ſpeaking of the ſituation of the earth, as connected with the formation of ſprings, Dr. Darwin has obſerved, that it conſiſts of ſtrata, many of which were formed originally beneath the ſea. The mountains were afterwards forced up by ſubterraneous fires, as appears from the fiſſures in the rocks of which they conſiſt, the quantity of volcanic productions all over the world, and the numerous remains of craters of volcanoes in mountainous countries. Hence it is contended, that the ſtrata which compoſe the ſides of mountains lie ſlanting downwards, and that one or two, or more, of the external ſtrata not reaching to the ſummit when the mountain was raiſed up, the ſecond or third ſtratum, or a ſtill more inferior one, is there expoſed to day; this may be well repreſented, it is ſaid, by forcibly thruſting a blunt inſtrument through ſeveral ſheets of paper, a bur will ſtand up with the lowermoſt ſheet ſtanding higher in the centre of it. On this uppermoſt ſtratum, which is colder as it is more elevated, the dews are condenſed in large quantities, and ſliding down, paſs under the firſt or ſecond or third ſtratum, which compoſe the ſides of the hill; and either form a moraſs below, or a weeping rock, by oozing out in numerous places, or many of theſe leſs currents meeting together, burſt out in a more copious rill.

But that, as the ſprings conſiſt of the water which ſlides down between thoſe inclined ſtrata; it is evident that, in ſome eminences of ground they are only to be met with on one ſide of the mountain; and in other eminences of ground, on all ſides of it. In ſearching for ſprings, therefore, attention ſhould be given to the inclination of the ſtrata of that part of the country, which may be often ſeen in marle-pits, gravel-pits, or in hollow lanes. But they may in general be found above any moiſt or moraſſy place, or valley; the moiſture of which ſhews that ſprings exiſt in the ſtrata on that ſide of the hill or mountain. And another obſervation for the purpoſe of detecting ſprings, may, it is ſaid, be made on miſty evenings; as thoſe parts of the ground where the miſt commences, are moiſter than thoſe in their vicinity on the ſame level, and in conſequence may generally, if they are not hollow baſons, poſſeſs ſprings nearer the ſurface; for theſe moiſter parts of the ground, having evaporated more during the day, are become colder on their ſurfaces than the drier ground in their vicinity; and in miſty evenings, which are at the ſame time calm, the ſtationary air over theſe moiſt parts of the ground is alſo more loaded with the evaporated moiſture; and on both theſe accounts, theſe moiſter ſituations are liable to ſhew a condenſation of aerial vapour ſooner than other places on the ſame level. And there may be other cauſes of ſprings in the nature of hilly ſituations, for as mountains are colder in proportion to their height, 1ſt, their being in a manner inſulated or cut off from the common heat of the earth, which is always of 48°, and perpetually counteracts the effects of external cold beneath that degree, may be one cauſe. 2. From their ſurfaces being larger in proportion to their ſolid contents, and hence their heat more expeditiouſly carried away by the ever moving atmoſphere. 3. The increaſing rarity of the air as the mountain riſes. All thoſe bodies which conduct electricity well or ill, conduct the matter of heat likewiſe well or ill. Atmoſpheric air is a bad conductor of electricity, and thence confines it on the body where it is accumulated; but when it is made very rare, as in the exhauſted receiver, the electric aura paſſes away immediately to any diſtance. The ſame circumſtance probably happens in reſpect to heat, which is thus kept by the denſer air on the plains from eſcaping, but is diſſipated on the hills, where the air is thinner. 4. As the currents of air riſe up the ſides of mountains, they become mechanically rarefied, the preſſure of the incumbent column leſſening as they aſcend. Hence the expanding air abſorbs heat from the mountains as it aſcends. 5. There is another, and perhaps more powerful cauſe, it is ſuſpected, which may occaſion the greater cold on mountains, and in the higher parts of the atmoſphere, and which has not yet been attended to; it is meant that the fluid matter of heat may probably gravitate round the earth, and form an atmoſphere, which may diminiſh or become rarer, as it recedes from the earth's ſurface, in a greater proportion than the air diminiſhes. And the greater condenſation of moiſture on the ſummits of hills has another cauſe, which is the daſhing of moving clouds againſt them; in miſty days this is often ſeen to have great effects on plains, where an eminent tree, by obſtructing the miſt as it moves along, ſhall have a much greater quantity of moiſture drop from its leaves, than falls at the ſame time on the ground in its vicinity. Hence it is concluded, as ſuggeſted above, that the evening miſt commences ſooner on them than in the vallies, but is ſeen earlier in the ſituations over the moiſter places, if they are on the ſame level with the drier ones, exactly as on the plains or vallies; and may therefore indicate the exiſtence of ſprings, unleſs theſe moiſter places conſiſt of hollow baſons, containing water, which, if not attended to, may in all ſituations deceive the obſerver. And further obſervations for detecting ſprings may be made in rimy mornings; for as moiſt earth is a better conductor of heat than dry earth, the rime will ſooner melt on thoſe parts of the ſoil which are kept moiſt by ſprings under it than in other parts; as the common heat of the earth, which is 48° in this country, will ſooner be conducted upwards in moiſt places to diſſolve the rime on the ſurface. On this account the rime is frequently ſeen on froſty mornings, when the heat of the air is not much above 32°, to lie an hour longer on dry cakes of cow-dung, or on bridges, or planks of wood, than on the common moiſt ground, as the latter much better conducts the common heat of the earth to the incumbent rime which is in contact with it. But as the heat of the common ſprings in this country is 48°, where they exiſt, the rime is ſooner diſſolved than on the ſtagnant moiſture of bogs or moraſſes. It is therefore concluded, that the common cold ſprings are thus formed on elevated grounds by the condenſed vapours, and hence are ſtronger when the nights are cold, after hot days in ſpring, than even in the wet days of winter. For the warm atmoſphere during the day has diſſolved much more water than it can ſupport in ſolution during the cold of the night, which is thus depoſited in large quantities on the hills, and yet ſo gradually, as to ſoak in between the ſtrata of them, rather than to ſlide off over the ſurfaces, like ſhowers of rain. The common heat of the internal parts of the earth is aſcertained by ſprings which ariſe from the ſtrata of earth too deep to be affected by the heat of the ſummer, or the froſts of winter. Thoſe in this country, as has been ſeen, are of 48° of heat, thoſe about Philadelphia were ſaid by Dr. Franklin to be 52°. Whether this variation is to be accounted for by the difference of the ſun's heat in that country, according to the ingenious theory of Mr. Kirwan, or to the vicinity of ſubterranean fires, is not yet, it is thought, decided. And in the winter months, the riſe of ſprings may be detected in moiſt ditches by the preſence of aquatic plants, as of the water-creſs, water-parſnip, brooklime, &c.; as in thoſe ditches which become dry in ſummer theſe plants do not exiſt; and when thoſe ditches with ſprings in them are nearly dry, it may be diſcovered which way the current has formerly deſcended, by the direction of the points of the leaves of aquatic plants, as certainly as by a level; an obſervation which was learnt from Mr. Brindley, the great canal conductor of Staffordſhire.

The proper application of theſe principles may lead to many uſeful concluſions, both in reſpect to agriculture and rural economy, and is a ſort of knowledge which thoſe engaged in the providing of water for wells or pits ſhould be well acquainted with. See Draining, Water, and Well.

For the method of preventing or remedying the injury done to land by ſprings, &c. ſee Spring-*Draining*.

Springs, *Different Sorts of*. Springs are either ſuch as run continually, called *perennial;* or ſuch as run only for a time, and at certain ſeaſons of the year, and therefore called *temporary* ſprings. Others, again, are called *intermitting* ſprings, becauſe they flow and then ſtop, and flow and ſtop again; and *reciprocating* ſprings, whoſe waters riſe and fall, or flow and ebb, by regular intervals, which are alſo called "ebbing and flowing wells." In order to account for theſe differences in ſprings, let A B C D E (*Plate* XV. *Hydraulics*, *fig.* 7.) repreſent the declivity of a hill, along which the rain deſcends; paſſing through the fiſſures or channels B F, C G, D H, and L K, into the cavity or reſervoir F G H K M I; from this cavity let there be a narrow drain or duct K E, which diſcharges the water at E. As the capacity of the reſervoir is ſuppoſed to be large in proportion to that of the drain, it will furniſh a conſtant ſupply of water to the ſpring at E. But if the reſervoir F G H K M I be ſmall, and the drain large, the water contained in the former, unleſs it is ſupplied by rain, will be wholly diſcharged by the latter, and the ſpring will become dry; and ſo it will continue, even though it rains, till the water has had time to penetrate through the earth, or to paſs through the channels into the reſervoir; and the time neceſſary for furniſhing a new ſupply to the drain K E, will depend on the ſize of the fiſſure, the nature of the ſoil, and the depth of the cavity with which it communicates. Hence it may happen, that the ſpring at E may remain dry for a conſiderable time, and even whilſt it rains; but when the water has found its way into the cavity of the hill, the ſpring will begin to run. Springs of this kind, it is evident, may be dry in wet weather, eſpecially if the duct K E is not exactly level with the bottom of the cavity in the hill, and diſcharge water in dry weather; and the intermiſſion of the ſpring may continue for ſeveral days. But if we ſuppoſe X O P to repreſent another cavity, ſupplied with water by the channel N O, as well as by fiſſures and clefts in the rock, and by the draining of the adjacent earth; and another channel S T V, communicating with the bottom of it at S, aſcending to T, and terminating on the ſurface at V, in the form of a *ſiphon* (which ſee); this diſpoſition of the internal cavities of the earth, which we may reaſonably ſuppoſe that nature has formed in a variety of places, will ſerve to explain the principle of reciprocating ſprings. For it is plain that the cavity X O P muſt be ſupplied with water to the height Q P T, before it can paſs over the bend of the channel at T, and then it will flow through the longer leg of the ſiphon T V, and be diſcharged at the end V, which is lower than S. Now if the channel S T V be conſiderably larger than N O, by which the water is principally conveyed into the reſervoir X O P, the reſervoir will be emptied of its water by the ſiphon; and when the water deſcends below its orifice S, the air will drive the remaining water out of the crooked channel S T V, and the ſpring will ceaſe to flow. But in time the water in the reſervoir will again riſe to the height Q P T, and be diſcharged at V, as before. It is eaſy to conceive, that the diameters of the channels N O and S T V may be ſo proportioned to one another, as to afford an intermiſſion and renewal of the ſpring V at regular intervals. Thus, if N O communicates with a well ſupplied by the tide, during the time of flow, the quantity of water conveyed by it into the cavity X O P, may be ſufficient to fill it up to Q P T; and S T V may be of ſuch a ſize as to empty it, during the time of ebb. It is eaſy to apply this reaſoning to more complicated caſes, where ſeveral reſervoirs and ſiphons, communicating with each other, may ſupply ſprings, with circumſtances of greater variety. See Muſchenbroeck's Introd. ad Phil. Nat. tom. ii. p. 1010. Deſag. Ex. Phil. vol. ii. p. 173, &c.

We ſhall here obſerve, that Deſaguliers calls thoſe *reciprocating* ſprings which flow conſtantly, but with a ſtream ſubject to increaſe and decreaſe; and thus he diſtinguiſhes them from *intermitting* ſprings, which flow or ſtop alternately.

It is ſaid, that in the dioceſe of Paderborn, in Weſtphalia, there is a ſpring which diſappears twice in twenty-four hours, and always returns at the end of ſix hours with a great noiſe, and with ſo much force, as to turn three mills not far from its ſource. It is called the *bolder-born*, or boiſterous ſpring. Phil. Tranſ. N° 7. p. 127.

There are many ſprings of an extraordinary nature in our own country, which it is needleſs to recite, as they are explicable by the general principles already illuſtrated.

Springs are farther divided into *oozing* or *weeping* ſprings, where the water gently trickles through the pores of the land; *pipe* ſprings, where they appear in a ſingle rill; and *wall* ſprings, where the water iſſues, as it were, through the joints of a wall. But beſides theſe, ſprings have many other local names, which ſerve to diſtinguiſh them in their particular ſituations, where they break out in grounds. See Spring-*Draining*.

Springs, *Burning*, or *Boiling*. The burning ſpring near Grenoble, in Dauphiné, is famous. St. Auguſtine ſpeaks of it as extinguiſhing lamps which are lighted, and lighting thoſe which are extinct. But it is now cold, like others; only near it is a ſpot of ground, which ſtill emits a light flame; over which ſome imagine it might anciently have paſſed. Auguſt. de Civ. Dei, lib. xxi. cap. 7, and 11. Mem. Acad. Inſcript. tom. ix. p. 565. Mem. Acad. Scien. an. 1699, p. 26.

At Boſeley, near Wenlock, in Shropſhire, there is a famous boiling well, which was diſcovered in June 1711, by an uncommon noiſe in the night, ſo great, that it awakened ſeveral people, who being deſirous to find what it was owing to, at length found a boggy place under a little hill, not far from the Severn; and perceiving a great ſhaking of the earth, and a little boiling up of water through the graſs, they took a ſpade, and digging up ſome part of the earth, the water flew to a great height, and was ſet on fire by a candle. This water was for ſome time afterwards conſtantly found to take fire, and burn like ſpirit of wine; and after it was ſet on fire, it would boil the water in a veſſel ſooner than any artificial fire, and yet the ſpring itſelf was as cold as any whatever. Phil. Tranſ. No. 334.

This well was at length loſt for many years, and not recovered till May, 1746, when by a rumbling noiſe under ground, like to what the former well made, it was hit upon again, though in a lower ſituation, and thirty yards nearer the river.

The well is four or five feet deep, and ſix or ſeven wide; within that is another leſs hole of like depth, dug in the clay, in the bottom of which is placed a cylindric earthen veſſel, of about four or five inches diameter at the mouth, having the bottom taken off, and the ſides well fixed in the clay, rammed cloſe about it. Within the pot is a brown water, thick as puddle, continually forced up by a violent motion, beyond that of boiling water, and a rumbling hollow noiſe, riſing and falling by fits five or ſix inches. It may be fired by a candle at a quarter of a yard diſtance; and it darts and flaſhes in a violent manner, about half a yard high. It has been left burning forty-eight hours, without any ſenſible diminution. It may be extinguiſhed by putting a wet mop upon it, which muſt be kept there a ſmall time. On the removal of the mop there ſucceeds a ſulphureous ſmoke, laſting about a minute, and yet the water is very cold to the touch. Phil. Tranſ. No. 482, ſect. 6.

SPRING, *Lancarim*. See LANCARIM.

SPRINGS, *Medicinal*. See WATER.

SPRINGS, *Artificial*, thoſe kinds of ſprings, or collections of water, which are made by art in different views and intentions, by the farmer and land proprietor.

The methods of proceeding in theſe ſorts of undertakings may be thoſe of making a ſufficient number of under-drain ſprings for the purpoſe of the above kind, in different directions, ſo as that they may unite in one, at or near their terminations in the wells or ciſterns, as, in theſe ways, the water may be drawn from a much larger ſpace of ground than would otherwiſe be the caſe, and, of courſe, better ſupplies of water be afforded.

Country-houſes and reſidences may ſometimes be ſupplied with good water in ſomewhat this way, where there is either a deficiency in the quantity or quality of that which is provided. A very diſtinguiſhed proprietor in the county of Berks, E. L. Loveden, eſq. of Buſcot Park, had recourſe, it is ſaid, to the following very ingenious and ſucceſsful contrivance, in order to accompliſh this purpoſe, which deſerves to be particularly noticed, as it may be applicable to many other ſituations, where the ſcarcity of water, or of ſuch as is good, is felt. It is ſtated in the Agricultural Report of the above diſtrict, that, the ſeat of this proprietor ſtanding near the very brow of the eminence on which it is built, there was only a ſuperficies of about an acre and a half of graſs-land in front, from which there was not the leaſt deſcent. A ſemicircular drain with a mole-plough, ſcarcely perceptible on walking over the ground, in the line of the greateſt elevation, was made to communicate with two ſmall iron grates on the ſide of the gravel-drive up to the principal front. All the water which falls on this drive paſſes to one or other of thoſe grates, between which there is an under-ground drain, with a very moderate fall to that which is the moſt weſterly, where a channel commences which is capable of receiving all the water within the compaſs of the ſemicircular drain, and which paſſing through proper ſtrainers, is conveyed to a large ſunk reſervoir, in a court to the weſtward of the manſion; and a pump being placed there, the family is ſupplied, it is ſaid, with a pure ſoft water, no leſs ſalutary than uſeful for every domeſtic purpoſe.

Springs of the above artificial kind may likewiſe be applicable in many other caſes, where there is a want of water for particular uſes.

SPRINGS, *Land*, ſuch of the more ſuperficial kind as riſe and exiſt in ſituations where the collecting ſurface of the water, together with the containing ſtratum, are of a rather ſmall and confined extent. They are often met with about the baſes of hilly lands, on ſlopes, at the feet of the little riſings in valley tracts, in their variouſly mixed banks, as well as in many other ſituations and circumſtances of land. The term is alſo ſometimes applied to the drains which are made by art for the procuring of water for different purpoſes.

They are always ſuch as are of the more ſuperficial kind. The writer of the work on "Landed Property" conſiders theſe ſprings as partial effects, partaking of the nature of cold, or of weak lands, according to the quality of the ſoil that covers them. They may, it is ſaid, be conſidered as the moſt common diſeaſe of land where water is concerned.

It is ſuppoſed that the cauſes of theſe ſorts of ſprings are moſtly of a topical nature, the diſeaſe being commonly produced by rain-water falling on an abſorbent ſoil which has a broken ſub-ſtratum. A broad, flat-topped ſwell of ſandy or gravelly loam, beſet with plots or maſſes of clay, is, it is thought, ſingularly productive of this ſort of watery lands. The means of remedying the injurious wetneſſes ariſing from theſe kinds of ſprings, are ſhewn in ſpeaking of ſpring-draining. See SPRING-*Draining*.

SPRING-*Drain*, that ſort of drain or channel which is prepared and conſtructed in land for the purpoſe of taking away ſuch kinds of over-wetneſs in it, as is cauſed by internal or other ſprings. Theſe drains are made in many different methods, according to the nature and circumſtances of the grounds, and the degrees of the wetneſſes which are preſent in them; but, for the moſt part, in a deeper and more ſubſtantial manner than in the other modes of forming drains.

Drains of this ſort are conſtructed of many different kinds of materials, but moſtly of thoſe which are of the more ſolid and durable deſcriptions, ſuch as the common brick, bricks made in different forms and ſhapes for the purpoſe, pipes made in different ways, flat ſtones of the free-ſtone and other kinds, common ſtones laid in different modes, and ſome other ſimilar ſubſtances. Where common bricks are employed, they are often built in a firm manner on the ſides and arched over the tops, but in other caſes laid lengthwiſe over each other to the neceſſary height, and then covered over with flat ſtones, and the earth filled in upon them. They have alſo other modes of conſtruction, which are ſometimes much leſs expenſive, according to the nature of the drainage, as will be more fully ſeen and explained in ſpeaking of ſurface-drains. But where bricks made for the purpoſe are uſed in theſe caſes, other methods are followed. There are many different forms of bricks contrived in this intention; one of which is ſo conſtructed, as to form, when laid, a ſmall neat arched drain four inches in diameter, and is principally made uſe of where only ſmall drains are neceſſary, as in the conveying of the water of ſprings to houſes and other buildings, &c. A ſecond ſort is made of three pieces, ſo as to conſtitute a ſquare drain ſix inches in width and height; and a third kind is formed with a circular opening ſix inches in diameter, having long ſquare openings in the top part, and light parts two inches in breadth, to reſt upon, on the ſides. It was invented by Mr. Couchman, of Boſworth Temple, in the county of Warwick. The two laſt ſorts are well ſuited for forming large drains, but more eſpecially the latter. In ſtiff ſoils, they are for the moſt part beſt when laid ſingly, without any common bricks or tiles being placed underneath them; but in light ſandy lands, it is moſtly better to lay common bricks, or ſtrong tiles, under their ſides, in order to prevent their ſinking down into the ſoil too much. See SPRING-*Draining*.

Another ſort of bricks that may be employed in this way, it is ſuppoſed, with ſtill greater advantage than the above, has been invented by John Aſhworth of Turton, near Bolton, in the county of Lancaſter. Theſe are contrived in different forms and ſhapes, ſo as to be laid in different manners, and form different ſorts of openings. When they are placed in ſuch a manner as to conſtitute a ſort of incloſed triangular opening for the diſcharge of the water from the land, eighty-four bricks are required to every eight yards; while with common bricks, one hundred and ninety are neceſſary. There is conſequently a ſaving, by this means, of one hundred and ſix bricks in every eight yards of draining that is performed. By another form of theſe bricks, laid ſo as to ſlant againſt each other, without any thing under them, fifty-five bricks are only neceſſary for draining eight yards in length; and, of courſe, one hundred and thirty-ſeven bricks are ſaved in that extent. In another form in which theſe bricks are laid, which repreſents a ſort of incloſed diamond-formed opening, one hundred and ten bricks of this kind are taken to complete the ſame length of drain, by which eighty-two bricks are ſaved. This form is, however, only neceſſary where the quantities of water to be carried off, or taken away, are very large. In a further different form and manner of laying theſe bricks, the ſame number are made uſe of as in the firſt caſe, and the ſaving of common bricks is in the ſame proportion. A farther ſtill different form and manner of laying theſe bricks, employs them in the ſame proportion as in the third caſe, and ſaves common bricks in the ſame extent. This is particularly uſeful in the drainage of boggy, ſwampy, ſoft lands, and where quickſands are preſent. There is yet another form and manner of laying theſe bricks, which ſaves common bricks in the ſame manner as in the ſecond of the above caſes. And there is, laſtly, a ſtill different form and manner of laying theſe bricks, which takes them in the ſame quantities as in the third and fifth caſes above, and conſequently ſaves common bricks in the ſame proportion as they do. See SPRING-*Draining Bricks*.

It is not improbable but that bricks for this purpoſe may have been invented by other perſons, in different other diſtricts, which may anſwer well for forming ſpring-drains in different caſes. See SURFACE-*Drain*, and SUBSOIL *Brick-Drain*.

Drains formed of theſe materials, though they are commonly very effectual for the purpoſe, are in general attended with conſiderable expence.

Large pipes formed of burnt clay, and ſome other ſorts of materials, are not unfrequently employed in the making of drains of this nature, as well as in ſome caſes for thoſe of the ſurface kind.

Where ſtones are made uſe of in conſtructing drains, for the purpoſe of carrying off the water of ſprings, there are ſeveral different modes of laying them. They are ſometimes built up on the ſides, to the neceſſary heights and widths, by the ſmaller ſtones, and then covered over the tops, and connected by the large flat ones of the freeſtone, limeſtone, or other ſimilar kinds: at other times, the flat ſtones, whether of the freeſtone, limeſtone, or other ſorts, are ſet up edgeways in the bottoms of the drains, in a kind of triangular manner, or, which is better, in ſomewhat the form of the reverted letter A, the latter being laid over on the tops with broad flat ſtones. Theſe conſtitute excellent cheap drains.

There are alſo ſeveral other matters of this nature, as thoſe of the flaggy and ſlaty kinds, which may be uſed for this purpoſe, with equal advantage in different ſituations. See SURFACE-*Drain*.

It has been ſuggeſted, that in conſtructing main drains of this ſort for carrying off and diſcharging the water of ſprings, beſides the particular conſideration of the nature of the ſoils through which they are to be cut and formed, which is conſtantly to regulate the whole of the future operations, proceſſes, and works about them, where they are of a looſe gravelly quality, or of the nature of a quick or running ſand, the round or barrel form of drain, when turned with either common bricks or ſtones, the *lower* half being laid in mortar, and the *upper* half dry, may probably be the moſt effectual as well as the moſt durable of any that can be had recourſe to, in ſuch caſes. In moſt inſtances, alſo, of drains for carrying away wetneſſes of this kind, the outlets of them, where the water is diſcharged, ſhould be well ſecured in ſome way or other, in order to prevent any injury that might be ſuſtained by the force of the paſſing current of the water out of them.

As the common openings of the ſoughs or paſſages in theſe drains are moſtly about ſix inches ſquare, a piece of wood of that ſize, and about one yard in length, is often found very uſeful for laying in the bottoms of the drains, while forming, for building the ſtones or other materials on each of the ſides of it, and which is capable of being drawn or ſhifted forward, as the workman proceeds in completing the ſoughs or drains.

The different tools uſed in forming and cutting drains are deſcribed under their proper heads.

The making of drains of this nature, in ſome diſtricts and places is termed *ſoughing*, eſpecially when they are formed with ſome ſort of hard materials, ſuch as bricks, ſtones, or other ſimilar ſubſtances, and is a method of ſpring-draining which is very commonly had recourſe to by the drainer. See SOUGH and SPRING-*Draining*.

SPRING-*Draining*, the removing of that ſort of wetneſs in land, which is cauſed by, or which ariſes from, ſprings, in its internal or other parts, in the manner already explained under the article DRAINING *of Land*.

Its practice principally depends upon the diſcovery of the main ſprings in the different caſes, upon the proper taking of their levels, and upon making uſe of ſuch means as are capable of drawing off the water in particular inſtances, without the expence of too much cutting; as, without finding out the *main* ſpring, or cauſe of the miſchief, nothing effectual can, it is ſaid, be done; or without taking the exact level of it, and aſcertaining the *ſubterraneous* bearings which it may have; as where the drains, in ſuch caſes, are cut even a very ſmall diſtance beyond the lines of the ſprings, the water which iſſues from them can never be reached; whereas by exactly aſcertaining thoſe lines, by the practice of levelling, the ſprings can be cut off in an effectual manner, and the land be rendered dry in the leaſt expenſive and moſt eligible method. The ſuperabundant wetneſs of the land, where neceſſary, may be taken away, where the depth of the drains do not reach it, by making uſe of implements of the auger kind, ſo as to bore down, and tap or let off the water of the ſprings which lie ſtill lower.

It is conſtantly neceſſary in this, as well as other kinds of draining, to pay great attention to the direction or mode of conducting the drains, and likewiſe to the application of the tools which are employed for tapping or drawing off the ſprings. It is perhaps principally in the ſuperiority of management in theſe reſpects, that the excellence of Mr. Elkington as a drainer of land conſiſts. But though the mode of tapping ſprings by means of the auger, and letting off the water from the bottom parts of the drains, without the trouble and expence of more cutting and digging, was unqueſtionably brought to practical perfection by this able drainer, its uſe for other ſimilar purpoſes had long been known and experienced; as it has been aſſerted, that in attempting to diſcover mines by means of this tool, ſprings have been tapped, and the adjoining wet grounds, in conſequence, drained or laid dry, either by letting the water down into a porous ſubſtratum below, or giving it a vent and exit at the ſurface. The ſame tool has alſo been employed in bringing water into wells, by boring with it in the bottoms of them, to ſave the expence of more digging. This is ſuppoſed to be the caſe more eſpecially in Italy, where it is probable that the practice is of great antiquity, as Buffon has ſtated in his Natural Hiſtory, that in and about the city of Modena, whatever part is dug, when the depth of ſixty-three feet is reached, and five feet deeper bored with this tool, the water ſprings up with ſuch force, that the well is filled in a very ſhort ſpace of time. It is likewiſe noticed, that, in theſe caſes, the tool often bores through large trunks of trees, &c. which give great trouble to the workmen. This is conſequently a tool which is not only well calculated for the purpoſes of ſpring-draining, in many inſtances, but for a great variety of different other rural uſes and applications.

The porous rocky chalks are excellent conductors of water, it has been obſerved, where they have only a thin covering of an abſorbent loamy material, as they imbibe, after the ſurface-ſoil has been ſaturated, every particle of water that may come upon them in the form of rain or otherwiſe. This is ſeen to be the caſe in many hilly ſituations formed chiefly of ſuch matters, in the ſouth-weſt parts of the kingdom, as in the counties of Wilts and Dorſet. The water which is abſorbed and taken up by ſo porous a ſubſtance as chalk, it is ſaid, ſoon eſcapes the power of evaporation, and continues to deſcend, in the manner of that which paſſes through a filtering-ſtone, until it meet with an impervious or non-conducting ſtratum or layer, upon which it collects; and if this ſurface, on which it is collected, ſhould lie above the level of the ſea, or other collection of water, it forces its way out, in the manner of a ſpring, or more copious fountain; not always in one conſtant ſtream, but often periodically: the ſprings of chalk-hills differing, in this reſpect, from thoſe of the more open conducting kinds; which is a fact, it is thought, that is entitled to be more fully and philoſophically inveſtigated. The action or operation of the waters of chalk-hills, it is ſuggeſted, is moſt clearly ſeen on the ſea-coaſts, where the baſes of the chalk-cliffs reſt upon an impervious or non-conducting ſtratum or bed, which being ſoftened and worn away by the impreſſion of the waters collected upon it, the cliffs are undermined, and the faces of them thrown down. Where the baſe of the chalk dips beneath the ſurface of the ſea in low tides, the whole collection of water regains its "native home," it is ſaid, unſeen. And it is not doubted but that much rain-water, paſſing through other ſtrata, finds its way to the ſea in a ſomewhat ſimilar manner.

Rocks of the open kind, it is ſuppoſed, when they are examined as conductors of ſubterraneous water, will be found to have various effects in producing the neceſſity of this ſort of draining, according as there may be a difference in their natural properties. Sand-rock, where it is preſent, always acts, in the manner of chalk and looſe ſand, as a filter, letting the water freely through it. There are many different parts of the kingdom in which it is found in conſiderable quantity and extent, the ſurface-ſoil being moſtly dry in quality. Where the rock is of the nature of ſlate, from being of an argillaceous or clayey quality, it is often in a high degree impermeable to water; but as it in general abounds with cracks, fiſſures, and ſtill finer crevices, eſpecially near the ſurface, water readily finds its way into it, and either filtrates or percolates ſlowly through it, or finds a vent and exit in the clefts or ſeparations of the maſſes; and, collecting in ſuch parts, forces its way to the ſurface, as a ſpring; or continues to deſcend, until it meet with a more compact ſtratum, which dips towards the face of ſome hill or ſhelving ground, where, reaching the ſurface or outer limits of the rock, it either forces its way through the ſoil, and feeds a fountain, or, if the quantity of water is too ſmall, or the thickneſs and texture of the ſoil are too powerful to permit it to eſcape in a body, ſpreads itſelf beneath the ſurface materials or thicker covering, and produces watery land. A ſhelf of ſlate-rock, under theſe circumſtances, operates, it is believed, as a ſtratum of ſand or gravel. Rocks of this nature are common to many different parts of the country, as to the counties of Devon, Cumberland, and Weſtmoreland, to Wales, and the weſtern Highlands of Scotland; being, it is imagined, peculiar to the more weſtern parts of the iſland.

Limeſtone rocks, which are moſt various in texture and arrangement of parts, are met with in many places as a ſubſtratum of ſoils. The ſoft and granulous kind, of which the Cotſwold hills may be ſaid to be compoſed, as well as thoſe which ariſe in the environs of the city of Bath, and which are found in ſome places in Yorkſhire, Northamptonſhire, and probably in ſome other parts of the kingdom, is of a porous abſorbent texture; water acting upon it as upon chalk. But the more ordinary ſort of limeſtone, which may be ſaid to be met with in almoſt every department of the kingdom, is of a more cloſe texture. It is, however, commonly either divided and parted out into large blocks, or broken into fragments, though ſometimes found diſtributed in continuous maſſes. Still more frequently, the blocks ſeem as if they had been thrown together in a fortuitous manner into their preſent ſituations, being ſeparated by irregular interſpaces, either filled with earth, or other foſſile ſubſtances, or forming open fiſſures, cracks, and chaſms of different widths; and, in a few *known* inſtances, form caves or openings of extraordinary dimenſions. This claſs of limeſtone rocks may, it is ſuppoſed, without riſk, be conſidered as the moſt free and extenſive conductor of internal waters of any in this country. There are other kinds of this ſort of rocky ſubſtrata, which have directly the contrary quality and effect in reſpect to the diſtribution of water in ſoils.

The next ſort of material, which diſplays the moſt ſimple explanation of the effects which are produced by water falling or coming upon land, is that of ſand, and eſpecially where the lands are of the deep ſandy kind, ſuch as the county of Norfolk is chiefly compoſed of; ſand, it is remarked, being of a more open and porous nature than chalk, and the hills formed by it, or the more depreſſed maſſes of it, being in general of much leſs depth than thoſe of that ſubſtance, the effect is more quickly produced. Preſently after a glut of rain, the ſprings, in theſe caſes, are ſaid to fly out. Beſides, there is another difference, which is more intereſting, it is thought, to the preſent inquiry, between the effects produced by chalk and by ſand, as conductors of rain or other water. Chalk, for the moſt part, throws it out from the ſides or at the baſes of the hills formed by it, in clear ſtreams, producing no other effect on the ſurfaces of the lands than that of forming channels of conveyance for it to the rivulets or brooks, to which the particular caſt of ſurface may incline them. The waters abſorbed or drank up by chalk-hills ſeldom occaſion, it is ſaid, any thing of the nature of upland bog, unleſs when they riſe in the area of a flat-baſed valley, or are impeded and obſtructed therein, and by ſpreading and ſtagnating over its ſurface, encourage the growth and decay of aquatic plants. On the contrary, ſand-hillocks are, it is ſaid, ſingularly productive of this baneful diſeaſe of land; owing, in part, it is ſuppoſed, to a want of uniformity in their internal ſtructures, as well as of an evenneſs of baſe, when compared with chalk hills, which generally reſt on impervious ſtrata of clay; and likewiſe owing to the openneſs of the texture of the ſandy material, which ſuffers the contained waters to ſpread out and diſtend themſelves freely in every direction.

Gravel is more porous, or conducts water ſtill more freely, than ſand; and is moſtly found in thin ſtrata or veins, but ſometimes in detached maſſes, though very rarely in extended hills. In ſome ſituations it is free from the admixture of any ſort of earthy matter. In this condition it conducts water as a pipe; or when embanked with impervious matters on every ſide, contains it as a ciſtern. When a ſtratum or layer of ſubterrene gravel, or any other free conductor, is ſupplied with, or has deſcending waters coming upon it, it either conducts them to the ſurface, leads them to a fountain, or, when the ſurface is too ſtrongly guarded to allow of their eſcape, ſtores them up, and confines them in quantity beneath the ſoil. Where the gravel is partially depoſited in veins, and the covering is thin, and of an abſorbent or porous quality, the water, wherever it approaches the ſurface, fills every pore of the ſoil, and though unable to break its way out in a ſtream, as a ſtrong ſpring, occaſionally trickles and percolates through it; thus encouraging the growth of ſuperaquatic plants; which, being too groſs and unpalatable for paſturing ſtock, fall where they have grown, and, during a ſucceſſion of ages, raiſe detached mounds of vegetable earth; partaking, like the moory baſis of ſand-hill vallies, of the nature of moraſs.

If the containing ſtratum or bed be more generally and evenly ſpread beneath the ſoil, and where this is of an abſorbent porous quality, and moreover ſo thin as to be eaſily permeable, as well as lying nearly level, a large extent of ground may, it is ſaid, be rendered worthleſs,—may become a mere moraſs, or extended bog. But if, under theſe circumſtances, the land lies with much deſcent, the lower ſide only will be much affected. Further, if the ſoil or covering, though of an abſorbent porous nature, be conjointly of a ſufficient thickneſs and texture to prevent the contained waters from riſing to the ſurface, an uniform breadth of cold weak land will be produced. Where the covering is not only thick, but impervious or non-abſorbent, ſo as to prevent the depreſſed waters from riſing to the roots or feeding fibres of field-plants, lands of a valuable quality are met with: even when in the ſtate of perennial herbage, the finer graſſes are, it is ſaid, produced; but that, owing to the coolneſs which ſubjacent waters communicate to the ſoil, in the early ſpring, vegetation is more backward, and the produce leſs than it would be, if the cauſe of the coolneſs were removed by this mode of draining. Land of this deſcription is met with extenſively, and in great abundance, on the ſlopes, and at the baſes of the riſing grounds, in almoſt every vale-diſtrict of the kingdom.

Pebbly matters, which are a common ſubſtratum of land, it is ſaid, in the more mountainous parts of the country, act in a ſimilar, but more complete manner; being a ſtill more free conductor of ſubterraneous waters than gravel.

The manner in which chalk conducts ſubterraneous water to the ſea, without injury to the ſurface of the land, is ſeen above; and open rock, ſand, gravel, or any other porous or conducting material, either ſingly or in conjunction, have the ſame effect, when they form a free and continued connection between it and the ſurface of the open abſorbent lands. But the ſame ſubſtructure, when ſituated at a diſtance from the ſhore, and cut off from all ſubterrene communication with the ſea or other waters, by the intervention of impervious or repellent matters, produces widely different effects; and is capable of doing much miſchief to the lower lands which more immediately inveſt it, as well as to thoſe cloſe around it. In theſe circumſtances, the ſubſiding waters, unable to find a paſſage downwards, fill every fiſſure, crevice, and pore; continuing to collect, until the ſurface of the embodied waters reaches ſome friendly porous ſtratum, to conduct the overflow horizontally towards ſome open outlet; or until the collection has gained a ſufficient aſcendency and weight to break its bounds, and force its way to the ſurface, or blend with the ſuperficial waters. The bottom of a lake, or the channel of a deep-ſunk river, firſt offers the means of relief, in many caſes; and it is not unuſual to ſee ſpring-waters curling at the ſurface of a deep river-pool. In many ſituations, it is ſuppoſed probable that rivers receive larger ſupplies from their own beds than is evident to the eye of common obſervation. Where the river-bed is ſhut againſt them, the impounded waters naturally continue to riſe, until they reach an open ſtratum of the lands on its banks, and thus effect their eſcape. Where no ſuch conducting ſtratum offers itſelf, deep cleft dingles and narrow dells, branching out of the rivered valley, or wider vale, may, it is ſaid, be conſidered as the next places calculated for giving vent to riſing waters: and here they are not uncommonly found boiling up through beds of ſand or gravel, or the ſhattered fragments of rock; and by ſpreading, in a ſtate of nature, over the baſe of the dell, give riſe to moory grounds; or iſſuing from its banks, give birth to a more active ſtream. No deep ſunk dell occurring, or any abſorbent ſtratum of the vale lands being ready to receive the internal waters, or, having received them, being unable to give them vent, by reaſon of their being cloſed on their lower margin or border, the ſurface of the embodied waters neceſſarily continue to riſe above the baſe of the hill, until, having reached a proper conductor, a ſpring or fountain is formed; or meeting with a deſcending ſubſtratum of abſorbent or porous matter, it enters it with the effect of deſcending waters, and produces different ſorts of wetneſs according to circumſtances. On extenſive continents, and even in the interior parts of this iſland, inſtances of a ſimilar nature muſt neceſſarily, it is ſaid, frequently occur.

It may be alſo noticed, that it muſt likewiſe not unfrequently happen, that waters which have been abſorbed by the porous materials of high lands are checked in their deſcent, before they reach the baſe of the hill or mountain which has imbibed them; in the interior of which, it is more than probable, minor reſervoirs are formed by riſing waters, and there act in a ſimilar manner to thoſe which are formed at a greater depth. The perpetual ſprings which may be ſaid to be every where iſſuing from the ſides of hills, are ſtrong evidences, it is thought, in favour of ſuch a poſition. For what, it is aſked, but an extended ſurface of embodied waters, could ſend forth theſe *conſtant*, and, in ſome inſtances, almoſt *uniform* ſtreams? A lake, it is well known, thus regulates the ſtream which flows from it. But to produce this effect, it is not requiſite, it is ſuppoſed, that the lake ſhould be formed in the interior of a mountain. It matters not what the receptacle is, provided it be of ſufficient extent, and its ſeveral parts, if anomalous, have a free communication with each other; whether it be a cave, an extended ſeries of fiſſured rocks, or an extenſive ſtratum of gravel, or any other freely conducting material, the ſurface of the water will be equally level, and equally capable of regulating the ſupplies received, ſo as to diſcharge an uniform or a moderated ſtream; as the wide naked waters do, which are ſeen to ſpread on the ſurface in mountain ſituations. A ſudden ſhower does not ſenſibly affect, it is ſaid, the overflow of a lake, nor does a heavy fall of rain cauſe a ſudden flood; as it does where there is no ſuch extent of ſurface to regulate the ſupply: nevertheleſs, after much rain, and ſtill more after a long continued wet ſeaſon, the overflow is increaſed, and the ſtream enlarged. And preciſely ſo, it is ſaid, are theſe ſorts of ſprings or fountains affected.

The marles which abound in calcareous matter are moſtly of an open, porous, and abſorbent nature, and not unfrequently form the ſubſtrata of lands in different places, which may receive and hold water, in ſome caſes ſo as to let it break out and produce ſprings on the ſurface, which are highly injurious to the ſoils. Some marles are, however, of an impervious and retentive quality.

There are alſo ſome ſorts of materials which are highly impervious under ſome circumſtances, but which become porous or open in others, as clay in certain ſtates; this, however, has little to do with the nature of ſpring-draining. See Draining *of Land*.

In laying down the general principles and theory of draining land under its proper head, the manner in which the principal agents and cauſes which operate in the production of ſprings are capable of producing ſuch effects in different circumſtances, has been particularly explained, though the great internal ſprings which ſupply the interſecting rivers of countries have not been touched upon, as they have not yet been by any means ſufficiently inveſtigated or explored; and beſides, they moſtly lie at ſuch great depths, as not to affect the ſurface, conſequently have nothing, or very little, to do with the preſent inquiry.

Draining, on the principle of removing ſprings, not only produces extraordinary effects in the laying of the lands dry which are near to them; but in cauſing ſprings, in wells, wet grounds, and other places, at very conſiderable diſtances, to become dry, though they had no evident communication or connection.

Drainage of Boggy, Moraſſy, Swampy, and other wet Land, produced by Springs.—See Bog and Draining *of Land*, under which articles this ſubject is diſcuſſed as far as our limits will allow.

A pump has been lately contrived by Mr. Wakefield, the ingenious drainer of Trafford and other moſſes in Lancaſhire, for aſcertaining the lines of ſprings in this ſort of draining, which is ſaid to anſwer well. See Spring-*Draining Pump*.

In many caſes of this ſort, it may be known, it is ſaid, whether the channel of the water lie deep or not, by the appearance of the ſurface. Where the land is dry immediately above the place where the water ſprings up, it is an evidence that the channel or reſervoir lies deep, and that the water is forced up ſo as to iſſue in a perpendicular manner; but, on the contrary, where the land is wet for ſome diſtance above the principal outlet of the ſpring, it is a ſure ſign that the water is flowing in a channel near the ſurface, and that the *overflowings* of it cauſe this wetneſs. It will be a certain evidence of this, if there be only one ſpring in the wet ground; but if the internal ſtrata do not lie horizontally, or regularly, and ſeveral ſprings appear, ariſing from water running in different channels, the land above the largeſt or principal ſpring may be wet, not from the *backing-up* of that ſpring, or its channel being near the ſurface, but by the breaking out of the leſſer ſprings in their *deſcent*, the channel of the waters of which has thus found a vent and exit to and out of the ſurface, higher than that of the larger ſpring. It is in caſes of this kind that draining is attended with moſt difficulty; and where all the cutting and other matters neceſſary cannot be ſo eaſily aſcertained at firſt, until ſuch time as what is abſolutely requiſite be executed, which will lead to the diſcovery of what further is wanted, and in what manner it ſhould be accompliſhed, by expoſing to view the ſubſoil, or under ſtrata, in which the water flows. The making of *exploratory bores* with the auger, is, it is ſaid, uſeful in this and all other difficult caſes.

Where, in ſuch caſes as the above, there are different lines of drains cut one below another, from the highermoſt ſprings between the wet and dry land, not of ſuch depth as to catch and intercept the water all the way down the ſlope, as formerly practiſed, however they may be filled with looſe ſtones, though they may render the ſurface drier while they continue to run, they ſoon choak up, and burſting out in different parts, the land ſoon becomes equally, if not more wet, than it was before they were made, and ſo formed out. It is more difficult to drain this ground a ſecond time, even in the proper manner; as the ſurface, by means of the former drains, being ſo much altered from its natural appearance, the true ſituation of the ſprings cannot ſo eaſily be hit upon, and the frequent burſts of the old drains increaſe the perplexity in no ſmall degree. It frequently happens that the uppermoſt, where they are the *ſtrongeſt* outlets, are the *main* ſprings, and thoſe below only *leakages;* which implies, that ſome of the water from the main ſpring finds a paſſage through ſome opening in the *upper ſoil*, near the ſurface, and breaks out lower than the main ſpring, when it meets with reſiſtance from any bed of clay: by cutting off the main ſpring, this of courſe becomes dry; therefore the ſame caution is neceſſary to aſcertain this before proceeding to mark out the drain or drains in ſuch caſes, as from the *main ſpring only* the level muſt be taken. In irregular banks, where the ground, owing to the perpendicular ſituation or preſſure of water behind, has *ſlipt*, or fallen down, the drain muſt be carried higher up the declivity than where the water has its apparent outlet, to the ſound ground that has undergone no change, and where the *real* ſpring will be intercepted; the water in the ſlipt ſand below being only leakages from that above, but which is apt to deceive in cutting the upright trench, or that which is made from the outlet up to the croſs one, along the line of the ſprings. When the main ſpring riſes in a ſteep bank a conſiderable height above the level of the brook or place where the drain is to diſcharge itſelf, it is unneceſſary to cut a deep trench, or to lay a covered drain, all the way from the brook up to it; for the deſcent being too rapid, and if deep cut by croſſing veins of ſand, that are always met with in ſuch ſituations, the bricks or ſtones with which the *ſough* or conduit of the drain is laid, would be undermined by the rapidity of the current, which would alſo carry down a great quantity of the looſe ſand; but it ſhould be begun only ſo far down the bank, as, by *cutting in level*, the drain may be ſix or ſeven feet lower than the outlet of the ſpring, or whatever depth is neceſſary for drawing down the water to ſuch a level as it may diſcharge itſelf without riſing to the ſurface, or injuring the ground adjoining it. The remaining part of the cut, down to the brook, either in a ſtraight or ſloping direction, may be left open, and need not be deep, but guarded from the cattle, and from the plough when the field is in tillage. If covered, it need not be deeper than two feet; and there is no occaſion for boring in any part of it.

When there may be any difficulty in aſcertaining the exact line of the ſpring and that of the croſs-drain, where *it* does not *appear* on the *ſurface*, or when there is no apparent outlet from whence to take the level, in bringing up the leading drain for carrying off the water, it can be then diſcovered when it croſſes the proper line, and without cutting any farther up, the croſs-drain muſt be carried on that level, ſo far to each ſide, along the *tail* or termination of the rock or ſand containing the water, as the ſituation of the ground and other circumſtances may require. And if, in cutting the croſs-drain, the line marked out by the ſpirit-level ſhould be found in ſome places to be below that of the ſprings; and if in boring along that line no water be found, then ſmall cuts muſt be made, of the ſame depth, from the drain up to where the ſpring lies; for if the drain be cut *below* the line of the ſpring, all poſſibility of reaching it, even by the auger, is loſt, as boring can have no effect where the ſubſtratum is clay, and where there is no *under* water; and if it be cut *above* the line of the ſpring, it will require deeper cutting and boring to reach it, as there, for the moſt part, the ground riſes higher, and that part of the porous ſtrata below the drain may contain as much water as may injure the ground, and which may eaſily paſs under the bottom of the trench, between the auger-holes, and find vent below it. If the expanſe of the valley or bog betwixt two banks be ſo narrow, that the ſtratum of rock or ſand containing the ſprings, unites within reach of the auger below the clay, one trench up the middle, with auger-holes, will do the buſineſs, without any croſs or branch-drains. Although the ſprings that injure ground in this ſituation break out of the banks all round nearly on the ſame level, yet the reſervoir from whence they proceed may, it is ſaid, be hit on in the middle of the valley, by boring through the ſuperincumbent body of clay that forces the water to riſe and ooze out along the upper edge of it, at its junction with the higher porous ground. The drain being cut in the hollow part of the ground, and the ſpring below bored into, it is evident that the depth of the drain being ſo much lower than the natural outlet of the ſprings, the preſſure of water above that level, which is the bottom of the drain, will force that under the trench through the auger-holes; or even for ſome time, until the water ſubſide, it might be made to riſe higher than the level of its natural outlet. The conſequence of this will be, it is further ſaid, that the water of the ſpring having found, by means of the drain and boring, a new and eaſier channel, will ſoon abandon its former outlets, and ceaſe to overflow the ground that formerly lay below it. Many remarkable inſtances of this ſort of drainages are ſtated to have been performed by Mr. Elkington in different places, and particularly at Scariſbrick-Hall, near Ormſkirk, in Lancaſhire.

However, bogs, or wet grounds of the ſame nature in ſimilar ſituations, may, it is ſuppoſed, proceed from different cauſes, and, of courſe, require different ſorts of treatment in the removal of their wetneſſes. In ſuch caſes, the firſt thing to be conſidered, in examining the ground, is, whether the ſprings proceed from one ſide only, from both ſides, or lie in the middle of ſuch bogs; as, according to the nature of theſe circumſtances, the line or lines of the drain or drains muſt be directed. In order to properly aſcertain this, it will be neceſſary to have recourſe to the uſe of the ſpirit-level. If the bog ſhould have a deſcent from one ſide to the other, although the wetneſs may appear all round, it will be evident that the water proceeds only from the higher ſide, but paſſing over and under the ſurface, part of it is abſorbed by the dry ground along the lower ſide; from whence, if the level were not previouſly aſcertained, it might be ſuppoſed alſo to proceed. In this caſe, one drain cut along the upper ſide will be ſufficient to keep it dry. If the bog ſhould have a deſcent from both ſides to the middle, or be perfectly level, the ſprings may proceed from both ſides; and will, conſequently, require a drain on each, if they do not unite in the ſame ſtratum below the middle of the bog, and can be hit on by boring in one drain cut in the centre, as already ſhewn.

In caſe a bog of this nature between two hills is of great extent, it may be requiſite to have three different drains; one on each ſide, and one in the middle; which laſt muſt be an open one, to receive the whole of the ſurface-water, as well as to cut off any ſprings that may ariſe in that part of the bog. In all caſes of this nature, where there is any difficulty of diſcovering from whence the principal ſprings proceed, or what is the nature and inclination or diſpoſition of the ſubſtrata, the application of the auger may be had recourſe to for the purpoſe.

But in very wet ſwamps, or bogs of great extent, it is neceſſary to have other cuts than thoſe that carry off the ſprings: for although the upper ſprings, which are the principal cauſe, be cut off, there may be veins of ſand or gravel lower than thoſe, out of which it is alſo neceſſary to extract the water. If the ground is to be divided into incloſures, the open ditches may be ſo directed as to hit on theſe lower collections of ſubjacent water, as well as to carry off any that might ſtagnate in the hollow parts of the ſurface. The next thing to be conſidered in this ſort of draining is the conducting of the drain, after the levels have been taken, and the true line of it fixed; and whether it ſhould be covered or open. If the land is to be incloſed, and as the line of the trench may ſerve as a proper diviſion of the ground, it may be made an open cut, or ſunk fence; if not, a covered drain: but it is firſt neceſſary to aſcertain which, as the depth, width, and other circumſtances, may be regulated accordingly. After finding the neareſt outlet, where the water collected in the drain can be diſcharged, from that a trench muſt be brought up to the croſs one that is to be carried along the line of the ſpring, allowing a ſmall declivity of a few inches in every ten yards, for the water to run. In cutting the drain that is to carry off the ſpring, if, after paſſing the clay, there be a ſtratum of hard gravel betwixt that and the ſand containing the water, it is preferable to lay the *ſough* there, being a more ſolid foundation for it, and either to perforate the gravel with the *punch*, or open ſmall pits through it with the ſpade; by means of which the water will flow up, and run as ſpeedily off, and with more ſafety, than if the ſough had been laid in the ſand itſelf; which would not only increaſe the depth and difficulty of working it, but in many caſes the level of the orifice will not admit of the drains being cut to ſuch depth. Alſo, if, in cutting the trench along the tail of the rock, the level of the orifice will not admit of its being cut ſo deep as to touch the rock, the clay or impervious ſtratum that lies immediately above it muſt be bored through, when the water will flow up through the fiſſures of the ſtone, and through the auger-holes, into the ſough; but it is preferable, in caſes where the level will admit, to dig the drain through the clay, and ſo far into the rock as will furniſh ſtones for laying the ſough; and then the water will meet with leſs reſiſtance, and have a freer iſſue, than if the ſtone had not been opened or broken. This will increaſe the expence of cutting the drain, but leſſen that of quarrying the ſtones elſewhere, and of carrying them to the place where the drain is made. Although in the ground to be drained there may be a ditch, or other old water-courſe, in which it may be practicable, by means of boring, to *tap* the ſpring, yet it is better to make a new trench, in which the water of the ſpring only can have admittance; and where this muſt croſs any ditch or old water-courſe, it muſt be ſecured by *puddling* with clay, or be conveyed in a *wooden trough*, ſo as not to receive any ſurface-water: which, by being augmented in time of floods, might ſoon blow up and deſtroy the ſough. As the water thus obtained by means of boring may be converted to ſeveral uſeful purpoſes, as thoſe of irrigation, ſerving ſmall mills, canals, houſes, fiſh-ponds, paſtures, fields, &c. caution is neceſſary in uſing the auger, leſt the water procured in one part of the drain may be loſt at another, in the ſame manner in which it was found; and, in the endeavouring to procure a greater ſupply, it may by that means be let *down* from a *wet*, into a *dry, porous ſubſtratum,* as will be ſeen in its proper place.

Such are the chief objects that require conſideration before beginning to cut the drains: the following directions will be uſeful in guiding the execution of them. If the drain is to be cut through a ſoft boggy ſoil, it is better to be open than covered, eſpecially where it may receive other water than that collected from below, and can at the ſame time ſerve as the ſide of an incloſure or diviſion betwixt the upland and low grounds. Stones laid in ſuch drains are ſoon apt to ſink, owing to the ſoftneſs of the bottom, and the ſough may alſo be ſoon choaked up. The width of a covered drain may be from three to four feet at top, and one and a half or two feet wide at bottom, thus allowing ſix or nine inches for each ſide-ſtone, and ſix inches between, for the paſſage of the water, forming a ſquare conduit, or what is termed the ſough, being alſo ſix or nine inches in height. Or, when the quantity of water collected, or to be conveyed in the drain, is ſmall, it may only be coupled at the bottom. This is a conſiderable ſaving, both in materials and labour, requiring much fewer ſtones, and a great deal leſs time in laying them. It is equally ſecure when the bottom is ſolid, the ſtones good and properly laid, being well packed at the ſides, to prevent them from ſhifting. It is alſo a ſaving in cutting the drain, as it requires leſs width at the bottom for this manner of laying the ſtones, than it does for a ſquare conduit. In moſt caſes, however, where circumſtances are favourable, the other method ſhould be preferred. The depth is regulated by the level of the place where the drain is to empty itſelf, and the nature of the ground through which it is cut, which is commonly four or five feet, and never leſs than three. Where the drain is only to act as a conductor for the water which is brought up by the borer where the ſoil is *all* clay, its depth may only be three feet, which will be ſufficient to allow a proper depth of earth above the ſtones laid for the conduit at bottom, which need not exceed, nor ſhould ever be leſs than one and a half or two feet. Drains are ſometimes ſeen, in ground apparently very wet on the ſurface, cut to the depth of three and even four feet, and ſeveral hundred feet in length, without any water being collected by them; but when the borer has been applied, and holes put down at the diſtance of ſix yards apart, and eight or ten feet deep, a conſiderable ſtream of water has been procured, and which has continued to flow. In a particular inſtance, a drain has been directed to be cut in a very retentive clayey ſoil, which, at the depth of four feet, met with no water; which gave occaſion to the workmen to ſay, and the proprietor to think, that he was laying out his money to very bad account; but they were ſoon convinced to the contrary. As the drain had a ſmooth and uniform ſlope in the bottom, in order to expedite the work, ſeveral men were employed to lay the ſtones, beginning at the *lower* end, and proceeding upwards, while others were engaged in boring at the *upper* end, to proceed downwards. When thoſe below began their work, the drain was quite dry, and had no appearance of water, either from the ſides or bottom; but by the time they had proceeded a few yards, and two or three holes were made above, an unexpected ſtream of water made its appearance, to their no ſmall aſtoniſhment; and which has ſince had the effect of laying dry a piece of very wet land. This fully ſhews, that without the uſe of the auger in ſimilar caſes, many drains may be cut to an extenſive depth, without effecting the deſired end, or without making any material change in the appearance of the land.

In ſoft boggy ſoils it is often neceſſary, where the drain is to be covered, to cut to a much greater depth than in other caſes, or to the bottom of the moſs, in order to have a ſecure foundation for the ſtones, as a great part of the water is conſtantly lodged between the moſs and the next ſtratum. In digging the drain, it is beſt to cut the whole length to the depth of two or three feet, at which there is no danger of its falling in; and when the ground near it by that means has become more firm, and the ſtones have been laid down by the ſide of it, then cut to the depth required. In this way the ſtones are at hand, and ready to lay ſo ſoon as the proper depth is dug, and the laying ſhould be begun at the upper ſide, proceeding downwards, ſmoothing and clearing the bottom of the drain. By this means, the fall of the water will be ſeen and kept, as there is a danger, when the work is begun at the lower end, and laying upwards, in level ground, of digging too deep in clearing the bottom, and thereby cauſing a ſtagnation of water and ſludge in the ſough, which ought to be carefully avoided. The turf, in opening the drain, ſhould be firſt pared off thin, and laid to one ſide for after uſe, and all the mould thrown out to the other. The moſt difficult part of the work is laying the ſough in running ſands, where it is neceſſary to have the ſides of the trench ſupported with flat boards and props, which are removed forwards as they proceed in working, and which keep the ſides from falling in, and the looſe ſand from falling amongſt the ſtones with which the conduit is laid. If the ſough or conduit be laid with brick, a ſmall aperture muſt be left betwixt each, to admit the water from the ſides of the drain, and the thin turves muſt be laid above, graſs-ſide downwards, to prevent the mould from getting through the openings. The turves are laid graſs-ſide downwards, *immediately* above the *ſtones*, without any looſe ſtones above the laid ones, as the water is all collected from the bottom of the drain, very little from the ſides of it, and none admitted from the top; unleſs in ſuch caſes as where the ſtratum containing the water, or that may receive it in time of rains, is cut through to a greater depth than the height of the conduit, then ſmall ſtones muſt be laid above the conduit or cover ſtone, to the height of ſuch ſtratum, or as far up as the water appears to ooze out. Theſe ſmall ſtones admit the water to ſubſide through their interſtices to the conduit or ſough below, and thus prevent the bad effects that would otherwiſe proceed from its confinement ſo near the ſurface. In quick or running ſands, turves muſt alſo be laid at the bottom of the drain, under the ſough, to prevent the looſe ſand from flowing up, and to render the foundation of brick or ſtone more ſecure in caſe of their ſinking. Before boring, it is proper to lay the ſide-ſtones of the conduit; after which the holes may be put down, at the diſtance of every four or ſix yards. But if the water, on withdrawing the auger, ruſh up with violence, and continue to have a boiling appearance, it indicates a ſtrong body of water confined below, and, conſequently, requires a great number of openings to give it a ſpeedy and ſufficient vent. When the force of the water is great, the width of the holes enlarges, and conſequently the diſcharge is increaſed. By a careful examination of the adjoining ground, it is ſometimes poſſible to ſay at what depth the ſtratum containing the ſpring lies, and conſequently how deep the *bores* muſt be made; but the general rule is to go down until the water riſe immediately on withdrawing the auger. Thirty feet have been bored down before the water flowed in a full and free manner; but about from ten to fifteen feet may be ſaid to be the average depths of boring. One caſe is ſtated, in which, after boring thirty feet, the water iſſued in a quantity equal to *three* hogſheads in a minute, by which a great extent of wet ground in the vicinity was drained. In theſe ſands, it is alſo better to dig a little into the ſides of the trench, off the line of the ſough, where the auger is to be uſed, and, after boring, to cover the places in the ſame manner as the reſt of the ſough, leaving out a ſide-ſtone oppoſite the hole, as the ſand thrown up by the ſpring can thus be more eaſily taken out with the hand till it ſubſide and give over running, and is likewiſe off the main current, coming down the middle of the drain. That part of the ſough above the auger-holes ſhould be left uncovered till the ſand is all thrown up, and the openings clear; but, till then, the ſand muſt be taken out, and the ſough may afterwards be covered up with ſafety. Above ſome of the auger-holes, or at any other convenient part of the drain, a kind of funnel may be built to the top of the trench with a flat ſtone laid over it, whereby it can at any time be looked at to ſee if the iſſue is clear, and if the quantity of water diminiſhes or increaſes. When the circumference of the auger-holes is not ſufficient to let up the quantity of water which the ſprings would otherwiſe iſſue, where it is not far from the bottom of the trench to the ſtratum containing the water, and where there is a bed of hard gravel intervening, impenetrable by the auger, holes muſt be dug with the ſpade, down to the ſpring, and theſe holes filled up with looſe ſtones; firſt putting down a round ſtake in the middle, which, after the ſtones are filled in, muſt be drawn out, which leaves an opening for the water to flow up. No apprehenſion need be entertained of the holes made by the auger being filled up, whether the drain be open or covered, provided no other water is admitted; for ſuch is often the force of the ſpring, that it will throw up any earth or other ſludge that may accidentally get into it; and it can be injured only by the admiſſion of great quantities of ſurface or flood-water coming up on it at once. When flat ſtones can be got, they are preferable to brick for this uſe; but there are ſeveral kinds of brick beſides the common ſort invented and uſed only for the purpoſe of draining, in ſeveral parts of the kingdom, where the expence of ſtone would become greater. When ſmall drains are wanted, and when the water is to be conveyed to a houſe, &c. that which is of the arched form is commonly made uſe of. For larger drains, thoſe of the ſquare, hollow, pantile form are well adapted, eſpecially the latter. They are laid ſingle, without one reverſed under; for when that is done, the water running on the under one occaſions a kind of ſludge, which in time becomes ſo encruſted on it, as totally to obſtruct the paſſage of the water, and render the work uſeleſs in a few years. In clay bottoms they may be laid ſingle, or without any thing under; but in ſoft ſandy bottoms, a common building brick ſhould be laid under each ſide to prevent them from ſinking down, and be ſo laid as to form a regular arch, by the ſide-bricks being laid with an equal height, the better to ſupport the preſſure above from breaking them. They may be conſtructed in the above ſhape to any dimenſions, ſuitable to the quantity of water the drain is to convey.

Although the earth that is thrown out of the drain ſhould, when filled in again, be conſiderably higher than the ſurface of the ground on each ſide, it muſt remain ſo; for in a year or two it will ſubſide to the level of the ſurface on each ſide. What remains may be ſpread or laid in ſome adjoining hollow; for, if levelled at firſt, the earth immediately above the drain ſinks down, and the rain by that means lodging in the hollow and ſubſiding downwards, may injure the ſough, by carrying part of the ſurface of the earth along with it.

While the drain is cutting, in very wet peaty ſoils, the ſurface-water, or what may ooze from the ſides before coming to the ſpring, muſt be ſtopped here and there; and when let out to run through the ſough, a turf or bunch of graſs muſt be laid ſo as to prevent any ſludge which it may bring down from running through along with it, as this might choak the laid part of the drain and ſtop the paſſage of the water. When trees, eſpecially aſh, happen to be in the courſe of the drain, they muſt be entirely *grubbed* up, otherwiſe the roots will get into the ſough, and expanding through the joints of the ſtones, will ſoon put a ſtop to the paſſage of the water. When the water iſſued by the drain becomes of a red *ochrey* colour, it indicates a ſtagnation either from the above cauſe, if amongſt planting, or from ſome part of the ſough having fallen in; which ſhould be ſpeedily repaired, otherwiſe the grounds will ſoon become equally wet as before. In the laſt place, the mouth of the drain ſhould be carefully railed in, or otherwiſe guarded, to prevent the cattle from trampling it or choaking it up, being fond of drinking there for the ſake of the cool water, even although there be watering-places in the field; and where there is any defect of this kind, it ſhould immediately be remedied. Likewiſe the outlets of the drains where they empty themſelves into an open ditch, or run of water, ſhould be often examined and kept clear, as they are very apt to be choaked up with graſs and ſand when neglected in ſuch places. The firſt ſymptoms of the drain's having effect, and which ſoon appear when the ſpring is properly *tapped*, are, that all the *ſurface-drains* that may have formerly been made, and alſo any adjacent pits, ditches, or places to which it may have *backed up*, immediately become dry, and remain ſo afterwards. On the whole, it appears from the foregoing obſervations, that this mode of draining bogs, or land injured by ſubterraneous water, is by far the moſt effectual of any that has yet been ſuggeſted; and that ſuch ground may be made completely dry, by *cutting* off *one* ſpring alone, with which the particular place to be drained may have no apparent communication, but which may be ſo connected *under* ground, that from it all the others derive their ſource, and being therefore the *principal* cauſe of the whole, to *hit* on it ſeems the chief deſideratum of the buſineſs. Many inſtances of this have occurred in the practice of draining boggy land, under the direction of the above expert drainer, where by a few auger-holes, hitting upon the particular ſpot where the *loweſt* part of the *main* ſpring lay, a conſiderable extent of ground, with which the drain had ſeemingly little connection, has been laid dry, and cauſed much ſurpriſe to thoſe who witneſſed the effect. At Odſtone Hall, in Leiceſterſhire, a conſiderable tract of wet marſhy ground, of very little value, divided in the middle by a ſmall river, was ſo completely drained, it is ſaid, by the ſame experienced drainer, by making a ſmall trench at one ſide, and by boring in it, that the part of the marſh on the oppoſite ſide of the rivulet, which was at a very conſiderable diſtance from the drain, became, in a ſhort time, equally dry with that where the cut was made; has continued ſo ever ſince; and, from being formerly of little or no value, is now converted into excellent *water* meadow, producing, *without* manure, abundant crops of graſs and herbage.

At Madeley alſo, near the town of Newcaſtle, in Staffordſhire, there was likewiſe a very conſiderable bog of ſome hundred acres, the drainage of which was deemed impracticable, being of ſo wet and ſoft a nature that no cattle could paſs over any part of it, until this able drainer lately obtained a leaſe of it for a certain number of years, and, by means of a very little cutting and expence, has in conſequence ſo effectually drained it, that it may now be conſidered as not only a ſingular inſtance of the ſucceſs of this ſort of draining, but as being likely ſoon to become highly productive as a farm, in conſequence of other improvements, which this has produced, on it.

Extenſive bogs too, which were formerly conſidered as incapable of being reclaimed, have within theſe few years been effectually laid dry, by this ſort of drainage, at or near Woburn, belonging to the noble duke who reſides near that town, at but very little expence, conſidering the manner and nature of the undertaking in ſuch bogs. The drainage, in theſe caſes, was accompliſhed by the ſame ſkilful drainer.

Succeſsful drainages of this kind have alſo been performed in different parts of the northern diſtrict of the iſland: and particularly in the extenſive park of the duke of Buccleuch, where the work has been carried on in exactly the ſame manner, and in perfect conformity to the principles, and the rules and directions which have been laid down for the drainage of the firſt claſs of theſe ſpring-bogs. In this caſe, the ground has not only been rendered dry and much more valuable than formerly, but the drains have likewiſe ſerved the uſeful purpoſe of affording a conſtant ſupply of ſpring-water to different parts of the park.

It has been ſuggeſted by the writer of the Middleſex corrected Agricultural Report, that, wherever there may be any bogs, draining is unqueſtionably the firſt ſtep to be taken towards their improvement; for the accompliſhment of which, the principles and practices which have been laid down above ſhould be reſorted to, though the drainer ſhould not be too ſanguine, or imagine that it is, in every caſe, an eaſy operation. It is much feared, that there are *ſome* bogs which could not, without great difficulty, be drained at all; and *others*, that would coſt the value of the land, in drains and machinery, to fully effect it. Yet, notwithſtanding ſome *unſucceſsful* trials may have been made, they ſhould, it is ſaid, not diſcourage or prevent the making of ſuch attempts, in all caſes, where there is tolerable proſpect of ſucceeding in them. The inſtances are, no doubt, very numerous, it is thought, in which this ſort of land may be effectually drained at an eaſy expence; and thereby be brought from a ſtate of *annoyance* to yield conſiderable *profit* to the owners, as well as the community. See Bog, Morass, &c.

Drainage of Ground on the Sides of Rivers, and flat ſwampy Land, below the Level of artificial Leads or Runs of Water.— It is alſo ſtated, that many extenſive tracts of land are wet and ruſhy, from a cauſe that cannot be removed by any number of open or covered drains. This is called *haugh* or holm-land, and lies along the ſides of brooks and rivers, which having altered their courſe ſo often between the oppoſite banks, and depoſiting ſand and gravel as they recede from their laſt channel, the water of the river conſtantly percolates through the ground thus formed to the level of *its* preſent courſe, keeping it ſo moiſt and wet as to produce ruſhes and other coarſe aquatics; and wherever a drain or pit is dug in ſuch ground, it immediately fills with water to the level of that in the river. Where the river has a quick deſcent, it is leſs apt to produce this effect; but where the current of it is ſlow, and the level of its ſurface little below that of the ground on either ſide, the ſoil will be very much ſaturated with water. Any number of drains cut in any direction, can have no good effect while the river continues in its preſent courſe at ſuch a height. Conſequently the only remedy, where it can be had recourſe to at a moderate expence, is, it is ſuppoſed, deepening and widening the bed of the river, the earth taken out of which will, at the ſame time, ſerve to form an embankment on either ſide; for while it can riſe higher than the outlets of the drains, and flow back into them, it renders the ground equally wet as before they were made, and the expence of making them is laid out to no advantage. Beſides being injured in this way by the *river*-water, ſprings, in many ſituations, iſſue from the bottom of the higher banks or ground, and ooze through the ſoil higher than *its* level. The water of theſe can eaſily be cut off or lowered to the level of the river by a proper drain, as will be afterwards ſeen. As this ſort of land is moſtly formed by the rivers changing their courſes, and thereby leaving conſiderable extents of flat level ground on one or both ſides of them, which is of an alluvial nature, and commonly of a very rich quality, being for the moſt part conſtituted of very fine earthy particles, which are either depoſited by the water in the time of or after floods, or waſhed down from the higher grounds in time of heavy rains, and ſometimes by both; its drainage and embankment muſt conſequently, when neceſſary and practicable, or capable of being performed without any extraordinary expence, be highly deſirable and important. See Haugh-*Land*.

But in ſome caſes the wetneſs proceeds entirely from ſprings, where the ſoil of the flat ground betwixt them and the river does not conſiſt of looſe gravel or ſand, but of a loam or clayey mixture. In order to drain this ground, a trench muſt be begun at the lower end of it, and brought from the river along the bottom of the bank from whence the ſprings iſſue. This trench ſhould be cut *below* the line of the ſprings, where it can more eaſily be done, and kept open to receive the river-water in floods, and alſo any runs of water from the high grounds in time of rains, which would *blow it up* if covered; and muſt diſcharge itſelf into the river at the loweſt poſſible level. Where the ground by the ſide of the river is of ſuch extent as to render a regular embankment along the ſide of it a matter of conſideration, a flood-gate might, it is ſuppoſed, be placed at the mouth of the outlet-drain, which would ſhut with the preſſure of the river-water in a flood, and thereby exclude it entirely from the inner ground, and would open by that of the water accumulated in the drain during the inundation, and ſo be emptied into the river when it ſubſides. The conſtruction of ſuch a gate is ſimple, and the only remedy in caſes where it is deſirable to have the flood-water excluded in ſuch inſtances.

From this trench, ſhort covered drains muſt be cut up a little way into the bank, to lead in the ſprings that are above it, where boring oppoſite to them has not that effect. The bottom of theſe muſt be higher than the level of that of the open cut, to prevent any of the water in it from flowing back into them. In theſe the auger muſt alſo be uſed to *tap* the ſprings, if the depth of this level does not reach the ſtratum containing the water. There will be no occaſion for any croſs-drains betwixt the open cut and the river, as all the water that is intercepted will be carried along the bottom of the bank, and emptied into the river at a lower level, unleſs the ground be of ſuch extent that it may be divided by croſs-ditches into ſeparate incloſures. The open drain along the upper ſide will ſerve as a diviſion betwixt the meadow and higher ground.

This ſort of land, from its peculiar ſituation, and the nature of the ſoil, is moſtly well adapted to the purpoſe of being watered after it has undergone proper drainage.

In caſes where a mill-lead, or other ſimilar artificial runs of water paſs through land, there are many valuable tracts which are not unfrequently conſidered as impracticable in their drainage. Alſo where they glide along the ſides of them to which the falls incline. From the low ſituation of the ground in ſuch circumſtances, and the height of the water in the leads or runs, there is no fall for diſcharging into them the water of any ſuch drains as may be cut to the neceſſary depth. The only expedient for the remedying of this difficulty is ſuppoſed to be the following, which has been had recourſe to in different inſtances, where no other mode was practicable, with the moſt complete ſucceſs. In all ſuch caſes, the firſt thing is to begin, it is ſaid, at the river or natural ſtream, and bring up a cut to the lead or run at the point where the outlet of the upper drain is to croſs it. This cut muſt be as deep as the river will permit, or the drains above require. A cut muſt then be made acroſs the lead or run to the ſame depth, and a ſtrong wooden trough, or ſquare box, for which larch wood is the beſt, made of a ſufficient ſize to admit the water collected above to paſs through it, be placed acroſs it. The length of this trough muſt be ſeveral feet on each ſide more than the width of the lead or run, and muſt be ſecured by ſtakes firmly driven down into the ground on each ſide, with croſs-bars or pieces above, to hold it ſecurely down. The ſpace between the top of it and the bottom of the lead or run, muſt be well filled with clay cloſely beat or rammed down. After this, the cut to the higher ſide of the ground may be made as deep as the level of the trough will allow, and continued along the upper ſide of the wet land, ſo as to cut off the ſprings that riſe in that quarter. This may either be a covered or open drain, as circumſtances may require. From the trough, alſo, an open cut ſhould be made parallel to, and along the back of, the lead or run, to receive the ſurface-water from the ground above, and from the diviſion ditches that may be neceſſary, if the ground be of great extent. The earth from this cut ſhould be laid between it and the lead or run, to ſtrengthen and ſecure the bank. In like manner, an open cut may be neceſſary along the other ſide of the lead or run, to receive the water that may ooze from it, and injure the ground between that and the river; and this ground, if extenſive, may likewiſe be divided by croſs-ditches, or ſuch as ſerve the double purpoſe of fences, on the ſides of incloſures, and drains. The croſs or diviſion ditches, in the upper part of the ground, ſhould not join the upper drain, but a ſmall ſpace be left uncut, to prevent any connection between the ſpring-water in the upper drain, eſpecially when it is covered, and that which is collected in the croſs open ditches; and which may likewiſe ſerve as a paſſage from one diviſion of the field to another. The parts of the land between the diviſion ditches are moſtly well calculated for watering, where there is a full command and ſupply of water from the leads or runs.

Something of this manner of drainage has ſucceeded, it is ſaid, in a caſe of land lying along the ſide of a river, below gently riſing ground, where the wetneſs was commonly believed to be owing to a mill-lead penning up the water above the level of the low meadow-land; after attempts to drain it, on the ſuppoſition of the wetneſs originating from ſprings riſing in the higher grounds, by cutting them off by means of a trench, had completely failed. This was lately done at Petworth by lord Egremont, according to the writer of the "Corrected Account of the State of Agriculture in the County of Suſſex." In this caſe, the water in the river was higher than the meadow-land to be drained; but there was an old ditch for carrying the water from the low meadow-land into the river, at ſuch times as when it was low. This ditch was intended to be ſtopped up in caſe of the ſucceſs of the above mode of drainage, as the trench-drain would, it was thought, ſerve the purpoſe. But on the drain or trench being cut, the effect was, that when the ditch was ſtopped up, the low meadow-land was flooded by the ſprings, as the drain did not anſwer the purpoſe of taking away the water; and when the ditch was open, the ſame meadow-land was flooded by the river. The banking of the river out at the ditch, and the building of a wind-pump to render the ditch dry, were afterwards adviſed as the only means to be taken for accompliſhing the drainage.

A different method, of ſomewhat the above kind, was, however, had recourſe to with complete ſucceſs. Upon the levels of the meadow-land, on each ſide of the river, having been taken, it was found that the meadow-ground on the oppoſite ſide was beneath the level of the meadow-land which required to be drained, and conſequently that the drainage of it could be effected by a trunk-drain laid acroſs the bed of the river; a wooden pipe was, of courſe, laid at the bottom, to receive and convey the water of the ditch, and which was carried on forward by an open drain being cut ſo as to paſs through the other meadow-land, on the oppoſite ſide of the river, which was alſo drained by the cut thus made, quite up to the bridge under which it paſſes, cloſe to the turnpike gate, fixed there by means of a pipe, and which empties itſelf into the river at the mill-head. This mode of drainage has anſwered, it is ſaid, moſt effectually, ſo that the water in the old ditch now ſtands always a foot below the ſurface of the meadow-land which was wet; and more than one hundred acres of contiguous meadow-ground have been highly improved by the new drains which have been thus made: much of it, which was a mere bog or ſwamp before this drainage of it was completed, is now, it is ſaid, converted into a fine water-meadow, and worth full three pounds the acre. Theſe grounds are, it is remarked, at any time capable of being flowed by means of ſluices made through the towing-path, which acts as an enbankment; and in the ſummer ſeaſon, if the river be too low, by freſh ſtreams which flow into it from the upper grounds; and beſides, the water can at pleaſure be drawn off by drains into the lower level, below the locks, ſometimes, when particular circumſtances render it neceſſary, by the means of culverts carried acroſs the bottom of the river. This intereſting manner of freeing ſuch low dammed up meadow-lands from the effects of the water ſo kept up in them, may be applicable in many other caſes and ſituations of a ſimilar nature.

Drainage in boggy and other wet Ground, by perforating through a retentive to a porous Sub-ſtratum.—There is a ſort of boggy and other wet land, which is moſtly cauſed in a different way than by that of ſprings, but which, as partaking in ſome degree of the nature of that kind of bogs, and being capable of having the wetneſs removed by ſuch means as are had recourſe to in ſpring-draining, may be conſidered in this place without impropriety. In many parts of the kingdom there are conſiderable tracts of land which lie waſte and uncultivated, owing to wetneſs in a particular ſituation, that might, by means of letting down the waters into a porous under-ſtratum, be eaſily drained, and rendered much more productive. The cauſe of their wetneſs proceeds not from ſprings lying under the ſurface, nor from the overflowings of any of the adjoining higher grounds, but from the accumulation of rain-water ſtagnating on a retentive body of clay, or other impervious ſubſtance, through which the water can have no deſcent; and being alſo ſurrounded with higher ground of the ſame impervious nature, the water of itſelf can have no natural outlet. Such ground, when it becomes boggy, is commonly called *land-locked* bogs. The ſituation of theſe bogs being often ſo much lower than the grounds that ſurround them, the cutting of a main drain, or conductor, through the bank, for carrying off the water collected by the ſmaller drains, would, in many caſes, be attended with an expence greater than the value of ſuch land when drained. The thickneſs of the impervious ſtratum that retains and upholds the water is often ſo great, that although the ſtrata under it be of a porous and open nature, as rock-ſand or gravel, the water can find no paſſage whereby of itſelf to deſcend through the one into the other; and, therefore, by its long ſtagnation above, all the coarſe vetegables that have, for a ſeries of years, been produced on its ſurface, and even the upper part of the ſoil itſelf, are formed into a body of peat-earth, equally ſoft and leſs productive than that of any ſpring-bog, and which is only paſſable by cattle in very dry ſeaſons, when the wind and ſun exhale part of its moiſture; and is even then inacceſſible to the plough. The drainage of theſe bogs muſt be effected in a manner different from that of thoſe above, or ſpring-bogs, the cauſe of both not being the ſame in their nature, as already ſeen. It may probably be done in the following manner at the leaſt expence. The firſt drain muſt be made in the middle or loweſt part of the ground, and into this all the others muſt lead. The number and direction of theſe muſt depend on its extent. They muſt be cut through the peat, or wet, ſpongy, upper ſoil, to the top of the clay or retentive ſub-ſtratum, which muſt be perforated by the auger, in order to give an *outlet* downwards for the water, which will be abſorbed by the porous ſtrata below. The making one large pit or well in the middle or lower part of the bog, dug through into the porous ſubſtrata, with the drains leading into it, would anſwer equally well, and would ſave boring along each of the drains: this is a method which has frequently been practiſed with ſucceſs in different diſtricts. In Hertfordſhire, according to the corrected account of the agriculture of that diſtrict, if a pit be ſunk twenty or thirty feet in depth, in the middle of a field, through the red, flinty, and impervious clay of the county, into the chalk below, when the uſual quantity of chalk is taken out, the pit-ſhaft is filled up with the flints which are collected out of the chalk and clay, and the top, or ſurface-drainage, of this part of the field, much ſhortened for ever afterwards, by making principal drains from the part of the field above the level of the top of the pit terminate therein, and the ſuperabundant moiſture will eſcape through the flints in the pit-ſhaft to the chalk below. And if a drain be carried into a limeſtone quarry, it is ſeldom neceſſary to carry it farther.

In dells or hollows of conſiderable extent, which are covered with an impervious ſtratum, and from which there is no natural drainage; ſuch, for inſtance, as the valley between Mold, the ſhire-town of Flintſhire, and the adjoining high land; a pit about four feet in diameter, and fifteen feet in depth, more or leſs, as the caſe may require, is ſunk through the impervious ſuper-ſtratum into a pervious ſtratum of gravel, and the rain-water, and that of ſome adjoining ſprings, are carried from the ſurface thereby: the pit is railed round to prevent cattle from falling into it. It is here remarked, that though in this, as well as in many other inſtances that might be given, the top-water eſcaped through the pervious ſub-ſtratum, the effect might have been directly the contrary. It is, conſequently, adviſed, that the impervious ſuper-ſtratum, in all ſuch caſes, ſhould firſt be perforated by bore-rods, as the holes made by them are eaſily ſtopped up.

Where the firſt method is had recourſe to, the drains ſhould be cut as narrow as poſſible, and, after the auger-holes have been made, ſhould be filled with looſe ſtones to within a foot and a half of the ſurface; and this vacuity may be filled up with part of the earth taken out, having a turf, graſs-ſide downwards, next the ſtones. The water and noxious moiſture, contained in the peat or upper ſoil, will be extracted by the drains, and will ſubſide through the auger-holes into the porous ſtrata below. If the ground is afterwards ploughed, care muſt be taken in forming the ridges, and giving them a proper deſcent towards the main drain, which will greatly aſſiſt the others in diſcharging any heavy falls of rain-water.

Before proceeding to drain this kind of land in the manner deſcribed, the following obſervation muſt be attended to. It ſhould be diſcovered, in the firſt place, whether the porous ſtrata immediately under the clay be dry, and will receive the water, when let down into it from above; or, being ſaturated with water itſelf, may, in place of receiving more, throw up a greater quantity to the ſurface; and thus, inſtead of remedying the evil, render it worſe. This may ſometimes be the caſe; and the ſubſtrata may contain water that makes no appearance on the ſurface, at *this* place, owing to the ſuperincumbent body of clay, but which, being connected with ſome higher ſpring, may flow up, when a vent is given to it by the auger. Thus would a greater quantity of water be brought to the ſurface, which, having no outlet through the circumjacent bank, would render the ground much more wet, and might even, in ſome ſituations, almoſt form a lake. If the ſurrounding high ground declines deeper or lower than the bog, although at ſome diſtance, by means of a ſpirit-level, and the appearance of the ſurface, the nature of the under-ſtrata may in a certain meaſure be diſcovered; and although it ſhould already contain water, a drain may be there cut to draw off that water, and alſo what is let down into it from above.

It not unfrequently happens, that ſprings, or *ſpouts*, as they are commonly termed, riſe in the middle of a field, or portion of ground at a diſtance from any ditch or open drain, into which the water may be diſcharged; ſo that a covered drain, brought from the neareſt outlet, would paſs ſo far through dry ground, as to render the expence of conducting the water from the ſpouty part greater than the injury done by it. In order to remedy this evil, it is neceſſary to begin by cutting a drain a few yards in length, or by ſinking a pit into the porous ſoil immediately between the *lower* ſide of the wet and next dry ground; and from that to bring up an upright drain to the *upper* ſide of the wet ground, from which a branch muſt be taken to both ſides, along the upper ſide of the wet, ſo far as it goes.

This upper drain will cut off the water, when it riſes to the ſurface; while the upright drain will convey it to that cut along the lower ſide of the wet ground, where the water will ſubſide into the porous ſubſoil. An eaſier method may be practiſed, where the retentive or impervious ſubſtratum is not deep, which is firſt to cut the drain along the *upper* ſide of the wet ground, and after coming to the ſtratum in which the water flows, either to bore through the retentive ſubſtratum, or cut the drain to that depth; by which means the water cut off above will be let down into the abſorbent or porous ſtratum below, and thus be got rid of more eaſily than by any other method. But if the ground be ſteep, and the ſtratum, into which the water is let down, *tails* out any where below, or lower down on the ſlope or declivity, the water will again flow out, and cauſe a ſimilar *ſpout* or wet place in the field. This, however, will ſeldom be the caſe, it is ſaid, and may eaſily be remedied, by being made perhaps near the extremity or lower ſide of the field.

It has been ſtated, that Dr. Nugent, in his Travels through Germany in 1766, has ſhewn the mode of draining marſhes in that country to be nearly on the ſame principles as thoſe explained above. The draining of marſhes is ſaid to be conducted in much the ſame manner as that of lakes; but the operation has there been ſeen performed only on what we call moor or turf-grounds. Theſe are moſt eaſily drained, by carrying trenches through thoſe grounds, when the diſpoſition of the country is ſuch that the water can be conveyed to ſome neighbouring ſtream.

In theſe caſes, the firſt thing they do is, it is ſaid, to carry a ditch to the middle of the moor in a direct line, its depth and breadth adapted to the extent and wetneſs of the ground, and thus to the ſuppoſed quantity which is to be carried off. At every ſix, eight, or ten perches, as the ground is more or leſs ſwampy, croſs-trenches on both ſides are drawn in a direct line, and communicating on both ſides with the main trench. But, in caſe of water coming from any neighbouring eminences, they dig a trench round the whole ground as a reſervoir; and this likewiſe communicates with the main trench, &c. In caſe the draining of the water into ſome natural receptacle be not practicable, at leaſt not under a very great expence, then they have recourſe to ſinking ponds or reſervoirs in ſome neighbouring bottom, and to theſe they carry all the trenches. Theſe ponds are likewiſe ſaid to be of uſe as a fiſhery; but even if the ſinking of ſuch pond be too chargeable, there ſtill remains an expedient which is of good effect, and chiefly if the moors are not too wet and marſhy. It is the nature of moors, in general, that, beneath the turf or moſs, there is a loam which hinders the moiſture from penetrating; and this, indeed, is what makes the marſh, and cauſes the luxuriant growth of the turf or moſs: but this loam or clay is only a ſtratum, and far from being of an immenſe depth; under it is generally a ſand, or ſome other ſtony or looſe ſoil. Here reaſon readily informs us, it is ſaid, that a middling moraſs may be drained by *perforating* the clay, and thus making way for the moiſture to penetrate. In order to this, a pit is dug in the deepeſt part of the moor, till they come below the obſtructing clay, and meet with ſuch a ſpongy ſtratum as, in all appearance, will be ſufficient to imbibe the moiſture of the marſh above it. Into this pit the ebbing of the moraſs is conveyed through a trench, and both the trench and pit are filled up, after the firſt drain, with large broad ſtones, ſetting them edgewiſe, ſo as to leave interſtices for carrying off the water: then ſuch ſtones are laid over breadthwiſe, and theſe covered with looſe earth, like that on the ſurface. When no ſuch ſtones are to be had, ſtrong piles are rammed down the ſides of the trench, and broad boards laid acroſs; and theſe are covered with earth to a height fit for culture. This is a matter of no great expence, the pit being as near the moraſs as the water will admit, and the trenches but ſhort; then they have a drain unperceived, which leaves the ſurface of the trenches for the plough. And in middling marſhes, or eſpecially in ſuch moors as are only wet and damp, this method, though ſometimes ſlow, never fails taking effect; and many tracts are thereby made ſerviceable to the farmer or grazier. Much land, in ſome parts of this country, has been drained in the manner here deſcribed.

It has been done with great ſucceſs, to a conſiderable extent, near Aberdeen, in Scotland, as well as in the county of Roxburgh, according to the writer of the Agricultural Report of that diſtrict, on ſuch waſte lands as might be made arable, in which, at the depth of from one to ſix feet below the ſurface, is found, it is ſaid, a large ſeam of black ſlaty or metallic ſubſtance, generally from twenty to twenty-five feet in thickneſs; and below this is diſcovered a maſs of whinſtone rock, both lying in a tolerable regular ſtraight line. The thickneſs of the whinſtone rock, it is ſuppoſed, is unknown, as it is not believed to have ever been bored into. The black ſlaty or metallic ſubſtance is commonly found ſo cloſely cemented, as it were, without chinks or fiſſures, as that it is impenetrable even to water, or any other liquid; while, on the contrary, the whinſtone rock, when come at, abounds with chinks and fiſſures, and will receive and ſwallow up any quantity of water that may be poured into its boſom. The ſurface of the earth, above the ſlaty or metallic ſubſtance, is found every where of a light, kernelly, and moſſy nature; apparently having, in the courſe of a ſeries of ages, been produced and formed from the vegetable ſubſtances which had attached themſelves to it; falling in the autumnal ſeaſons, and having no receptacle to receive the rain-water, as it falls below its ſtratum, it preſerves it on its ſurface; and in the winter months becomes ſwelled and enlarged in a conſiderable degree. In the ſpring months, when the ſun and wind abſorb it, and cauſe it to exhale, the moſs becomes of tolerable firmneſs, and produces a coarſe kind of unprofitable graſs, mixed in many places with a ſort of ſhort heather, which is of no uſe either for the rearing or feeding of ſheep or cattle.

Two portions of this ſort of waſte land, amounting to twenty acres, the one lying nearly on a level, and the other on the ſlope of a hill, were broke up in the autumn of the year 1784. The level part was gathered up in ſmall ridges, ploughing rather deeply, and making the furrows narrow; labourers being employed, after the ploughs, to remove any obſtructions that might ariſe from ſtones or roots, as well as to turn the upper rind or ſurface underneath, when not effected by the ploughs. It was then allowed to remain in that ſtate until the middle of the ſummer of 1785, being only eaten and trodden in the ſpring ſeaſon by ſheep and cattle, which were occaſionally driven about the ground for the purpoſe, the benefit of which was very great. At the above period the land was again gathered up; but finding, although the ridges were getting high, being only ſet out eight feet at firſt, the plough did not reach or get to the ſlaty ſubſtance in the hollow of the ridge, it was neceſſary to lay out the ridges to ſixteen feet. This coſt much trouble, but the plough was at laſt got down to the ſlaty ſubſtance. When the work was ſo far advanced, the next buſineſs was directed to the getting the water drawn out of the hollows of the ridges, which were at leaſt four feet below any level that could be obtained. In order to accompliſh this, a pair of bore-rods was procured, and put down the ſlaty ſubſtance, to the whinſtone rock, at ſundry places, and which effectually anſwered the purpoſe; the tops of the holes or canals being kept covered with a baſket of looſe ſtones, which was allowed to remain or to be removed at pleaſure, as the weather proved more or leſs wet.

By this means of draining, the land was found to be, in the ſpring of 1786, brought into a condition for ſowing, nearly as early as any other part of the farm; the winter rains falling through the ſoil upon the ridges into the boſom of the ſlaty ſubſtance, which was laid bare in many places, in the hollows of the ridges; the water was gently drawn off, and glided regularly into the bore-holes or canals: and the production of crops in the following years was very good.

On the contrary, the other part of this wet waſte ground, lying on the ſlope of the hill, was ploughed in thin broad furrows; uſing the ſame meaſures and precautions as in the above caſe, and being allowed to remain to the ſame period, after breaking up, was then endeavoured to be brake-harrowed, and afterwards prepared for burning. But both theſe methods failing, it was left in a more backward ſtate than the former part; and was at laſt, in the ſpring of 1786, after two ploughings, braking, &c. being left in a large lumpy condition on the ſurface, ſown with peaſe, in drills, in a cloſe manner, for the ſake of ſhade and the improvement of the land; which had theſe effects, beſides producing a good crop. The after-crops on it were likewiſe good.

As the ſoil above the ſlaty ſubſtance, in this part, was not above two feet and a half deep, the plan of ſetting off the ridges eight feet in breadth is ſaid to have anſwered well.

Drainage in hilly Lands and Sheep-Paſtures, with the means of procuring and raiſing Water for certain Purpoſes, &c.—In hilly diſtricts, and other ſteep places, where ſheep are the ſtaple or chief produce and ſtock of the land, leſs attention ſeems to have been paid to the drainage of ſuch parts of their walks and paſtures as are wet and unproductive, in the opinion of the writer of the work on draining, according to Mr. Elkington's principle, than to that of arable ground, although the effects in the one caſe are equally beneficial with thoſe in the other. This neglect is often attended with conſiderable loſs. From the nature of the herbage which a ſuperabundance of moiſture produces, whether ſtagnant on the ſurface, or long confined under it, proceeds that almoſt incurable malady the rot, to which ſo many thouſands of valuable animals fall a ſacrifice. For this, draining is a moſt infallible preventive; and in ſuch ſituations it is attended with little expence, as the drains may, for the moſt part, be left open, with here and there covered paſſages, over which the ſheep may croſs with ſafety. It is ſtated to be the practice, in many of the ſouthern ſheep-farms of Scotland, to cut ſmall open drains in the wet paſtures, only one foot in width, and the ſame depth; but this, it is believed, has very little effect either in carrying off the ſuperfluous water, or preventing the rot in the animals. One rood of ſuch a drain, as has been adviſed above, would anſwer theſe purpoſes, it is thought, more effectually than fifty of the other, and, on that account, would not be more expenſive.

And although in places where the depth of the cut does not reach the ſpring, the auger muſt be applied, no apprehenſion need, it is thought, be entertained of the holes filling up, where the drain is left open; for the force of the ſpring will, of itſelf, throw up any ſand or ſludge that may get into them, provided no great quantity of flood or ſurface-water is admitted. But the better to ſecure them againſt any obſtruction, ſmall openings may be made along the upper ſide of the trench: and in theſe the perforations may be made, leaving the mouth of the auger-holes about ſix inches or a foot higher than the bottom of the drain, which will be without the reach of the water that may accumulate in time of rains. From the irregular diſpoſition of the component ſtrata, the ſides of many hills are covered with alternate patches of wet and dry ſoil. By the appearance of the ſurface, and by the vegetables it produces along the declivity, the internal ſtrata, and manner in which they lie, may often be aſcertained with ſuch a degree of preciſion, as to guide the direction of a drain without inveſtigating *below* the ſurface; for the difficulty or facility with which ſuch ground may be drained, depends entirely upon the *lie* of the different ſtrata of which the hill is compoſed, and upon the perpendicular or horizontal inclination of the rock or body in which the water is contained. If the rock lies in a horizontal direction, all the different outlets or ſprings that appear on the ſurface may proceed from, or be connected with, the ſame body of water, and may all be *dried* up, by cutting off or letting out the main body of water that ſupplies them, at the lower part of the reſervoir, or place where the water would of itſelf run off more eaſily, if it was not confined under an impervious covering of clay. But, where the rock lies in a perpendicular manner, and contains only partial collections of water amongſt the more open fiſſures of the ſtone, which empty themſelves at numberleſs outlets unconnected with one another, it would be prepoſterous to attempt cutting them off by *one* drain, or by *tapping* any particular one of them, without a drain being cut into each. In this manner it is better to cut the main drain *all* in the clay, with ſmall cuts up to each outlet, than along the line or place where the ſprings break out, as it would in that direction be *too* much in the *rock*, and difficult to cut, from the nature and inclination of the ſtone. Where the water iſſuing out in certain parts, can, by means of the auger, be hit on in the main drain, at particular points it will be more effectually cut off; but if that is not practicable, the depth of the ſmall cuts will reduce it to ſuch a level as to prevent its overflowing or injuring the ſurface below. In many hills compoſed of alternate ſtrata of rock, ſand, and clay, the ſurface of the latter is commonly wet and ſwampy, while that of the former is dry and productive, and therefore requires as many cuts to drain it completely as there are diviſions of wet and dry ſoil. The higheſt part of the hill, being for the moſt part compoſed of porous ſoil, receives the rain-water which deſcends through it, till it meet ſome impervious ſtratum, as clay, which obſtructing its percolation any further downwards, it then riſes to the ſurface, and forces itſelf a paſſage over that impaſſable ſtratum. After it has thus overflowed the *upper* clay ſurface, it is immediately abſorbed by the next porous ſtratum, and, deſcending into it in like manner as above, it again iſſues at the lower ſide of it, and injures the ſurface of the next clay-bed, as it did that of the firſt. In this manner the ſame ſpring will affect the other ſimilar ſtrata of which the hill is compoſed, down the whole declivity, and form at laſt, in the hollow, a lake or bog, if there be not a proper outlet or deſcent to carry off the water. In order to drain a hill-ſide of this deſcription, it is neceſſary, it is ſaid, to begin by making a trench along the upper ſide of the *uppermoſt* ruſhy ſoil, which will have the effect of cutting off the higheſt ſpring; but as the rain falling on the next porous ſoil ſubſides to the loweſt part of it, and forms another ſpring, and as it may likewiſe be partly ſupplied from ſome other internal ſource, a ſecond cut is neceſſary there, to prevent that water from injuring the ſurface of the next clay-bed. Thus, ſimilar cuts will be requiſite lower down the deſcent, ſo far as the ſame ſprings and appearances continue to injure the ground, which may produce a quantity of water ſufficient to irrigate the lower ground, or which may be uſeful in ſome other reſpects and manners.

In ſome hills, the ſtrata of which they are formed lie ſo regular, that it is practicable to extract the water from either ſide on the ſame level, which would be a very conſiderable advantage in draining the one ſide, and in irrigating and procuring water for the other; for there is often found on the one ſide a wet ſwamp, and on the other the ſoil is too dry. This is owing to the bed of clay that upholds the water not lying horizontally, but *dipping* more to the one ſide than to the other, and by the one (the dry) ſide being *overlapt* by a covering of clay, whereby the water is forced to iſſue at the open ſide; but if an outlet is given to it on the *dry* ſide, by means of a drain lower than that from which it flows on the wet ſide, the courſe of the ſpring may be eaſily diverted. The oppoſite ſide being porous, and covered with ſand, will act as a reſervoir, to receive the rain-waters, which will afterwards flow through the opening made in the clay. This may be of great uſe in ſupplying a houſe with water that is ſituated on the dry ſide of the hill, and ſave the additional expence of conveying it in another manner. Care muſt, however, be taken in conducting the drain for conveying water to ſupply a houſe, &c. not to cut it or bore in it ſo deep as to reach a porous ſtratum, otherwiſe the water that may have been found at one place, may, by the ſame means, be loſt at another. Puddling may, it is ſuppoſed, in ſome degree, ſecure it, but not in every caſe.

A ſpring in a low ſituation, adjacent to higher ground, may be raiſed to ſupply a houſe, or for any other uſeful purpoſe, although much below that level, by confining it in a pipe, or brick chimney. The reſervoir from whence the ſpring or outlet of water is ſupplied being confined, and pent up between two impervious ſtrata, and the upper part of it extending perhaps to a conſiderable height and diſtance in the high ground, it is evident, that if a perforation be made through the ſuperincumbent ſtratum into the *tail* or loweſt part of the porous ſtratum containing the ſpring, the water may be raiſed by confining it nearly as high as the level of the head of the reſervoir. Of this kind there have been, it is ſaid, ſeveral inſtances in actual practice, where the water procured from draining low grounds has been raiſed to a conſiderable height above the level of the drains. The drains in ſuch caſes ſhould be cloſely built with brick, and puddled above with clay, to prevent the water from oozing through the joints. It is thus made to riſe, through ſome ſort of confined paſſage, to the height which is required, by the preſſure which it receives in the high ground. The advantages of ſuch operations, it is remarked, muſt be very great in many ſituations, and may often be accompliſhed with ſucceſs, where many would think them impracticable. Of the practicability of this, however, and that water may often be raiſed to a very conſiderable height, by means of its preſſure in diſtant ground, the following remarkable occurrence, which happened lately in digging a well in the vicinity of London, is a proof: earl Spencer, for the preſervation of his noble manſion-houſe at Wimbledon againſt fire, and to be well ſupplied with water, ordered a well to be dug at a little diſtance from the houſe, which was ſunk to the amazing depth of nearly 600 feet, before any ſpring was found. It was begun on the 31ſt of May, 1795; and on the 12th of Auguſt, 1796, the man who was employed in the undertaking, gave a ſignal to the perſon above to draw him up, as he had found the ſpring, and was immerſed in water ſo deep, that his life became endangered. In the ſpace of four hours the water roſe to the height of 350 feet, and during two days following its increaſe was more than a foot an hour. The water, proceeding from a rock, is remarkably fine, and, from the ſtrata it paſſes through, is ſtrongly impregnated with mineral qualities. As there is no extent of higher ground near that where the well is ſunk, and as the depth of it is ſome hundred feet below the bottom of the Thames, the ſource of the reſervoir from whence the ſpring is ſupplied, muſt be ſituated at a very great diſtance, and muſt contain a very large body of water to raiſe it ſo ſuddenly to ſuch a height.

There are many other caſes of wetneſſes in the deep moory or heathy grounds, which often take place and occupy the baſes of the narrow vallies at the bottoms of ſuch hilly lands, hang on the ſloping ſurfaces of their ſides, or ſpread over the more flat lands which lie at their feet.

The moſt ſimple caſe of this kind is probably that in which the more ſuperficial parts of the ſoil are of an impervious or porous nature, the ſubſoil of the abſorbent porous kind reſting upon a repellent impervious baſe or bottom; the porous ſubſoil part being uniformly charged with the deſcending waters, which are conveyed or brought down from ſome internal higher ſource, by a ſubſtratum of the gravel or other preconducting kind. In theſe circumſtances, where the under ſoil is ſufficiently free and open, a ſingle drain, properly made or cut acroſs the lower margin or edge of the riſing ground, may be fully equal to the prevention, even of the flatter lands below it, from being ſurcharged with water. But though this may be the caſe, ſuch an eaſy mode of removing the wetneſs may not always be the moſt ſuitable or proper, but muſt be decided upon by the full and mature conſideration of the particular caſe; as it is in caſes of this nature that waters for different uſeful purpoſes are to be procured, and the higher they may be drawn off, the more capable they will, for the moſt part, be of becoming beneficial in ſuch ways: beſides, where the abſorbent porous ſtratum of the lower lands is not ſufficiently open to permit the waters of a wet ſeaſon to paſs ſo freely through them as to prevent a temporary ſurcharge, a threefold benefit, it is thought by ſome, may poſſibly ariſe, by cutting and taking off the internal deſcending waters at the foot of the ſloping ground. As, in addition to the advantages already ſuggeſted, another good effect may be produced; which is that of taking off the *weight* of the waters which are pent up in the higher grounds from the lands below; and thereby relieving them from a common diſeaſe or complaint to which lands ſo ſituated are very liable; and which is occaſioned by the water, thus compreſſed, being forced up, through ſome fiſſure or defect in the ſoil, to the ſurface of the ground in ſome particular part or parts. But by a ſuitable fully efficient drain, made all along the upper margin of the flatter declining grounds, they may be entirely relieved from ſuch internal deſcending waters, and become in a healthy productive ſtate. It may, however, be added, that a drain ſo made, is in general more difficult and expenſive in cutting, than one which is formed at the lower part of the more flat declining land; the ſoil at the foot of a ſlope being commonly of a greater depth than it is either above or below that part; beſides the additional labour and trouble in cutting and ſinking the trench when to be ſoughed or filled, and ſtill more in keeping an open drain free, by reaſon of the greater preſs of water in that part. The upper ſide of the trench too, in ſuch caſes, is liable to ſhoot in; eſpecially if it be ſunk in a wet ſeaſon, the water acting the moſt forcibly there. Beſides, unleſs the trench be ſunk or cut down to a firm baſis or ſtratum, it is ineffectual; the lands below are ſtill liable to be affected with a portion, at leaſt, of the deſcending waters; beſides that which may fall on the particular ſurface of them. They conſequently demand nearly the ſame labour to render them dry, as they would without an ineffectual drain being made along their upper margin or border; notwithſtanding, however, in many inſtances, water, deſcending internally from a higher or more elevated ſource, and inſinuating itſelf beneath the ſuperficial ſoil of the lower grounds, ſo as to injure them, may be cut off by a drain running along at the foot of the hilly land, when cut or formed to a proper depth, as to the ſolid or impervious body; which may, at the ſame time, ſufficiently relieve the lands which are below, as well as afford a valuable ſupply of water for different economical purpoſes about the farm or ground.

Another caſe of this kind of draining is where the ſuperficial parts of the ſoil are of a porous or repellent quality, and the under or ſubſoil open or various, and partially charged with deſcending waters, paſſing through beds or veins of the ſandy, gravelly, or fiſſured rocky kinds. This is a ſituation of land which occurs more frequently than the above, but from which it principally differs, in the manner in which the internal waters act upon the lower lands. Inſtead of being diffuſed, in an uniform manner, beneath the ſoil, they enter or come into the ſubſtrata in collected ſtreams; and unleſs the ſubſoil be ſingularly open, and ſpreads out in an even manner, operate very irregularly on the land. Thus, if the ſoil be deep, and of an impervious or repellent quality, plots of cold wet land are formed and produced;—if thin, and of a porous freely abſorbent nature, moory excreſcences are raiſed on the ſurface; and if the ſtream be powerful and narrowly confined, a ſpring or fountain is the conſequence.

The nature of the means which are to be purſued in the removal of the wetneſs in this caſe is of a more complicated kind than in the preceding inſtance. In caſes where the ſupply of water cannot be cut off, the circumference of the flat ground is to be relieved by covered drains formed in a greatly declining manner from the diſeaſed parts, to a common drain or outlet in ſome proper place. In this caſe, the ſupply of water is cut off with leſs certainty, than when it is conducted by an evenly charged ſtratum, reſting on an impervious or repellent baſe or ſtratum. It may have only one, or many conduits ſituated at different depths. This too is a caſe in which the ſupply of water, with a ſufficient fall, may take place; and under circumſtances which particularly demand it, every expedient ſhould be had recourſe to in order to intercept the deſcending waters at the foot of the ſlope on the higher ſide of the lands which are to be drained.

A third caſe of draining in theſe ſituations is, where the ſurface-ſoil is impervious, or open and abſorbent; the under ſoil porous and abſorbent, with a cloſed bottom, and charged with deſcending waters, reſting on an impervious or repellent baſe, which has an under baſe that is open and freely abſorbent. This is a ſituation of land that may not often occur in ſuch a ſtate as to have the ſtratum or baſe on which the water reſts, only of a few feet in depth or thickneſs; but in which, it is probable, an open or porous ſtratum may not unfrequently be found, by careful examination, at a greater depth; particularly when the land is ſituated below riſing ground, at the baſe of which ſuch a ſtratum is indicated to be preſent, by the flowing of a natural ſpring or fountain.

The means of removing the wetneſs in ſuch a caſe as this, is obviouſly that of opening a communication between the impervious or cloſed and the open porous ſtrata; in order that the injurious waters, which are pent up in the former, may be permitted to paſs down into the latter. It is in this way, it is ſaid, that marle-pits are drained in ſome diſtricts, as in Norfolk; the beds of marle which hold up the water being cut through ſo as to let it down into the great body of ſand on which they reſt. In order to effect which, a large earth borer naturally preſents itſelf; and where the ſubſoil is *free* and open, and the ſurface-ſoil in a ſtate of *perennial herbage*, the operation of it, when duly directed, and performed in a ſuitably dry ſeaſon, may be found very effective for the time, if not durable: in the practical management of which a thick turf is to be raiſed on the ſurface, and at the bottom of the little pit which is made thereby, the borer is to be inſerted, the turf being returned into its place, as ſoon as the work has been completed, in order to prevent extraneous matters from getting into and obſtructing the opening made by the borer.

In land under the *arable* ſtate, the operation may not, it is ſuppoſed, be ſo efficient; but, however, if pits were ſunk down beneath the ſoil, it is ſuggeſted, ſo as to ſecure the tops of the bores from the operations of tillage, as to the depth of twelve or fourteen inches below the ſurface, ſods being then laid over the tops of the bores, and the excavated ſoil or mould returned to their places, ſuch drains might continue efficient for a ſhort length of time. In caſes, however, where the ſubſoil is ſo *tenacious* as to ſtand in need of many drains to draw the water effectually out of it, this mode of draining, or the uſe of the borer, it is thought, would appear a leſs eligible practice. In the bottom of a drain, whether open or covered, more or leſs current takes place, by which earthy matters are liable to be waſhed down into the bores; and theſe, in conſequence, to be choaked up. The operation and effects of water falling down a pipe or tube, and that of its riſing in them, are, it is thought, perfectly different; as riſing waters looſen, and force upwards the obſtructing matters they may meet with in their paſſage; whereas falling water, on the contrary, adds the preſſure of its own weight to that of the obſtructions; and by diſſolving earthy matter, and thereby filling every chink and cranny, tends to cloſe up the paſſage in the moſt effectual manner. Riſing waters too enter the pipe or tube in a pure ſtate, leaving their impurities below, while falling water carries down with it all the foulneſs that its current is capable of bearing to the mouths of the orifices of ſuch pipes or tubes. Hence, even under the firſt mentioned circumſtances, it is probable, it is ſaid, that the ſalutary effects of the bores would only be of a temporary nature. Beſides, where drains are neceſſary to extract the water from the ſubſoil, why, it is aſked, may it not be collected into a body, and be carried away upon the ſurface, where it may in many caſes be applied to different uſeful purpoſes?

Where, however, a ſuperficial deſcent cannot be had for the water thus collected, and an open ſtratum lies beneath the ſubſoil, which is ready and fit to receive it, the making of a communication between them becomes a point of great advantage and importance; as the trouble and expence of raiſing and removing the water by other means may be avoided.

In all ſuch circumſtances of land in theſe ſituations, the loweſt point of the ſpace of ground to be drained is to be aſcertained, in which it is adviſed to ſink a ſhaft down into the receiving open ſtratum, which is then to be filled up, to within a few feet of the ſurface, with rough clean ſtones, the roots of trees, or other open materials; on the top of which a filter is to be formed with heath and gravel, or any other ſubſtances which will prevent earthy matter, or water in a foul ſtate, from entering the ſhaft or opening. The collected waters are to be led to this filtering drain or opening in all caſes.

Where, however, the water is collected by means of covered drains, and where the filtering parts have likewiſe coverings placed over them, the whole proceſs will, it is ſaid, be free from external injury; and drains or works of this kind might, it is ſuppoſed, remain unimpaired for ages, or a very great length of time. Even if the waters were collected by open drains, and the filters, or filtering parts of them, were ſuffered to continue in a ſtate of neglect, until the ſhaft, in the courſe of time, ſhould become defective, the remedy, it is thought, would be eaſy; as by embracing a dry ſeaſon to re-open it in, and to clean it, as well as the materials with which it may have been filled, from their impurities, it may be reſtored to its original condition at but little expence or trouble. It may be noticed further, that where the land to be drained and improved is liable to have any other ſurface-water coming upon it than what falls upon its own ſpace, ſuch waters ought to be drawn and conducted away from it ſuperficially, by cutting it off at ſuch a height as will gain a ſufficient fall. And further, when the quantity of water which deſcends into it ſubterraneouſly, or which would deſcend into it if a free paſſage were opened for it, is found to be too copious to be readily diſcharged by ſuch a drain or ſhaft in the manner here propoſed, proper means ſhould be taken to cut off the ſupply, or as much of it as may be, by making a perforated trench, or otherwiſe, at a ſufficient height to be able to convey it away in a ſuperficial manner; and with a ſuitable fall, ſo as to prevent its entering the ſpace of land to be improved; which by this means will only have its own ſuperfluous waters to diſcharge by the ſhaft-drain. See Shaft-*Drain*.

There are many inſtances of low, flat-lying, moory vallies in different diſtricts of the kingdom, and eſpecially in Norfolk, from the baſes of which it would be difficult to make ſuperficial drains, which have for their ſubſtrata or ſubſtructures, moſt probably, inſatiable beds or depths of ſand, or ſandy matters, in which this mode of draining might, it is ſaid, be practiſed with vaſt benefit. The practice in theſe caſes alſo affords additional explanation of what has been ſaid above, in ſpeaking of the removal of the wetneſs of land by perforating through a retentive ſtratum to the porous one below, as well as the nature of the drainage in bogs ariſing from ſprings.

In caſes where the ſuperficial ſoil is impervious and repellent, or porous and abſorbent, the ſubſoil being uniformly abſorbent, but cloſed in the bottom part, and charged with riſing waters, the effect produced varies in ſome meaſure with the nature of the ſurcharged lands. Where the abſorbent ſubſtrata are imperfectly cloſed, or where the ſurcharging waters find ſome other partial vent at the ſame level, the effect is merely that of an under ſoil, which is liable to be ſaturated in a wet ſeaſon, and which is left dry after a long continued drought. But where the ſubſoil of the land to be improved, together with the ſubſtrata in its vicinity, on the ſame level, are equally impermeable, and the *embanked* waters are, in conſequence, under the neceſſity of riſing, for a vent, to a higher level, the lower lands become ſubjected to perpetual ſurcharge: even the ſurface-ſoil, when in any degree abſorbent, becomes liable to a ſimilar degree of ſaturation, by reaſon of the weight of water which lies above it; as the compreſſed waters, acting in conformity to the general law of fluids to gain a common level, preſs upwards againſt the ſoil: and where this is freely and uniformly abſorbent, it becomes fully ſaturated; the inevitable effect of which is a bed of ſuper-aquatic plants; and, in the courſe of time, an extent of deep moory bog: if partially abſorbent only, plots of moor are the conſequence.

The means of relief in caſes of this nature are much the ſame as thoſe in the firſt of the above caſes. Where the ſubſoil is uniformly free, and a ſupply of water is not wanted above what is called the running level of the lower margin of the land to be improved, a trench, with a ſufficient outfall there, will lay the whole effectually dry; and will, in addition, become the common outlet of the internal waters; inſtead of the natural ſpring, which will conſequently ceaſe to flow.

But if, on the contrary, the ſubſoil be not ſufficiently open to permit a free paſſage for water through it, or where economical intentions demand a fall from the upper margin, it will be right and proper to attempt to take off the head and weight of the water, by a trench made at the foot of the hill; and then to free the ſpace of land diſeaſed by one or more drains, as the particular circumſtances of the caſe may direct. Where a ſupply of water is particularly deſirable, or the improvement of cold lands, hanging on the ſlopes of riſing grounds, is wanted, it may be the moſt proper, when it is found that a deep trench alone, made at the foot of ſuch ſlopes, by reaſon of the too great depth of the impervious or repellent materials, is inſufficient for the purpoſe, to try the effect of the borer, and by this means endeavour not only to accompliſh the ſupply of water that may be deſired, but by bringing down the ſurface of the ſubterraneous collection to a level with the bottom of the trench, to relieve the plain below from the upward preſſure; and thereby probably remove the evil in a ſufficient manner, eſpecially on the higher ſide, without additional trouble and expence.

In caſes ſimilar to the above alſo, where a freely conducting ſtratum, which is charged with water, lies too deep to be eaſily reached by a trench, and too level to be relieved by the borer, and in all caſes where the water lies too low, and in too flat a ſituation to admit of a ſuperficial channel being ſunk deep enough to draw it from its natural bed, yet without an open ſtratum beneath to render a ſhaft-drain effective, a well-drain ſunk in the loweſt part of the ground to be improved, may, it is ſuppoſed, be had recourſe to with good effect. See Well-*Drain*.

In caſes where the quantity of water to be raiſed is conſiderable, and the depth at which it lies not more than ſix or eight feet, it may be forced up into an open drain, ſunk to about half the depth, by the uſe of the common draining-mill of marſh-land diſtricts: or, where the depth is too great, or the ſuperſtrata too looſe and unſtable to admit of a deep open drain, and that of an arched one too expenſive, a pump wrought by wind, or by water, where a ſufficient ſtream can be commanded, may be ſufficient to raiſe it to the ſurface; care being taken in this, as well as the above caſe, that no extraneous waters interfere. See Surface-*Draining*.

There are other caſes of draining beſides theſe, in which the wetneſs is removed by drawing off the ſprings that cauſe them. See Tapping *Springs*.

Caſes of the ſame nature as thoſe given above are illuſtrated by means of ſections, in all the different inſtances, by the writer of the work on "Landed Property."

In many caſes too, a great deal is capable of being effected in theſe and other ſorts of hilly grounds, and very aſtoniſhing effects produced, in ſome inſtances, by means of cuts or drains alone, properly directed, without the neceſſity of either boring, or having recourſe to the making or ſinking of pits in the land, for removing and taking away the wetneſs. It has been found that fields or grounds of conſiderable extent, which lie upon irregular banks, hills, or knolls, have been readily drained in this manner; though the water which roſe and iſſued out from the ſprings in particular parts of them, rendered them before of but very little value: and though many drains, in improper directions, and not properly cut, had been before formed in them, at great expence, for draining off the wetneſs without effect. This has been accompliſhed by cutting drains to ſuitable depths through the porous ſubſtrata, and in ſuch directions as to cut off the ſprings coming from the higher grounds; or to take the water of them away, which lodged in the hollow parts of the land. Such drains have often ſpeedily removed the wetneſs, without coſting a tenth part of what was paid for the others, or taking into the account the difference of keeping them in order, which muſt be a mere trifle, when compared with that of the others, as they were moſtly on a looſe bottom, and made ſo ſmall, as to be readily choaked up and deſtroyed. The nature of the ſituation, and the lie of the ſtrata of which ſuch lands are formed and compoſed, readily explain the reaſon why the moiſture in ſuch caſes is ſo quickly removed by properly cut and directed drains, as it ariſes, in moſt inſtances, from the inclination of the ſtrata, which is commonly towards the hollow parts of the grounds, and from their frequently terminating on the ſides of ſuch banks, hills, or knolls, under the impervious, clayey, marly, or ſtiff loamy ſtrata, though for the moſt part upon them.

Miſtakes in the modes of cutting the drains, and in the directions they ſhould have for properly intercepting and taking away the water of the ſprings, are almoſt every where in ſuch caſes committed, and vaſt expence thereby not unfrequently incurred; it is conſequently of much importance, in all ſuch inſtances, to have a proper plan laid down before any part of ſuch works be undertaken.

There are ſometimes ſprings and wetneſſes found on the tops of banks and hills, where the ground which is contiguous is much lower on all ſides; but in ſuch caſes they are, in many inſtances, ſupplied with the water from higher ground at a diſtance, by means of metallic, mineral, or other ſubſtrata, lying in a particular curving direction, between impervious ſtrata, from the higher parts of the land to the lower. The ſprings, in theſe caſes, iſſue forth at the points where the metals *crop* out.

The drainage, in ſuch caſes, is to be accompliſhed by forming ſuitable outlets for the water, and by boring or ſinking pits through the porous or metallic ſtrata, ſo that the water flowing through them may be intercepted, and reduced to ſuch a level, that the ſource of the ſprings may be cut off, and the ground on the top and on both ſides of the declivity become dry. By this means the metals, to that depth, may be rendered capable of being wrought, without any inconvenience from the water.

In the above method, the continuation of the ſtrata is ſuppoſed to keep on the ſame riſe, in the high ground on the north ſide of the rivulet, to a much higher level than the line of ſprings, by which means, the ſprings iſſuing from the *crop* of the metals are ſupplied.

By bringing up a cut from the rivulet into the bank an outlet will be obtained for the water, free from that of the rivulet; and by boring or ſinking a pit, the water flowing through the porous ſtrata will be reduced to a level, and of courſe the ſource of the ſprings will be intercepted, and the ground on the top, and on both ſides of the declivity, become dry; and the metals, to that depth, may be wrought free of water.

This could not be effected by boring from the bottom of the rivulet, or any run of water, for the preſſure of the running water above would prevent that below from riſing freely, and ſmall ſtones or ſand would be lodged in the hole. If the ſtrata crop out to the ſurface, and cauſe wetneſs, the pit or bore may be continued till it reach it; but lying at ſuch a depth, and covered with ſo much clay on the ſurface, the water contained in it may do no injury to the ground above it.

Drainage in Lands compoſed of alternate Beds of Clay and Sand; and other mixed Soils.—In diſtricts where the ſoil is compoſed of an intermixed variety, and where clay forms the moſt predominant part, draining is, according to the firſt writer above noticed, a work attended with much greater difficulty and expence, than in thoſe where both the ſurface and internal ſtrata are more regularly diſpoſed. In theſe kinds of ſoils, where every reſervoir of water is unconnected with another, being ſeparated by intervening beds of clay, the partial collections of water that theſe reſervoirs contain are ſo much augmented in time of great rains, that, being full to the level of the ſurface of the ſurrounding clay, the water having then a free iſſue, as over the edges of a diſh, ſo overflows and ſurcharges the ſurface of that clay, and renders it ſo wet and ſour, that its produce becomes every year more ſcanty, and the nature of the ſoil itſelf more barren. As theſe ſand-beds have no communication with each other, it requires as many drains as they are in number to extract the water from each of them. From the neareſt and loweſt part of the field to be drained, a trench muſt be cut up to the higheſt or moſt diſtant ſand-bank, in ſuch a direction, as, if poſſible, to hit on ſome of the intermediate ſand-beds, and ſave the making a longer ſide-cut, otherwiſe neceſſary; but where this would give many aukward turnings to the main trench, it would neceſſarily lengthen it; and where, by croſſing the beds in places higher than the ſurface of the ſurrounding clay, it would conſiderably increaſe the depth of it, and be difficult to work, eſpecially if rock or running-ſand; drains in form of the letter Y muſt branch off to ſuch beds, to draw off the water they contain, and convey it into the leading one. Although the ſand-beds throw out the water they contain on all ſides, ſo as to injure the clay-ſurface immediately round them, a drain on the one ſide will completely extract the water from the whole, and prevent it from breaking out at either ſide, provided that where it is cut be the loweſt. It may be obſerved, that unleſs the drain is ſo cut, it cannot be ſuppoſed to have this effect, while the water can find an outlet on the oppoſite ſide of the bank, lower than the bottom of the drain. This ought, therefore, to be previouſly conſidered; and by carefully examining the ground, and applying the ſpirit-level, the proper ſide for the drain may eaſily be found: or, if the water burſting out round the bank has been obſerved in dry ſeaſons to run at one place, and not at others, it is a proof that this is the loweſt point; and by cutting the drain in the direction of this level, the water will afterwards be prevented from riſing to the height of the upper outlets, or above the level of the bottom of the drain, even in the wetteſt ſeaſons. In many caſes, the whole water that cauſes the wetneſs, and ſupplies the other ſand-beds below, may ariſe from the upper ſprings, paſſing over the upper ſoil, and through the different ſand-beds; by being prevented from deſcending deeper than the retaining bed of clay. In this caſe, the drainage of the whole field may be accompliſhed with much leſs difficulty and expence than in the former. After the main conducting drain from the outlet has been cut, a drain on the upper or higher top part, quite acroſs, muſt next be made, which will intercept and cut off the principal ſprings, and may by this means render the lower drains, on the different ſides of the main conducting one, unneceſſary, unleſs merely to extract the partial ſupply of water which the lower ſand-beds may receive in time of rains, and which, where theſe ſand-beds are of ſmall extent, can do little injury to the adjoining ſurface. From this it appears, that one ſpring riſing in the higheſt ground may be the ſole cauſe of injuring a conſiderable tract lying below; from its water overflowing the ſurface at one place, and ſubſiding into it at another, according to the tenacity or openneſs of the ſoil; and therefore, in ſuch caſes, the upper ſpring, or *feeder*, ſhould be firſt cut off, and the effect of that known, before any more drains are made in the lower ground.

Beſides ſoils correſponding to this deſcription, there are others nearly of a ſimilar nature; but each bed being of leſs extent, and lying more regularly together, their drainage can be more eaſily effected, by means of leſs cutting, and conſequently leſs expence. Under the beds of ſand and clay that thus lie alternately together, and almoſt parallel to one another, is found a general body of impervious clay, that keeps up the water contained in the ſand, which continues always full, moiſtening the adjacent clay, and, in wet ſeaſons, running over it. As this *main under-ſtratum* of clay is ſeldom above four or five feet below the ſurface, a drain muſt be cut to that depth through the middle of the field, if it have a deſcent from both ſides; or, if the ground declines all to one ſide, the drain muſt be cut there, where the water will more eaſily diſcharge itſelf into it; and, unleſs the field is of a conſiderable extent, and have more hollows in it than one, one drain will anſwer the purpoſe effectually; for, by croſſing all the different beds that hold the water, it will draw it from each.

The great difficulty, however, in draining lands of this deſcription, and which is impracticable by one drain, is, if the direction of the alternate beds of clay and ſand lie *acroſs* the declivity of the grounds; ſo that one drain, in this caſe, can have no other effect than that of carrying off the water after it has paſſed over the different ſtrata, and would here naturally ſtagnate in the loweſt part of the field, if there was no other outlet for it: therefore, when the ground lies in this manner, which is often the caſe, beſides the drain in the hollow, others muſt be cut up from it, in a ſloping direction, *acroſs* the declivity, which by croſſing all the different veins, or the very thin and narrow ſtrata of ſand, will extract the water from each. Where theſe alternate ſtrata are of great extent, and the wetneſs produced by greater ſprings forming ſwamps at different levels on the ſide of the hills, the method of draining them has been already deſcribed.

The firſt thing to be obſerved, in the drainage of ſuch alternate ſoils, is to diſcover minutely the inclination of the alternate ſtrata, or how they lie with regard to the ſituation of the field to be drained, as upon this the direction of the drain entirely depends; and as the external ſigns that diſtinguiſh the different beds are eaſily perceptible, from the appearance of the ſurface, and difference of the herbage that each produces, there is little difficulty in attaining this part of the object. In drains of this kind there is ſeldom any need for applying the auger, as the neceſſary depth of the trench reaches far enough down; and as there is no ſpring for want of connection with the higher ground to force itſelf up through the auger-holes, or, if there is, it cannot, at ſo great a depth, and below ſuch a body of clay, do any injury to the ground above.

The drain, after being formed like a ſough at the bottom, or ſet like a triangle, muſt be filled a conſiderable way up with ſmall ſtones, before the mould is thrown in, taking care to have *tough* ſods laid immediately above the former. Where ſtones are ſcarce, and plenty of bruſh-wood at hand, faggots may be ſubſtituted in their place with propriety. The under part of the drain, however, ſhould be laid or *coupled* with ſtones, as a canal to carry off the water ſubſiding through the faggots; and which has alſo the good effect of prolonging their duration; for when the water cannot get off, which muſt be the caſe where there is no open conduit of ſtones, its ſtagnation amongſt the branches muſt ſoon cauſe their decay, and choak up the paſſage of the drain. In no caſe whatever ſhould the drain be filled with ſtones thrown in in a promiſcuous manner, without a courſe for the water at the bottom being firſt formed. There is one thing more to be attended to in completely accompliſhing the drainage of theſe ſoils: if the field lies very much on the deſcent, care muſt be taken in laying out the *branch*-drains in a direction ſufficiently horizontal, ſo as not to make the fall too precipitant, by which the bottom of the trenches would be worn uneven, and this would obſtruct the paſſage of the water, which might ſoon blow them up; but the fall ſhould be ſuch as to enable the water to clear its courſe. The reaſon why fewer drains are required in fields that lie nearly horizontal, as thoſe of the ſecond kind here mentioned, is, that the water is drawn equally from both ſides, whereas thoſe on a ſloping declivity, drawing only from the higher ſides of the drains, require them to be more in number, or cloſer to one another. This is the caſe in every ſituation where ſurface-draining is neceſſary, and particularly ſo in ſome ſorts of ſoils, as will be ſeen deſcribed in that kind of draining. See Surface-*Draining*.

In Lancaſhire, where theſe ſoils, compoſed of alternate beds of clay and ſand, very much predominate, and which have there acquired the names of *ſand-pots*, or *guts*, a term properly enough applied to them from their holding water like a pot, it is obſerved, that ſeveral drainages have been executed by Mr. Elkington in the manner here deſcribed, and alſo a very difficult one of the ſame kind at Sutton-Hall, Derbyſhire, where the water was contained in ſmall beds of rock, croſſed and intercepted by beds of clay.

There are ſtill other caſes of theſe intermixed ſoils, ſuch as thoſe which have a porous, or partly impervious ſuperficial ſoil, while the under-ſtrata are conſtituted of different diſtinct maſſes of impervious repellent materials, diſpoſed in a regular manner. The lands which lie near the bottoms of hills and ſlopes are often compoſed of ſuch impervious maſſes of the clayey, ſtrong marly, or ſtiff loamy kinds. Such an intermixed, irregular conſtruction of land, has naturally the effect of forcing the internal waters, which deſcend from ſprings in the higher grounds, as well as that which is taken up by the ſurface-ſoil, where it is porous, upwards towards the ſurface of the lands, or other directions, ſo as to cauſe or induce wetneſſes which have different appearances, according to the nature or quality of the ſuperficial parts of ſuch grounds, as wet, ruſhy, ſedgy, or other cold moiſt lands, oozing, ſpringy, wet lands, land-ſprings, quagmires, quickſands, and actual ſprings of water, either of the temporary or more permanent kinds, as the circumſtances of the ſeveral caſes may be.

The means of draining ſuch intermixed portions of wet ground of this ſpringy nature, although attended with ſome difficulty, is moſtly capable of being accompliſhed without any very great trouble or expence; this is to be effected by cutting up from the main conducting drain, which ſhould always be carried through the moſt depending maſſes, ſmall drains into the ſeparate upholding maſſes or ſtrata, at ſuitable depths, ſo as to find the waters which reſt upon them and draw them off. Such drains, where properly made and directed, muſt not only be effectual, but durable in their nature. The bottoms of the drains or channels in all theſe caſes ſhould conſtantly be cut a few inches into the firm impervious beds or ſtrata, and their higher ſides be made to communicate well with the openings in which the waters are lodged. In theſe ways this ſort of land may, in moſt inſtances, be rendered perfectly dry, and in a ſtate fit for cultivation.

A full and perfect knowledge of the buſineſs of ſpring-draining is of the utmoſt utility and importance; as more labour and money have, probably, been uſeleſsly thrown away upon this ſort of rural improvement than that of any other, merely for want of ſuch information. In many caſes, from three to five times as much money may have been expended, and trouble cauſed, as the nature and circumſtances of the different caſes demanded. It is indeed not improbable, but that for one-fifth part of each, the buſineſs might, in different inſtances, have been more effectually and completely performed, if the perſon employed had been ſufficiently informed on the ſubject. It has been the too common practice of the ordinary claſs of drainers, in removing the wetneſs cauſed by ſprings, whether from intereſt and deſign, or the want of adequate knowledge, to fill the ground with a number of drains, cut ſo as to ſpread and extend themſelves in all directions, wherever the ſlighteſt appearances of moiſture or wetneſs preſented themſelves; while in all probability, by the cutting of a ſingle drain in a ſuitable and proper direction, ſo as to intercept the ſprings, or draw off the internally collected waters, which cauſed ſuch wetneſſes by their ſpreading branches, the whole of the land might at once have been effectually laid dry. The prevention of this uſeleſs waſte of labour and money is only, perhaps, to be found in the endeavour to bring the nature of the theory and practice of this ſort of draining into a more clear and comprehenſive point of view, ſomewhat in the manner which has been attempted above, ſo as to enable thoſe who undertake this kind of buſineſs, to ſuperintend and direct all the various operations and proceſſes of it in the moſt ſuitable, proper, and efficient manner, without incurring unneceſſary expence. There can be no doubt that improvements of this principal kind in land would be much more generally attended to and extended than they are at preſent, if this were the caſe, and the ineffectual modes in which they are executed, in too many different inſtances, leſs frequent. As the chief and beſt ſkill of the artiſt, in this ſort of buſineſs, probably lies in the readineſs and certainty with which he is capable of diſcovering the main ſprings, collections, and paſſages or channels of the water which produce the different kinds of wetneſſes which are to be removed; and as neither long cuſtom, nor the moſt extenſive practice, has hitherto been ſufficient to lead to the means of attaining theſe, in all caſes, even when guided and aſſiſted by the outward ſuperficial appearances which the ſurface of the ground may afford; it is ſomewhat extraordinary that other aids and methods have not been had recourſe to for the purpoſe. This has, however, ſo far as we know, not been at all attempted until lately, and yet in one or two inſtances only. The ingenious drainer of Trafford-moſs, in Lancaſhire, as already noticed, has contrived a pump for this uſe, which is to be put down into the ſoil in different places, in order to aſcertain the preſence of ſprings, or collections of water in it, before the work of draining is begun. It is an implement of very ſimple conſtruction, and ready application, and which may be of very great utility in this intention. See Spring-*Draining Pump*.

The writer of the work on "Landed Property" has alſo ſuggeſted, that the borer is a tool which particularly preſents itſelf as uſeful in this way. On the ſuppoſed ſimilarity of the modes of ſearching for ſprings or internal waters, and for mineral or foſſile ſubſtances, it is thought extraordinary that the ſame method of proceeding ſhould not have long ſince been adopted. In the latter caſes, in freſh diſtricts, the work of ſearching for coal is not, it is ſaid, begun by ſinking a ſhaft, though appearances may be ever ſo favourable; the ground is firſt tried by the borer, at a comparatively trifling expence, to aſcertain the proper place of ſinking the pit. In trying for other matters, as ochres and other ſimilar kinds, the ſame tool too may be ſaid to be that which is in common uſe. And there can, it is thought, be no riſk in ſaying, that it may be equally well and more profitably employed, as a common tool of the drainer, for the purpoſe of *finding* the ſprings, reſervoirs, and channels of ſubterraneous waters, in the practice of that art, and by which it may be reſcued from the difficulty and myſtery in which it has hitherto been ſo greatly involved. See Borer.

It is ſtated, that an inſtance in the practice of a firſt-rate drainer has been ſeen, in which the uſe of the borer, for the purpoſe of *finding* the water before the ſpade was ſet to work, would have ſaved a large ſum of money, which had been laid out under an error in the mode of practice which had been purſued.

There will be ſome difference in the depth and manner of uſing the tool, according to the circumſtances and diſpoſition of the land, and the intentions and methods of the draining which are to be undertaken, as has been ſhewn already in conſidering the nature of the drainage in different caſes. And it may be neceſſary and convenient to have the bores and boring rods properly marked and regulated, eſpecially in particular caſes.

Thus, though there may be ſome inſtances of wetneſs in lands, in which it may be eaſy at once to judge and determine, with a great degree of certainty, of the nature and ſituation of the cauſes by which they are produced, and conſequently to operate and perform the means of their removal without any difficulty or trouble of this ſort; there are ſtill numerous others, in which the uſe of ſuch tools and implements may be of the higheſt and moſt material importance and advantage, not only in pointing out, with accuracy, the peculiarity of their ſituations and directions, but in preventing uncertain and unneceſſary cutting, and thereby procuring conſiderable ſavings in different ways. They muſt, of courſe, contribute much to render the practice of ſpring-draining more complete and perfect.

Spring-*Draining Auger*, that ſort of tool which is employed in this kind of draining for boring down into the ſubſtrata of the earth, after the drains have been dug, and tapping or letting off the ſprings, or for perforating the ſtiff ſoil or other parts, and letting the water down into a porous ſtratum below. It is a tool of very great utility in this ſort of draining, and which has much ſimilarity to that which is employed in ſearching for coal and other ſubterraneous minerals. The auger, or ſhell part that forms the hole or bore in the earth or ſtrata through which it paſſes, is moſtly from about two and a half to three inches in diameter; the hollow portion of it being about one foot four inches in length, and conſtructed nearly in the form of the common auger of the carpenter, only the ſides of the ſhell part are made to come cloſer to each other. The rod parts are formed in ſeparate pieces, of four feet long each, which ſcrew into one another, to any ſuitable length, one after another, as the depth of the hole or bore may require. The ſize of the ſtem above the auger part is about an inch ſquare, except at the joints, where, for the ſake of ſtrength, they are a quarter of an inch more. There are alſo a chiſſel and punch for ſcrewing on, in going through hard gravel, or metallic ſubſtances, in order to expedite the paſſage of the auger, which could not otherwiſe perforate ſuch hard bodies. The punch is often uſed, when the auger is not applied, to prick or open the ſand or gravel, and give a more eaſy iſſue or diſcharge to the water. The chiſſel is an inch and a half or two inches broad at the point, and made very ſharp for cutting ſtone, and the punch an inch ſquare, like the other part of the rods, with the point ſharpened alſo. There is a ſhifting handle of wood, which is faſtened with two iron wedges affixed to it, for the purpoſe of turning round the rods in boring, and alſo two iron keys for ſcrewing and unſcrewing the rods, and for aſſiſting the handle when the ſoil is very ſtiff, more than two men being required to turn the tool.

It is remarked by Mr. Elkington, that it has been conſidered a difficult part of the buſineſs of draining, to judge properly when to make uſe of this boring tool. Some, it is ſaid, who have not ſeen it employed in this ſort of work, have been led into a miſtaken notion, both as to the manner of uſing it, and the purpoſes for which it is applied. They think, that if, by boring indiſcriminately through the ground to be drained, water be found near enough the ſurface to be reached by the depth of the drain, the proper direction for it is along thoſe holes where water has been found; and thus make it the firſt implement that is uſed. The contrary is the caſe, the auger being never made uſe of until after the drain is cut, and then for the purpoſe of perforating any retentive or impervious ſtratum lying between the bottom of the drain and the reſervoir or ſtrata containing the ſpring. Thus it is capable of greatly leſſening the trouble and expence that would otherwiſe be requiſite in cutting the trench to that depth, to which, in many inſtances, the level of the outlet will not admit. See SPRING-*Draining*.

The manner of uſing the tool in working of it is ſimply thus: two or rather three men are neceſſary. Two ſtand above on each ſide of the drain, who turn it round by means of the wooden handle; and when the auger part is full they draw it up out of the hole, and the man in the bottom of the trench clears out the earth with the inſtrument for the purpoſe, aſſiſts in pulling the auger up out of the hole, and in directing it into it again, and can alſo aſſiſt in turning with the iron handle or key, when the depth and length of the rods require additional force to perform the operation. The workman ſhould be careful in boring, not to go deeper at a time, without drawing, than the exact length of the ſhell, otherwiſe the earth, clay, or ſand, through which it is boring, after the ſhell is full, may make it very difficult to pull out. For this purpoſe the exact length of the ſhell ſhould be regularly marked out on the rods, from the bottom upwards. Two or four flat boards, with a hole cut into the ſide of one of them, and laid alongſide of one another over the drain, in the time of boring, are of very great uſe for directing the rods in going down perpendicularly, for keeping them ſteady in boring, and for the men ſtanding upon, when performing the operations.

The *horizontal* draining auger is another tool of this kind, which was invented in Leiceſterſhire, and is probably not yet become well known, or in general uſe. It is capable, however, of having conſiderable utility and application in the practice of ſpring-draining, as well as in other ways. It has the advantages, in many caſes, of greatly leſſening the expence of cutting, that would otherwiſe be neceſſary, and of performing the work in a much ſhorter ſpace of time. It may be of great benefit when employed for forming a ſuitable paſſage for the water without opening a trench-drain, where the water of a drain, brook, or rivulet has to paſs under a bank, hedge, road, wall, or any other ſimilar place, and where pits are to be laid dry; as well as in many other caſes, as for tapping ſprings, or detecting water at the bottom parts of hilly lands, in order to the draining of the ground or the ſupplying of the water for different uſeful purpoſes, as the water of the ſprings, in theſe caſes, when it may be hit upon, will flow with more facility and readineſs, as well as in greater abundance, through ſuch horizontal or level openings, than through perpendicular outlets. It may likewiſe be uſeful for laying or putting down leaden pipes for the paſſage or conveyance of water, in making the holes into which the pipes may be introduced, and laid without the neceſſity of forming open cuts for the purpoſe, which are often very laborious and troubleſome in performing.

The manner of uſing the tool in working is this: where, for inſtance, water is to be diſcharged from any ſituation in which it is contained, that has high banks ſurrounding it, if the land declines lower on one ſide, after finding the level of the bottom of the water on that ſide, it is to be traced to the face of the bank, where the perforation is to be made through it by the auger. In doing which, the ſurface of the ground is there firſt to be made ſmooth, ſo as to place the frame of the tool nearly level, with the auger part of it pointing a little upwards. It is then to be wrought, which is done by two men turning the handles at the top part. When the auger or ſhell part is full, the rods are drawn back by reverſing the lower handle, and other rods may be added at the joints when the diſtance requires it. In boring or working through a bank compoſed of the hardeſt clay, or other ſuch materials, two men will, for the moſt part, get through from thirty to forty feet in the courſe of a day, if they be not obſtructed by hard ſtones, or other ſuch matters, which will require a chiſſel to be fixed on in the tool in the place of the ſhell, and longer time in working through. Where the length or diſtance to be bored or wrought through is conſiderable, and longer than the whole length of the different rods when ſcrewed together, a pit or opening is neceſſary to be dug or ſunk down, at a ſuitable diſtance, upon the line to the proper depth of the hole, for placing the frame and tool in when removed from its former place, and the work be then carried on in the ſame manner as before in the former part of the operation.

SPRING-*Draining Level*, that ſort of level which is employed in forming and cutting drains where ſprings are concerned. It is the ſpirit-level which is, for the moſt part, made uſe of in caſes of this ſort, and which ſerves to aſcertain, after a principal ſpring has been diſcovered, a line on the ſame level, to only one, or the different ſides of it, in order that the direction of the drain may be better and more certain. The uſe of it is moſtly the firſt and moſt important work in ſetting out drains in this ſort of drainage. It is employed in determining the level from one particular ſight, or from different ſtations, for a conſiderable length or diſtance. It is alſo neceſſary to decide the quantity of fall that can be gained from a drain to the neareſt outfall or outlet for the diſcharge of the water, as the more ſhort that is the better, when ſufficient fall can be had. It has likewiſe ſeveral other applications in the practice of ſpring-draining, as may be ſeen in ſpeaking of implements or contrivances of this nature. See LEVEL.

Scarcely any thing can be done, in this or any other mode of draining, nor even in irrigating or watering land, without the uſe of a proper level of ſome kind or other.

SPRING-*Draining Pump*, that ſort of contrivance of the pump kind, which is made uſe of for the purpoſe of detecting

ing and aſcertaining the nature, ſituation, and direction of under-ground ſprings and collections of water, as well as, in ſome meaſure, the nature and poſition of the different ſubſtrata in land, before the work of cutting and forming the drains for taking off the injurious wetneſs is begun. It is conſtructed of copper, in the pipe form, in a very neat, ſimple, and cheap manner, ſo as to admit of being put down into the ground in holes formed by the boring-auger; and by being made to be wrought as a pump, is capable of ſhewing the preſence of water, where the preſſure of it in the higher grounds above is not ſufficient to force it up through the auger-holes, which is the caſe in many inſtances. The nature and direction of the under-ſtrata are, in ſome degree, found in boring and putting the pump down through them. It is the invention and diſcovery of Mr. Wakefield, who has been long much engaged in the practice of draining in ſeveral different places and parts of the kingdom. See Spring-*Draining*.

This is a contrivance which, with the boring-rod, would ſeem to be capable of being of very great importance in the buſineſs of ſpring-draining, as tending, by the facility and certainty which it affords of diſcovering and pointing out the nature, exiſtence, and lines of ſprings, before any thing is done, to prevent a great deal of unneceſſary labour in cutting at random, as has hitherto moſtly been the caſe, and thereby ſave much uſeleſs expence to thoſe who are under the neceſſity of having ſuch works performed. The utility of theſe contrivances is more fully ſhewn under the head alluded to above.

Spring-*Draining Bricks*, the ſeveral different kinds, forms, and ſhapes of bricks which are contrived for this uſe, and which differ from thoſe of the common ſort employed in building purpoſes. They are of many different deſcriptions. Theſe kinds of bricks are moſtly well calculated for forming drains which are to carry off the water coming from ſprings, as a large extent of land may often be rendered dry by no very great quantity of ſuch materials; but they are not ſo well ſuited for drains which are to remove water which ſtagnates on the ſurface of land, though they are occaſionally made uſe of for that purpoſe. They ſometimes form hollow paſſages for the water to run along, as in ſtiff ſoils; but in ſuch as are ſoft they are made to form a ſort of pipe or cylindrical paſſage for the ſame, by being laid one upon the other. See Spring-*Drain*.

Spring-*Bog*, a term applied to that ſort of bog or boggy wetneſs which is cauſed by ſprings, in contradiſtinction to that, or the ſwampy wetneſs, which proceeds from the ſtagnation of rain or other water upon the ſurface of land where theſe prevail in land-locked ſituations.

Spring-bogs are, for the moſt part, more confined than thoſe of the contrary kind, but they are ſometimes equally extenſive with them.

Spring-*Brine*. See Salt-*Brine Spring*.

Spring, *Elater*, in *Phyſics*, denotes a natural faculty, or endeavour, of certain bodies to return to their firſt ſtate, after having been violently put out of the ſame by compreſſing, bending them, or the like.

This faculty philoſophers uſually call *elaſtic force*, or *elaſticity*.

Fleas only jump to exceſſive heights by means of a ſpringy membrane, eaſily viſible by a microſcope; and of which we have a curious figure in Dr. Hooke's Micrographia. By the elaſtic force of this ſpring they are enabled to leap two hundred times the height of their own body. See Flea.

Nature has provided for the regular ſowing of the ſeeds of ſeveral kinds of plants, by furniſhing them with a ſpring, which is wound ſometimes round the outſide, and ſometimes round the inſide of the caſe in which the ſeeds are contained. See Semination.

Spring, in *Mechanics*, is any elaſtic body, commonly of ſteel properly tempered, and formed in various ways, according to the purpoſe it is intended to anſwer, whether it be for giving motion to a machine, or for equalizing and modifying motion derived from ſome other agent. Springs are alſo introduced into inſtruments, called ſpring ſteelyards, for aſcertaining the weights of bodies, as well as having various other applications, which it would be uſeleſs to enumerate in this place.

Conſidering, therefore, the numerous uſes to which this kind of force may be directed, it muſt appear very remarkable that ſo little is known of the true principle of the action of ſprings, and of the laws by which their powers are regulated; we know, indeed, of no regular ſet of experiments, that have yet been made, which are at all adequate to reducing their operation to correct mathematical principles.

Dr. Hooke ſeems to have been the firſt writer who undertook experiments on the action of ſprings, with a view of drawing from them general concluſions, and by this means to introduce them into the theory of rational mechanics: and the reſult which he thus obtained, was his celebrated law "ut tenſio ſic vis," the tenſion is as the force: a law which ſome ſubſequent experimenters have ſtated to be correct, while others of conſiderable eminence have denied its accuracy and agreement with experiment in numerous caſes. The fact, therefore, ſeems to be, that in ſprings of a certain form, and *within certain limits*, the principle is juſt; but that others of different form, and in *all*, when the force is very conſiderable in regard to the ſtrength of the ſpring, it does not apply: and, conſequently, that much ſtill remains to be done before the actions of different ſprings can be admitted to form a part of theoretical mechanics.

Dr. Jurin, by adopting the principle above referred to, *viz.* "the tenſion is as the force," ſucceeded in rendering the action of ſprings ſuſceptible of mathematical computation. See Phil. Tranſ. N° 472. p. 46; or vol. ix. p. 19. of Hutton's Abridgment.

This paper certainly diſplays great ingenuity, and would be of conſiderable utility, provided the hypotheſis there aſſumed were perfectly correct; and even as it is, although a different law may have place between the ſpace through which the ſpring is drawn or compreſſed, and its reſiſtance, the ſame principle of inveſtigation muſt ſtill be preferred; and it may, therefore, be conſidered as the foundation on which the true theory muſt be raiſed, after a ſufficient number of experiments has been made to aſſure us of the correct law of their action, not merely within the narrow limits contemplated by the founder of the hypotheſis, but through all degrees of compreſſion and extenſion, ſhort of that which deſtroys their original elaſticity. We ſhall therefore offer no apology for exhibiting a conciſe view of the principal theorems and deductions of this ingenious author.

Dr. Jurin commences his memoir with a few neceſſary definitions; as the

Length of a ſpring, which is uſed to ſignify the greateſt length to which a ſpring can be forced inwards, or drawn outwards, without prejudice to its elaſticity. He obſerves, this would be the whole length, were the ſpring conſidered as a mathematical line; but in a material ſpring, it is the difference between the whole length, when the ſpring is in its natural ſituation, or the ſituation it will reſt in when not diſturbed by any external force, and the length or ſpace it takes up when wholly compreſſed and cloſed, or when drawn out.

Strength or force of a ſpring is uſed for the leaſt force or weight which, when the ſpring is wholly compreſſed or cloſed, will reſtrain it from unbending itſelf. Hence alſo the force of a ſpring bent, or partly cloſed, is uſed for the leaſt force or weight which, when the ſpring is bent through any ſpace leſs than its whole length, will confine it to the ſtate it is then in, without ſuffering it to unbend any farther.

We have before ſtated, that the principle which this author aſſumes is, that if a ſpring be either compreſſed or ſtretched by any external force, its reſiſtance is proportional to the ſpace by which it is removed from its original and natural ſituation. Thus, ſuppoſe, for inſtance, a ſpring (*Plate* XXXVIII. *Mechanics*, *fig.* 6.) C L, reſting with the end, L, againſt any moveable ſupport, but otherwiſe lying in its natural ſituation, and at full liberty; then, if this ſpring be preſſed inwards by any force, p, or from C towards L, through the ſpace of one inch, and can be there detained by that force, p, the reſiſtance of the ſpring and the force, p, exactly counterbalancing one another; then will the force $2p$ bend the ſpring through the ſpace of two inches, $3p$ through three inches, $4p$ through four inches, &c. The ſpace, C l, (*fig.* 7.) through which the ſpring is bent, or by which its end, C, is removed from its natural ſituation, being always proportional to the force which will bend it ſo far, and will detain it ſo bent.

And if one end, L, be faſtened to an immoveable ſupport (*fig.* 8.), and the other end, C, be drawn outwards to l, and be there detained from returning back by any force, p, the ſpace, C l, through which it is ſo drawn outwards, will be always proportional to the force, p, which is able to detain it in that ſituation.

And the ſame principle holds in all caſes, where the ſpring is of any form whatſoever, and is in any manner whatſoever forcibly removed from its natural ſituation.

It may be here obſerved, that the ſpring, or elaſtic force of the air, is a power of a different nature, and governed by different laws from that of a material ſpring. For ſuppoſing the line L C (*fig.* 6.) to repreſent a cylindrical volume of air, which by compreſſion is reduced to L l (*fig.* 7.), or by dilatation is extended to L l (*fig.* 8.), its elaſtic force will be reciprocally as L l; whereas the force or reſiſtance of a ſpring will be directly as C l.

This principle being premiſed, Dr. Jurin gives us a general theorem concerning the action of a body ſtriking on one end of a ſpring, while the other end is ſuppoſed to reſt againſt an immoveable ſupport. And leſt any objection ſhould be formed againſt the poſſibility of an immoveable ſupport, ſince any body, how great ſoever, may be removed out of its place by the leaſt force, he obſerves, that the objection may be eaſily removed. Thus, if the ſpring L M (*fig.* 9.) be ſuppoſed continued to N, ſo that L N = L M, if a body M, with any velocity in the direction M L, ſtrikes one end of the ſpring, and a body N, at the ſame time, with an equal velocity, and a contrary direction N L, ſtrikes the other end, N, of the continued ſpring, the point L, the end of the firſt ſuppoſed ſpring, will be immoveable.

Theorem.—If a ſpring of the ſtrength P, and the length C L (*fig.* 10.), lying at full liberty on an horizontal plane, reſt with one end, L, againſt an immoveable ſupport; and a body of the weight M, moving with the velocity V, in the direction of the axis of the ſpring, ſtrike directly on the other end, C, and thereby force the ſpring inwards, or bend it through any ſpace C B; and a mean proportional, C G, be taken between the line $\mathrm{CL} \times \frac{\mathrm{M}}{\mathrm{P}}$, and $2a$, a being the height to which a heavy body would aſcend in vacuo, with the velocity V; and upon the radius R = C G, be erected the quadrant of a circle G F A: then,

1. When the ſpring is bent through any right ſine of that quadrant, as C B, the velocity, v, of the body, M, is to the original velocity, V, as the coſine to the radius; that is, $v = \mathrm{V} \times \frac{\mathrm{BF}}{\mathrm{R}}$.

2. The time, t, of bending the ſpring through the ſame ſine C B, is to T, the time of a heavy body's aſcending in vacuo with the velocity V, as the correſponding arc to $2a$; that is, $t = \mathrm{T} \times \frac{\mathrm{GF}}{2a}$.

After demonſtrating this propoſition, the author proceeds to draw from it ſeveral curious corollaries, which, for greater ſimplicity, he divides into three diſtinct claſſes, according as they appertain to the following caſes: *viz.*

Caſe 1.—When the ſpring is bent through its whole length, or is entirely compreſſed or cloſed, before the moving force of the body is deſtroyed and its motion ceaſes.

Caſe 2.—When the moving force of the body is conſumed, and its motion ceaſes before the ſpring is bent through its whole length, or wholly cloſed. And

Caſe 3.—When the moving force of the body is expanded, and its motion ceaſes at the inſtant that the ſpring is bent through its whole length, and is entirely cloſed.

We ſhall enumerate a few of the moſt intereſting corollaries in each of theſe claſſes, premiſing firſt, that P = ſtrength of the ſpring, L = its length, V = the initial velocity of the body cloſing the ſpring, M = its maſs, t = time ſpent by the body in cloſing the ſpring, A = height from which a heavy body will fall in vacuo in a ſecond of time, a = the height to which a body would aſcend in vacuo with the velocity V, C = the velocity gained by the fall, m = the circumference of a circle, whoſe diameter is 1.

Case 1. *Cor.*—When the ſpring is bent through any right ſine, C B, (*fig.* 10.) the loſs of velocity is to the original velocity, as the verſed ſine to the radius; or $\mathrm{V} - v = \mathrm{V} \times \frac{\mathrm{G}g}{\mathrm{R}}$, where v is the preſent, and V the original velocity.

2. When the ſpring is bent through any ſine, C B, the diminution of the ſquare of the velocity is to the ſquare of the original velocity, as the ſquare of the ſine to the ſquare of the radius; that is, $\mathrm{V}^2 - v^2 = \mathrm{V}^2 \times \frac{\mathrm{CB}^2}{\mathrm{R}^2}$.

3. When the ſpring is bent through any ſpace, l, the velocity, v, of the body is equal to $\mathrm{V} \times \sqrt{\frac{2\mathrm{ML}a - \mathrm{P}l^2}{2\mathrm{ML}a}}$, or to $\mathrm{V} \times \sqrt{\frac{2\mathrm{M}a - pl}{2\mathrm{M}a}}$.

4. The time, t, of bending the ſpring through any ſpace, l, is proportional to the arc, G F, divided by $\sqrt{a}$;

l being the right ſine of the arc, and $R = \frac{2MLa}{P}$ being the radius.

CASE 2. *Cor.* 1.—If the motion of the body ceaſe when the ſpring is bent through any ſpace, *l*, the initial velocity is

$$V = Cl\sqrt{\frac{P}{2MLA}}, \text{ or } V = C\sqrt{\frac{pl}{2MA}}.$$

2. If the motion of the body ceaſe when the ſpring is bent through any ſpace *l*, the time, *t*, of bending it is

$$t = 1'' \times \frac{m}{2}\sqrt{\frac{ML}{2PA}}, \text{ or } t = 1'' \times \frac{m}{2}\sqrt{\frac{Ml}{2pA}},$$

where $m = 3.1416$, *viz.* the circumference of a circle to diameter 1.

3. In the ſame caſe, the time of bending the ſpring is proportional to $\sqrt{\frac{ML}{P}}$, or to $\sqrt{\frac{Ml}{p}}$; and if $\frac{L}{P}$ be given, *t* will be as $\sqrt{M}$; and if both $\frac{L}{P}$ and M be given, *t* will always be the ſame, whatever be the original velocity, or through whatever ſpace the ſpring is bent.

4. If the motion of the body ceaſe when the ſpring is bent through any ſpace, *l*, the product of the initial velocity, and the time of bending the ſpring, or V *t*, = $1'' \times \frac{mCl}{4A}$, and is proportional to *l*, the ſpace through which the ſpring is bent.

Hence, any two of the three quantities, V, *t*, and *l*, being given, the other is readily determined.

5. In the ſame caſe the initial quantity of motion M V $= Cl\sqrt{\frac{PM}{2LA}}$, or $MV = C\sqrt{\frac{plM}{2A}}$.

CASE 3. *Cor.* 1.—If the motion of the body ſtriking the ſpring ceaſe, when it is wholly cloſed, the initial velocity $V = C\sqrt{\frac{PL}{2MA}}$.

2. The initial velocity V is proportional to $\sqrt{\frac{PL}{M}}$.

3. If P L be given, either in the ſame or in different ſprings, the initial velocity V is reciprocally as $\sqrt{M}$.

4. The product of the initial velocity, and the time ſpent in cloſing the ſpring, or V *t*, = $1'' \times \frac{mCL}{4A}$; and is proportional to L, the length of the ſpring.

5. The initial quantity of motion, or M V, = $C\sqrt{\frac{PLM}{2A}}$.

6. M V is proportional to $\sqrt{PLM}$, or to P *t*. And if P L be given, either in the ſame or different ſprings, M V is as $\sqrt{M}$.

7. If $\frac{P}{L}$ be given, either in the ſame or in different ſprings, the initial quantity of motion is as the length of the ſpring into the time of bending it.

8. If a quantity of motion, M V, bend a ſpring through its whole length, and be conſumed by it, no other quantity of motion equal to the former, as $nM \times \frac{V}{n}$, will cloſe the ſame ſpring, and be wholly conſumed by it.

9. But a quantity of motion, leſs or greater than M V, in any given ratio, may cloſe the ſame ſpring, and be wholly conſumed in cloſing it; and the time ſpent in cloſing the ſpring will be reſpectively leſs or greater, in the ſame given ratio.

10. The initial *vis viva*, or MV^2, $= \frac{C^2PL}{2A}$; and $2aM = PL$.

11. The initial *vis viva* is as the rectangle under the ſtrength and length of the ſpring: that is, MV^2 is as P L.

12. If $\frac{P}{L}$ be given, the initial *vis viva* is as P^2, or as L^2.

13. If the *vis viva* MV^2 bend a ſpring through its whole length, and be conſumed in cloſing it; any other *vis viva*, equal to the former, as $n^2M \times \frac{V^2}{n^2}$, will cloſe the ſame ſpring and be conſumed by it.

14. But the time of cloſing the ſpring by this *vis viva* $n^2M \times \frac{V^2}{n^2}$, will be to the time of cloſing it by the *vis viva* MV^2, as *n* to 1.

15. If the *vis viva* MV^2 be wholly conſumed in cloſing a ſpring of the ſtrength P, and length L; then the *vis viva* n^2MV^2 will be ſufficient to cloſe, 1, either a ſpring of the ſtrength n^2P, and length L; 2, or a ſpring of the ſtrength *n* P, and length *n* L; 3, or of the ſtrength P, and length n^2 L: 4, or if *n* be a whole number, the number n^2 of ſprings, each of the ſtrength P, and length L, one after another. We may add, that it appears from hence, that the number of ſimilar and equal ſprings a given body in motion can wholly cloſe, is always proportional to the ſquares of the velocity of that body. And it is from this principle that the chief argument, to prove the force of a body in motion to be as the ſquare of its velocity, is deduced. See FORCE.

The theorem above-mentioned, and its corollaries, will hold equally, if the ſpring be ſuppoſed to have been at firſt bent through a certain ſpace, and by unbending itſelf to preſs upon a body at reſt, and thereby to drive that body before it, during the time of its expanſion: only V, inſtead of being the initial velocity with which the body ſtruck the ſpring, will now be the final velocity with which the body parts from the ſpring, when totally expanded.

It is alſo to be obſerved, that the theorem, &c. will hold equally good, if the ſpring, inſtead of being preſſed inwards, be drawn outwards by the action of the body. The like may be ſaid, if the ſpring be ſuppoſed to have been already drawn outwards to a certain length, and in reſtoring itſelf draw the body after it. And, laſtly, the theorem extends to a ſpring of any form whatever, provided L be the greateſt length it can be extended to from its natural ſituation, and P the force which will confine it to that length. See Phil. Tranſ. N° 472. ſect. 10. or vol. xliii. art. 10.

SPRING is more particularly uſed, in the *Mechanic Arts*, for a piece of tempered ſteel, put into ſeveral machines to give them motion, by the endeavour it makes to unbend itſelf.

In watches it is a fine piece of well-beaten ſteel, coiled up in a cylindrical caſe, or frame; which, by ſtretching itſelf forth, puts the wheels, and the whole movement, in motion. See Fusee, and Watch.

The ſpring of a watch is prepared by forming a very thin plate of ſteel into a double ring, bending it round with wire, and putting it into a proper furnace, in order to give it a ſuitable degree of heat. When that is acquired, it is taken out, and dropped into a kettle of oil, or warm mutton ſuet, in conſequence of which proceſs it poſſeſſes a degree of hardneſs, very little inferior to that of glaſs. After this it is reduced or let down, if the ſteel be of a proper kind for the purpoſe, to a fine violet or blue colour; in which ſtate it becomes exceedingly elaſtic, inſomuch, that to make it ſtand bent, it muſt be brought into a very acute curve; nor can it eaſily be brought, by twiſting horizontally, to alter its form, without endangering its being broken to pieces. But as it afterwards requires to be planiſhed by the hammer, filed, and poliſhed, it is again deprived in a conſiderable degree of its elaſticity: and, therefore, when it has received its laſt poliſh, it muſt again be blued upon a braſs plate over a lamp, by which means its former elaſticity is perfectly reſtored. Dr. Hooke, in his Micrographia, ſays, that this blue covering is owing to the fine ſulphur, preſſed through the pores by heat, and fixed by the ambient air in a fine vitrified lamina upon the ſurface. See Steel.

The ſpring of a lock, piſtol, or the like, is a piece of ſteel violently bent, which beats back the bolt, or ſtrikes down the cock, when ſet at liberty.

Spring-*Arbor*, in a *Watch*, that part in the middle of the ſpring-box, about which the ſpring is wound or turned, and to which it is hooked at one end.

Spring-*Box*, the cylindrical caſe, or frame, that contains within it the ſpring of the watch.

Spring-*Compaſſes*. See Compasses.

Spring-*Rings*, in *Rural Economy*, the large ring contrivances of the ſtrong ſpring kind, through which the reins paſs in ſtables, in order to prevent horſes from being injured by being entangled in them. They have a different form from the rings which are commonly employed, and are fixed in an immoveable manner to the ſtems, ſhanks, or parts, which ſcrew into the wood and hold them faſt. The ſprings in them are ſo contrived, as that the reins of the head-ſtalls can be ſlipped into and out of them with great eaſe and facility. They are a very uſeful and ſafe ſort of ring contrivance, for this purpoſe, in many caſes, eſpecially where horſes are reſtleſs, and much liable to the above kind of accidents. The expence of them is not great, while the ſecurity which they may afford is conſiderable. They are equally neceſſary and beneficial in farm ſtables as thoſe of the ſaddle-horſe kind. See Stable *Rings for Stalls*.

Spring *of the Air*, or its elaſtic force. See Air and Elasticity.

Spring, in a *Ship*, is a rope paſſed out of one extremity of a ſhip, and attached to a cable proceeding from the other, when ſhe lies at anchor. It is uſually performed to bring the ſhip's broadſide, or battery of cannon, to bear upon ſome diſtant object: as another ſhip, or a fortreſs on the coaſt, &c.

Spring is likewiſe a rope reaching diagonally from the ſtern of a ſhip to the head of another, which lies alongſide or abreaſt of her, at a ſhort diſtance. This is generally performed to make one of the ſhips ſheer off to a greater diſtance from the other; or to make merchant-ſhips lie uniformly in the ſame tier. Springs of this ſort are, therefore, occaſionally applied from a ſhip to a wharf or key, for the ſame purpoſe. Falconer.

Spring *a Leak, To.* See Leak.

Spring *the Luff, To.* See Loof.

Spring *a Maſt.* See Mast.

Spring, *To*, in *Military Language*, is to give vent to any combuſtible matter upon which gunpowder principally acts by the power of exploſion. Hence the phraſe to ſpring globes of compreſſion, &c. which are frequently uſed for the ſame purpoſes with ſky-rockets, &c. to ſerve as ſignals when any ſudden attack is to be made.

Spring, *To*, is alſo to ſtep forward with a certain degree of elaſticity.

Spring *the Firelock, To*, is to bring it briſkly up to any ordered poſition, *e. g.* in the recover.

Spring *Up*, a word of command occaſionally uſed, and ſignifying the ſame as double up; ſometimes uſed ſingly, as *ſpring!* particularly to light infantry men.

Spring, *Cear*. The cear is a piece of hardened iron or ſteel in a gun-lock, which moves on a pivot, and the point of which is received in a notch cut in the tumbler, and the other end is acted upon by the trigger. The cear ſpring is a ſmall ſpring, which throws the cear into the ſaid notch, when the piece is at half cock or full cock.

Spring, *Feather*, the ſpring of a gun-lock beneath the foot of the hammer, called likewiſe hammer-ſpring.

Spring, *Main*, the ſpring of a gun-lock, which operates on the tumbler, and gives force to the cock.

Spring, *Ver*, in *Coſmography*, denotes one of the ſeaſons of the year; commencing, in the northern parts of the world, on the day the ſun enters the firſt degree of Aries, which is about the twenty-firſt day of March, and ending when the ſun leaves Gemini.

Or, more ſtrictly and generally, the ſpring begins on the day when the diſtance of the ſun's meridian altitude from the zenith, being on the increaſing hand, is at a medium between the greateſt and leaſt. The end of the ſpring coincides with the beginning of ſummer.

Spring is the ſeaſon in which plants vegetate and grow with the moſt force and luxuriance. Late ſprings are, however, in general, the moſt beneficial to the farmer, and occaſionally to the gardener.

In ſuch ſprings as are late in their appearance, there is, for the moſt part, leſs danger in the climate of this country of the crops of different kinds ſuffering from the checks and injuries which they may receive in them, than in thoſe which are early, as the changes in them are moſtly much leſs frequent, and at the ſame time much leſs ſevere.

Fruit-trees of various kinds are often greatly injured in the formation and production of their fruit by early ſprings. This is particularly the caſe with the almond, the apple, the plum, and the cherry-tree, as well as with the gooſeberry-buſh, and ſome others. The peach, the nectarine, and ſome other fine fruited trees, are alſo ſometimes much injured in their fruiting by early ſprings, as where they are planted againſt walls or palings, in the open ground in expoſed ſituations.

Garden-crops of many different kinds not unfrequently ſuffer greatly from early ſprings; whole crops of particular ſorts being, in ſome inſtances, nearly deſtroyed, as is not ſeldom the caſe, in ſuch ſeaſons, in the firſt ſown onion, pea, and ſeveral other kinds of culinary crops.

Spring *Crops*, in *Agriculture*, ſuch as are put into the ground in the ſpring ſeaſon of the year, as oats, barley, ſome ſorts of wheat, and different other crops. See theſe heads.

Spring *Food*, that ſort of food, whether of the turnip, rye, tare, rape, cabbage, preſerved graſs, artificial graſs, natural graſs, or any other kind, which is made uſe of for live-ſtock, eſpecially ſheep, in the ſpring ſeaſon.

Spring *Garden*, that ſort of ornamental garden which is chiefly deſigned for the introduction of all ſorts of curious early budding and flowering trees, ſhrubs, and flower-plants, in the intention of affording beauty, variety, and effect.

Gardens of this nature ſhould be ſuitably ſituated ſomewhat contiguous to thoſe of the winter kind, being connected with them and the reſidences by ſuitable walks of the gravel kind, ſo as that they may be gone into at any ſeaſon or period without inconvenience. The ground or ſoil for them ſhould be of the more light, friable, and dry kind, and be ſo ſituated as to be well expoſed to the influence of the ſun, being completely ſheltered on the northern ſides, ſo as to prevent the blaſts from that quarter having any injurious effects on them. They ſhould alſo have ſome ſort of neat ornamental erection in them for containing the heaths, the auriculas, and different other tender early flowering plants.

Gardens of this ſort have a fine effect in many ſituations, when well laid out and managed. See Parterre.

Spring *Graſs*, a term ſometimes applied to the ſweet-ſcented vernal or meadow-graſs, from its being ſo forward or early in its growth. See Anthoxanthum *odoratum*.

It alſo ſignifies the graſs of any kind that ſprings early in the ſpring ſeaſon, and which affords the firſt bite for live-ſtock of any ſort.

Spring *Sowing*, ſuch ſowings as are performed in the ſpring ſeaſon, as that for ſpring wheat, oats, barley, and many other crops. See Sowing *of Seeds*.

Spring *Sowing*, in *Gardening*, comprehends all thoſe ſowings which are made at that ſeaſon of the year, eſpecially for any ſort of general ſeed crops, as thoſe of the pea, bean, and ſmall ſeed kinds. Small flower and other ſeeds are put into the ground at an early period with advantage, as they are much leſs liable to be injured by inſects in their after-growth, and riſe more favourably than where the contrary is the caſe. The ſame is ſometimes the caſe with ſmall graſs ſeeds ſown in the field. See Sowing *of Seeds*.

Spring *Tare*, a term uſed to ſignify that ſort of tender tare, which is ſown and cultivated in the ſpring ſeaſon for ſummer uſe, in contradiſtinction to the winter tare, which is uſually ſown in the autumn, and ſtands the ſeverity of the winter ſeaſon. See Tare.

Spring *Tide* is the increaſing of a tide after a dead neap; or the periodical exceſs of the elevation and depreſſion of the *tide;* which ſee.

Spring *Wheat*, that ſort of this kind of grain, which is capable of being ſown or put into the ground in the early ſpring ſeaſon, and cultivated or grown with the ſame or greater ſucceſs and advantage, than the common kind. It has been ſtated by ſir Joſeph Banks, that real ſpring wheat, the *triticum æſtivum*, or ſummer wheat of the botaniſts, is a grain too tender to ſtand and bear the froſts of the winter in this climate, but as quick in its progreſs from its firſt ſhoot to ripeneſs, as barley, oats, or any other ſpring corn. See Triticum.

The writer of the tract on the reſult of an Inquiry into the nature and cauſes of the blight, the ruſt, and the mildew, which have affected the wheat-crops on the borders of England and Scotland, has ſuggeſted, that common or winter wheat requires the moſt expenſive culture, being generally put into the ground in the autumn, and uſually requiring eleven months before it arrives at maturity; that conſequently the returns from ſuch a ſpecies or ſort of grain, ſhould be more lucrative than when ſpring corn of this kind is raiſed, which, after remaining only about four months in and on the ground, is then in a proper ſtate to be cut down. Nor is the difference in point of produce ſuppoſed to be ſo very material, as to render it indiſpenſably neceſſary to excluſively cultivate winter wheat, with a view to profit; and, indeed, it would appear, it is ſaid, that in ſeveral other reſpects, it would be deſirable to grow a conſiderable quantity of ſpring wheat in this kingdom, as being better calculated for the different ſoils and ſituations in different parts and places, as being leſs liable to diſeaſe, and as furniſhing a moſt important reſource in caſe there be reaſon to apprehend that the autumn or winter-ſown wheats may become unproductive, or of a bad quality.

It is well known, that in ſome parts of the kingdom it is the practice to ſow winter wheat in the ſpring, ſeldom, however, it is ſuppoſed, later than the month of February, or the middle of March, and have occaſionally good crops from it; and it is underſtood, from the moſt reſpectable authority, that though the winter wheat ſown in the ſpring is at firſt later in ripening than the ſame ſort ſown in autumn, yet that this diſadvantage, in regard to becoming ripe, leſſens, when the crop of wheat of that ſort which was ſown in the ſpring, is ſown again in the ſucceeding ſpring. Winter wheat ſown in ſpring thence acquires a tendency, it is ſaid, to earlier maturity, if reſown in the ſpring; but from an experiment which was tried in the county of Middleſex, it does not appear, that when ſown in the autumn it becomes ripe earlier than common winter wheat. But ſtill, it is admitted, that it does not ripen quite ſo ſoon as wheat ſown in autumn, nor as real ſpring wheat, nor can it be ſown ſo late in the ſeaſon. An intelligent farmer, it is ſaid, ſtates the difference between real ſpring wheat and winter ſpring-ſown wheat, at three weeks; which is a moſt material advantage in favour of the former. But as we have a ſpecies or ſort of wheat which is peculiarly calculated for ſpring culture, why, it is aſked, ſhould we endeavour to force another ſort to alter its nature and properties, and to grow and acquire maturity in a ſhorter] period of time than nature intended? And if conſiderable quantities of wheat too can be ſown in the ſpring, with perfect ſafety and ſucceſs, why, it is alſo aſked, ſhould we confine our Lent or ſpring crops of grains to oats and barley? It is ſuggeſted, as being alſo underſtood by the ſame writer, on reſpectable authority, that the ſpring-ſown wheats were, at one time, getting out of uſe or faſhion in France; but that they were ſoon under the neceſſity of again returning to them as an eſſential ſource of ſupply.

In this place we may then ſhortly conſider the hiſtory, nature, qualities, uſes, and advantages of it, as well as the ſorts of land and expoſures moſt ſuited to its growth, and the means by which the ſeed of it may be the beſt and moſt readily procured; leaving the methods of its cultivation, growth, application, and other points and circumſtances, to the head wheat, to which indeed they as well as it properly belong. See Wheat.

Spring, or this ſort of wheat, is ſuppoſed, and with great probability, to have been originally produced in Sicily, where it is known, it is ſaid, under the name of *Tumenia*, a corruption of *Trimenia*, or three months' grain. It is alſo much cultivated in Barbary, in Spain, in Portugal, in France, in Germany, and in almoſt all the corn countries, with the exception of this country, where, on account of the immenſe conſumption of malt-liquors, barley is more in demand, than where wine is the common beverage of the people. The former of the above writers conſiders it as well known over all parts of the continent of Europe, and to be much uſed and employed in cultivation in France, where it is called *Blé de Mars*, from the ſeaſon in which it is uſually ſown; and in ſome provinces of that tract of country *Bleds-tremois*, from the time it takes between ſeed-time and harveſt; that in Spain, it is called *Trigo de Marzo;* in Portugal, *Trigo Tremes;* and in Germany, *Sommer Whaitzen;* according to the languages of the different countries; all of which names are ſaid to mark in a diſtinct manner the difference between this and the winter corn of the ſame ſort. It has alſo been aſſerted on the ſame authority, that ſpring wheat may be ſown in autumn, and that if it ſhould ſucceed, it will produce a beautiful ſample, but that as it is, like barley, a tender plant, a ſevere froſt will kill it. Some have, however, ſuppoſed it to be a native of ſome part of Tartary, but it is evidently the production of a warm climate, ſuch as that noticed above. It has been claſſed by Ray, and probably others, as a diſtinct ſpecies or ſort of wheat. In regard to its introduction into this country, it is commonly believed to have been introduced or brought into it about the year 1773, or probably a little earlier, under the names of Siberian wheat, Switzerland wheat, or blé de Mars, as above. It is ſaid, however, to have been mentioned by Harriſon, an hiſtorian in the time of Elizabeth, though he repreſents it as having been then only known to a few huſbandmen or farmers.

It has alſo been ſaid that ſpring wheat was known to the Romans as a ſpecies or ſort diſtinct from the common autumn or winter kind, and deſcribed as ſuch by Columella, who conſidered and believed it very acceptable to the farmer, when, in conſequence of floods, rains, or other ſimilar cauſes, the autumn or winter wheat was prevented from being ſown or put into the ground by him. And that the Rev. Mr. Dickſon, in his "Huſbandry of the Ancients," has likewiſe conſidered it as well adapted to the wet cold climate of Scotland, where, on account of heavy rains, and other cauſes, the farmers are not unfrequently reſtricted in regard to the quantity of autumn or winter wheat that can be ſown or got into the ground.

The writer firſt noticed has, however, remarked, that it does not appear from the older books on huſbandry, that it was at any former period much grown or cultivated in this country; and that the more modern ones are in general ſilent on the ſubject of it: they mention, indeed, under the name of ſpring wheat, every kind of winter wheat which will ripen when ſown after turnips in the month of February; but little or nothing is ſaid on real ſpring wheat. This, it is conceived, is probably the reaſon why the real ſpring wheat has been ſo little known, the cultivators of land in general conceiving themſelves to be actually in the habit of ſowing ſpring wheat, when, in reality, they were only ſubſtituting winter wheat in its place, have been little inclined to inquire into the properties or qualities of the real ſpring wheat, when they had an opportunity and the means of ſo doing.

The inquirer already noticed ſtates, on the authority of an intelligent correſpondent, that above thirty years ago, the empreſs Catharine ſent a buſhel of ſpring wheat to his majeſty, which the king gave to Mr. Ducket, the celebrated farmer of Eſher, in the county of Surrey, who cultivated it for ſome time, and ſold a number of buſhels from it for ſeed. Notwithſtanding which, not a veſtige of it now, it is ſaid, remains in all that neighbourhood. On which, it may be obſerved, that, as coming from Ruſſia, it might not be the beſt ſort of ſpring wheat, of which there are ſo many varieties, as will be ſeen below: that a ſmall quantity, thus accidentally introduced into a diſtrict, might get into improper hands, and be given up from thoughtleſſneſs or inattention: that the difference of price between wheat and barley, conſidering the difference of produce, was then ſo inconſiderable, as to induce farmers to give up the culture, not only of ſpring, but even of winter wheat: and that the introduction of many other uſeful objects and practices, beſides that of ſpring wheat, has at firſt many obſtacles, difficulties, and impediments to contend with. The late Dr. Walker, in a work noticed below, has likewiſe obſerved that this ſort of wheat, or the true *ſummer* wheat, as he calls it, is a grain very little known in this country, though much grown in the northern parts of France, as well as in Jerſey, Guernſey, and in other places. It was firſt brought into Ayrſhire, in Scotland, from the iſland of Jerſey, by John, earl of Loudoun, during ſpring, in the year 1766. And that, on being ſown in a heavy clayey ſoil, and upon one of a more early kind, in the former on the 7th of April, and in the latter on the 4th of the ſame month, it was reaped or cut down on the 26th of September in the firſt caſe, and on the 4th of the ſame month in the laſt. In both inſtances, it afforded ten Linlithgow bolls of wheat, which are above forty Wincheſter buſhels, upon the Scotch acre. When the grain was weighed, a boll of it was found to be only two pounds lighter or leſs than a boll of winter wheat.

Spring wheat of the true kind, though ſown ſo late as near the middle of May, has been found to become ripe at the ſame time with the autumnal or winter wheat, and that there is no benefit gained by early ſowing with it, as that which has been put into the ground in April, has become ripe as early as that ſown in the beginning of the preceding month. In its growth, it is ſaid by ſome that it does not tiller in the manner of common or winter wheat, but ſhoots up and advances immediately and directly from the moment of its appearance above the ſurface of the ground. The grains or corns, which are ſmaller than thoſe of the common winter wheat, become larger and finer by being grown on better and more fertile land. It is ſuppoſed to ſucceed well on low fenny ſorts of land, which are apt to be flooded during the winter ſeaſon: and that it is highly deſerving of being tried in the mountainous parts of Derbyſhire, Yorkſhire, Lancaſhire, and ſome other northern diſtricts, where little or no wheat is ſown, the ſituations and expoſures being too cold and open for wheat ſown in the autumn to ſtand the ſeverity of the winter froſts, thaws, and rains, without periſhing and being deſtroyed. It has been noticed, that though, under particular circumſtances, ſpring wheat, when lately tried, has not always anſwered perfectly well, yet that in many caſes it has ſucceeded to a wiſh, and that it is now the prevailing huſbandry in an extenſive diſtrict in the county of Lincoln: that the growth of wheat has become more important and eſſential than ever, ſince it has become ſo much more generally uſed as food: and that the price now ſo much better and more fully rewards the induſtry of the grower or huſbandman. All theſe circumſtances being taken into full conſideration, no ſubſtantial reaſon can, it is thought, be aſſigned, why ſpring wheat ſhould not be raiſed in every diſtrict of this country which is calculated for the growth and cultivation of ſo important a national reſource in this ſort of grain, and without the poſſeſſion of which, it is indeed thought that this country cannot be permanently independent of foreign ſupply.

The writer of the above Inquiry ſtates, that there are, it is ſaid, about fifty varieties of ſpring, or this ſort of wheat; but that the kind or variety beſt known in this country has awns like barley, and hence that it is ſometimes known under the name of *rough* or *bearded* wheat. The pickle or grain in it is red; but it has not ſo bold or full a ſample as winter wheat, yet it weighs better; it is conſequently preferred by all honeſt millers, who know its nature and value, as the perſons engaged in this buſineſs are now moſtly beginning to do. Some farmers mix it with different proportions of winter red wheat, as the red Lammas, which reſembles it ſo much in colour, that they never fail to profit by the practice, as it increaſes the weight of the mixture more than it diminiſhes the quality of the ſample; and beſides renders it more productive at the mill. The proportions employed are uſually about one half, or rather leſs than that quantity, in ſuch mixtures. The average weight of ſpring wheat is moſtly about ſixty pounds the buſhel. The bread made from the flour of it is, it is ſaid, ſweeter than that from winter corn of the wheat kind. And that it is likewiſe more nutritious, as containing a larger proportion of gluten, or half animalized matter, in its compoſition. The bread is alſo allowed to be more palatable, it is ſaid, to thoſe who are in the habit of conſtantly eating it. In proof of its greater power of nouriſhment and ſupport, the analyſis of ſir Humphrey Davy has ſhewn, that it has more gluten or real nutrient matter in it, when compared with other grains of the ſame kind, than in good winter wheat, in the proportion of twenty-four to nineteen in the hundred. And that in regard to the inſoluble matter or part, or the bran, there is only a difference of two parts more in the hundred, when compared with good winter wheat of this country. Conſequently, that the difference in price between it and ſuch wheat, when of equal weight, ſhould only be in that proportion.

The advantages which attend the more general introduction and growth of this ſort of grain or wheat, are partly of a private, and partly of a public nature. In the former point of view it is of great importance, it is ſaid by the writer of the above inquiry, to have it in the power of the farmer to raiſe ſo valuable an article as wheat, though ſown late in the ſpring, or even in the beginning of ſummer. It was formerly generally conceived that after turnips, which was conſidered as the baſis of good huſbandry on light ſorts of land, that barley, including bear or bigg, was almoſt the only crop that could be raiſed and grown with advantage, as the ſowing of winter wheat in the ſpring could only be attempted or practiſed in a partial manner. But it now appears that ſpring wheat may be raiſed and grown with as much eaſe and facility, and with more profit, than the inferior ſorts of barley, too great a quantity of which is grown at preſent, ſince the exportation of grain has been cheecked and reſtricted, and ſuch enormous duties laid on malt. But here is a reſource, it is ſaid, which, if aided by a prohibition of foreign wheat from being imported, unleſs at augmented rates or prices, would always enable the farmer or grower, where his ſituation and the nature of his land are ſuited to the cultivation of it, to proceed in his uſeful and induſtrious career with proper inducement, energy, and ſpirit.

A ſtill further moſt important circumſtance in favour of ſpring wheat is, that, it is ſaid, of its not only being exempt from the blight or mildew, but alſo of its not being liable to any riſk of damage or injury from the grub or wire-worm: and this is a matter which is not to be attributed to the nature of lands or ſeaſons; for the farmers of the extenſive tract or diſtrict of country known by the name of South Holland, in the county of Lincoln, in which there are various kinds of land, uniformly declare, that they were compelled, many years ago, by the frequent attacks of the blight and mildew, to abandon almoſt entirely the ſowing of winter wheat, and to ſubſtitute ſpring wheat in its place or ſtead. That ſpring wheat is not liable to the diſeaſe of blight or mildew, has alſo been lately ſhewn by a field of twelve acres, which was totally, it is ſaid, exempt from that diſeaſe, in a diſtrict where every other field was in a moſt miſerable ſtate or condition with it. In the corrected account of the "Agriculture of the County of Eſſex," it is ſtated, however, that there is an inſtance of ſpring wheat being mildewed: and that Mr. Bailey, of Chillingham, ſtates, in a letter to the writer of the "Inquiry," that ſpring wheat, ſown in the month of March, was affected with the mildew, while the ſame ſort, ſown on the 2d, the 3d, and the 10th of May, eſcaped; alſo, that ſome ſpring or bearded wheat of the laſt crop, ſuffered from that diſorder where it was thick on the ground, probably owing to the want of air; for where it was thin, it eſcaped. The writer of the "Inquiry," however, conceives, that a few exceptions cannot overturn a general rule, which was recognized above a century ago in the "Syſtema Agriculturæ," printed in the year 1681, and which repeated experience has ſince ſanctioned. They, however, ſufficiently prove that it is not wholly incapable of receiving the diſeaſe under particular circumſtances and modes of growth. The authority of the work quoted is probably of no great conſequence, as real ſpring wheat was at that early period but little if at all known or cultivated in this country. The fact or matter can perhaps only be ſatisfactorily aſcertained and decided by more full and correct experimental trials than any which have hitherto been made. It is a very material point in its favour, however, that it is a vaſt deal leſs liable to the diſeaſe than autumnal or winter wheat, which is allowed on all hands.

It ſhould, however, be noticed, that it is liable, as in the other kind of wheat, to be affected with the ſmut, and conſequently that it muſt be carefully waſhed, brined, or pickled, in order to avoid any riſk of the diſeaſe, with a very highly ſaturated ſolution of common ſalt, in ſuch a manner as to prevent the danger of this ſort of infection being communicated in any way, and then duſted over with quicklime, as has been occaſionally practiſed, and as will be more fully ſhewn in ſpeaking of ſteeps and ſteeping grain. See STEEP, and STEEPING *Grain*. See alſo SMUT.

In the latter of the above points of view, the advantages of raiſing this ſort of wheat are not leſs important. The writer of the "Inquiry" ſtates, that for ſeveral years paſt we have depended on importation for a part of our food. We have ſent abroad, it is ſaid, above thirty millions ſterling, to enrich and improve foreign countries, the moſt part of them lately in a ſtate of hoſtility againſt us; and that ſo regular were our demands, that they were led to imagine that we could not exiſt without their aſſiſtance in this way. What, therefore, can, it is aſked, be more deſirable than to put an end to ſuch a diſgraceful dependence upon ſuch nations, which, by the growth and cultivation of ſpring wheat to a conſiderable and ſufficient extent, may at once be completely and effectually accompliſhed? It ſeems to the writer, indeed, of ſuch eſſential importance, that until the ſyſtem or practice is thoroughly eſtabiſhed, ſome legiſlative encouragement, to increaſe the growth and cultivation of this ſort of wheat, would be in the higheſt degree expedient. How much better, it is ſaid, is it to promote domeſtic cultivation and improvement, than to beſtow bounties on the importation of mere traſh, the refuſe of foreign granaries, of which ſuch quantities are commonly ſent to this country in times of ſcarcity?

It may conſequently be fairly aſked, whether the cultivation and growth of ſpring wheat ſhould not be conſidered as a national reſource of very great magnitude and importance; and as ſuch be ſtrongly inculcated on, and recommended to, the attention of the public? The utility and conſequence of it in this way, in times off carcity, have indeed been enforced by the firſt of the above writers and others, by obſerving that the price of wheat ſeldom advances much, even in very ſcarce years, until a conſiderable portion of the crop has been threſhed out, and the yield of it by this means aſcertained, but that this does not take place until the ſeed-time of winter wheat is wholly over and paſt; no ſpeculation, conſequently, of ſowing an increaſed quantity of that grain, can be entered into, during the firſt year of a ſcarcity; but before the end of April, the queſtion of the average yield of the preceding crop will be generally known, and when it is much below the uſual proportion, there can, it is ſuppoſed, be no doubt, that a large quantity of ſpring wheat will be ſown, if the ſeed can be *eaſily* procured. And that when there is, in the early ſpring months, any general appearance of defect or deficiency in the autumnal ſown crops, from whatever cauſe it may ariſe, ſpring wheat ought to be ſown, in ſuch proportion as may ſuffice for yielding a produce equivalent to ſuch probable defect or deficiency: and that if the ſtock of wheat on hand ſhould prove ſcanty, or of inferior quality, either from mildew or other cauſes, there is, on theſe accounts, a neceſſity to have recourſe to the ſowing of ſpring wheat, in order to augment and increaſe the ſtock on hand. It is thought more eſpecially neceſſary by the writer of the "Inquiry," to promote the cultivation and growth of ſpring wheat in a more general manner, becauſe, unleſs it be grown to ſome extent, no quantity of ſeed will be capable of being procured, however neceſſary it may become from the circumſtances of the times, as for inſtance, a complete failure of the winter-ſown wheat, at once to increaſe the quantity that is to be ſown. And that though ſpring wheat may not be ſo ſaleable, in favourable ſeaſons, as winter wheat, at leaſt in the metropolis, and its immediate neighbourhood; yet as it can be raiſed in various parts of the country, where winter wheat will not grow; and as it may be applied to different uſeful purpoſes beſides the article of bread; there is no reaſon, it is ſuppoſed, why the cultivation of it ſhould not be promoted. It is always a reſource which can be reſorted to in times of ſcarcity, with much more advantage to the country than importing foreign grain, to the diſgrace, and it might almoſt be added, it is ſaid, to the deſtruction of the agriculture of this country. There are ſome, however, who think foreign wheats more valuable and uſeful than thoſe of this country, as will be ſeen in ſpeaking of wheat. See WHEAT.

It is ſaid, that it has been objected to the grain of this ſort of ſpring wheat, that it is of a hard and flinty quality; but that our millers find no difficulty in grinding it; and it is well known, that the harder and more flinty the pickle, the better and livelier is the flour. The moſt flinty wheat, it is remarked, may be ground with facility, when properly damped. And that the French, when in Egypt, were taught by the millers there, to ſuffer their wheat to ſteep a few hours in water, and the grain, when afterwards dried in the ſun, was ground without difficulty. In this country, it is ſuggeſted that it might be kiln dried, or otherwiſe, perhaps, by fire heat.

The ſame writer obſerves, it is alſo ſaid, that barley is a ſafer crop, and that oats would be more profitable. In regard to ſafety, no crop, it is ſaid, can be more certain than ſpring wheat, when it is ſown in a proper ſeaſon, with good, well waſhed, or pickled ſeed, in the manner already ſtated, and on land properly prepared for its reception; and as to profit, were a crop of oats to be equally, or even more valuable, which is far from being the caſe, yet ſuch a ſcourger or exhauſter of the ground could not be recommended, in preference to a crop that does not exhauſt or deteriorate the land more than barley would; and yet, if other crops of wheat ſhould fail, would be much more valuable and uſeful.

In the metropolis, however, it is ſaid, where they are accuſtomed to the fineſt wheats, and where faſhion and habit render it neceſſary to make the bread as white as poſſible, this kind of wheat is objected to as coarſe, thick-ſkinned, and as producing clammy flour. It conſequently finds no favour with the millers in the neighbourhood of that great city, who, it is ſaid, in times of ſcarcity, would only buy it in ſmall quantities, at a price two-thirds lower than that of the common ſorts; and in years of medium produce, would not purchaſe it, in quantities, at almoſt any price. This, however, it is ſaid, is altogether owing to the prejudices and habits of a rich and luxurious capital, and will not probably influence the reſt of the kingdom. Beſides, if it be thought eſſential for the public intereſt always to have a conſiderable quantity of this ſpecies or ſort of corn grown in this country as a *national* reſource, the policy of which, it is thought, would ſeem unqueſtionable, government might in various ways promote the ſale of this ſpring ſort of wheat; as, by permitting the exportation of it, when the price is ten ſhillings the quarter leſs than that of other wheat; by reſtricting the manufacture of ſtarch to the uſe of it, if it can be employed in that way; by permitting the conſumption of this ſort of wheat in the diſtilleries, while a prohibition exiſts as to other wheats; by making all the biſcuits for the navy of it alone, as it ſeems peculiarly well ſuited for that uſe; and probably by different other means.

It is ſtated, it is ſaid, that theſe advantages cannot be given to ſpring wheat, becauſe it is impoſſible to diſtinguiſh it from coarſe or partially mildewed winter wheat; but ſome riſk muſt be run, the writer thinks, to inſure ſo great a public object and advantage as a regular ſupply of food by *domeſtic* induſtry. And if ſome low-priced or damaged winter wheats were mixed with ſpring wheat, and exported, diſtilled, or made into ſtarch, it is not ſeen that any injury or inconvenience from ſuch a circumſtance would be ſuſtained by the public. It is better, it is ſuppoſed, except in inſtances of dearth and ſcarcity, to get rid of inferior wheats in any way, than in bread.

In regard to the ſorts of land, and the ſituations in which this ſort of wheat can be produced, it has been found, that almoſt all the kinds, from the clayey marly deſcriptions, to thoſe of the light ſandy ſorts, are capable of affording it; but that it is obviouſly the moſt ſuited to ſuch light lands as are remarkable for promoting a quick vegetation and growth in the grain. And it is of great importance to be known, that land of the fenny kind, with a bottom of the turf-earthy ſort, is particularly calculated for the growth of this ſort of wheat, and that it riſes in a more quick and ſpeedy manner on ſuch land than on any other kind. Lands of this quality not being well ſuited to the growth of winter wheat, which is liable to be thrown out of them by froſty ſeaſons, on account of their lightneſs; by having all ſuch lands, in the different parts of the united kingdom, ſown in ſuitable courſes with ſpring wheat, a vaſt ſcarcely calculable advantage, it is thought, would be produced.

It is alſo a matter of very great moment, it is ſaid, that ſpring wheat is capable of being grown in different diſtricts where winter wheat cannot be raiſed at all, nor any other ſort of crop of nearly the ſame value or importance; as, for inſtance, in the northern parts or Highlands of Scotland, where they grow an inferior ſort of barley, commonly called *bear* or *bigg*, which is now become of little value, in conſequence of the preſſure of taxation; as, from the quickneſs of its growth, it would be the moſt likely to anſwer and ſucceed in ſuch ſituations. Were only one half of the ground now employed in the growth of bear or bigg crops, it is ſaid, appropriated to the raiſing of ſpring wheat; it would furniſh a quantity of this ſort of grain, equal to the uſual average of imported wheat, and any foreign ſupply be unneceſſary. The propriety of growing ſpring wheat in theſe ſituations, and the iſlands connected with them, is ſtill more ſtrongly enforced, it is ſaid, by the high opinion which has been formed of it by the late Dr. John Walker, profeſſor of natural hiſtory in the univerſity of Edinburgh, in a work lately publiſhed, entitled the "Economical Hiſtory of the Hebrides and Highlands of Scotland," which is equally deſerving the attention of the ſouthern, as well as the northern cultivator, though more particularly calculated for the latter. After noticing the time and manner in which it was brought into that country, as already ſeen, and the nature of its growth and produce in different ſorts of land, it is remarked, that it "will be allowed, that our common winter wheat could not have afforded ſuch a crop, or indeed any crop in the ſame ſpace of time. It appears, therefore, to be a grain better adapted for a northern than a ſouthern climate; that it might be raiſed in many parts of the ſouth of Scotland, where winter wheat is not ſown; and that of all the different ſorts of wheat, *it* is the moſt *promiſing* to be attempted in the Highlands."

In reſpect to the means of procuring or providing the ſeed of this ſort of wheat, it has been ſtated by ſir Joſeph Banks, in a paper inſerted in the fifth volume of Communications to the Board of Agriculture, that as in the neighbourhood of the towns of Boſton and Spalding in Lincolnſhire, the growth and cultivation of it are now fully eſtabliſhed, and likely to continue; from either of theſe places, conſequently, the ſeed may at any time be procured without difficulty, in ſuch quantities as are wanted, even when conſiderable; and that, as there is a water communication between theſe two places, and as the former is a ſea-port, it may always be brought to the metropolis, or any other maritime part of the country, at a ſmall charge. It may conſtantly be had at the above ſea-port at the ſame or ſomewhat leſs prices than winter wheat. And any of the principal merchants at it may be depended on for a proper ſupply. In ſmall portions, many of the chief ſeedſmen in the metropolis or any large towns can moſtly ſupply it.

It would appear on the whole, from the account which has been given of the hiſtory, nature, properties, uſes, and advantages, as well as other circumſtances in reſpect to ſpring wheat, that a more full and general introduction of it into the ſyſtems and practices of arable farming, eſpecially on light and ſome other lands, where the regular wheat huſbandry cannot be carried on, muſt be of very conſiderable importance, not only to the intereſts of individuals, but to the nation at large, in affording better and more certain profits, and at the ſame time guarding againſt the danger of ſcarcity.

Spring *Bay*, in *Geography*, a bay on the N.E. coaſt of the iſland of Barbadoes.

Spring *Iſland*, a ſmall iſland near the coaſt of South Carolina. N. lat. 32° 22′. W. long. 80° 57′.

Spring *Townſhip*, a townſhip of Pennſylvania, in Centre county, containing 1550 inhabitants.

SPRINGE, or Hallerspringe, a town of Weſtphalia, in the principality of Calenberg, the chief trade of which conſiſts in beer; 12 miles E. of Hameln.

SPRINGER, in *Ichthyology*, a name given by authors to the grampus.

SPRINGERS, in *Architecture*, the ribs of a groin, or concentrated arch, which ſpring from their reſpective impoſts, and meet together in an orb or knot in the centre of the whole vault. The ribs of the arches were uſually made of hard ſtone, while light toph ſtone or chalk was preferred for filling up the interſtices.

SPRINGES, a ſort of horſe-hair nooſes, made ſo as to run very eaſy, and planted in the places where birds run in ſome particular path, to take them as they paſs.

Thoſe birds that frequent the waters, or love to paddle and feed in wet and plaſhy places, are the moſt eaſily taken by ſnares.

The ſportſmen who would uſe them to advantage, muſt firſt carefully ſearch out the haunts and places where the fowls come in flocks, or in couples, and feed in the morning and evening hours. The furrows and water-tracks in theſe places are principally to be regarded; and wherever the ſeveral furrows, or water-courſes, meet in one, and afterwards divide into ſeveral others, theſe places are to be remarked above the reſt: the places which have moſt marks of the birds' feet, give alſo the ſureſt of all proofs, that they are well frequented. When theſe places are found, there ſhould be placed a number of ſmall and ſhort ſticks croſſwiſe athwart all the other paſſages, one ſtick being placed about half an inch from another, and making together a kind of fence, guarding every way, except that one through which it is intended the fowls ſhould paſs. This being done, a good ſtiff ſtick is to be provided, cut flat on each ſide; both ends of this ſtick are to be planted under water, ſo that the upper part of the flat ſide may only be upon a level with the ſurface; then a bow is to be made of hazel, or willow, in the form of a pear, broad and round at one end, and narrow at the other, and at leaſt a foot long, and five or ſix inches wide: at the narrow end of this there is to be a nick or dent. Then a ſtiff young grown plant of hazel, elm, or withy, is to be choſen, being buſhy and clear, and without knots, three or four inches about at the bottom, and about an inch at the top. Having made the bottom end of this ſharp, at the top of it there muſt be faſtened a very ſtrong loop, made of about a hundred horſe-hairs, platted very faſt together with ſtrong packthread, and made to ſlip any way with great eaſe. This nooſe or loop ſhould be juſt of the dimenſions of the pear-faſhioned hoop before-mentioned. Then hard by this loop, and within an inch of the end of the plant, there is to be faſtened, with ſtrong horſe-hair, a broad and thin trigger, made ſharp at both ends. Then the bigger ſharp end of the plant being made faſt in the ground, juſt by the edge of the water, the ſmaller end, with the loop and the trigger, muſt be brought down juſt to the firſt bridge; and the pear-faſhioned hoop being ſet upon the bridge, one end of the trigger muſt be ſet upon the nick in the hoop, and the other end on the nick made on the ſmall end of the plate, which by the violence and bend of the plant will make them all ſtick together till the hoop be removed. This done, the loop is to be laid upon the hoop in ſuch faſhion as the hoop is proportioned; then from each ſide of the hoop little ſticks are to be pricked, as before directed, making as it were a kind of impaled path-way, widening it all the way as it goes farther from the hoop, and making it ſo conſiderably wide at the end, that any fowl that chances to come that way may be entered a conſiderable way in before ſhe perceives the fence; by this means the bird will be enticed to go ſtraight on to the ſpringe, and as ſoon as ſhe touches it, either with head or feet, ſhe will be certainly caught; and thus, if the plant be ſtrong enough, the largeſt bird may be caught as eaſily as the leaſt.

When the ſmaller fowls, that frequent watery places, are to be taken by this engine, it is to be made only a great deal ſlighter. When it is intended for ſnipes, woodcocks, or the like, the main plant may be of willow, hazel, or grown oſier, or any other pliant wood that will eaſily bend, and will recover its ſtraightneſs again. The uſe of this engine is limited to the winter ſeaſon, and to times when there is much wet upon the ground. If there happen any great froſts, ſo that there is no advantage to be made of the wet places firſt deſcribed, then the ſportſman is to look for ſome place where there is a conſiderable fall, and where the current is not frozen, and in this place the ſpringes are to be ſet; and the greater the froſts are in this caſe, the more birds will be taken.

There is another uſe of ſpringes for birds, which is the taking, by means of them, certain birds on the boughs of trees and in hedges, which is often attended with very great ſucceſs. The ſportſman, for this purpoſe, muſt firſt mark ſome tree where the birds very much reſort; then fix on ſome particular branch that is tolerably ſtraight, and cutting off all the twigs to within a foot or two of the top, he is there to bore a hole through the branch with a piercer or wimble, large enough to admit a gooſe-quill. Then another branch is to be pitched upon, at about a foot diſtance from the firſt, and all its boughs are to pared away up to a certain height. There is to be fixed to this branch a packthread of half a foot long, and at the end of this is to be tied a nooſe of plaited horſe-hair. The branch to which the packthread is faſtened is then to be ſtooped ſo far, that the nooſe may be brought through the hole in the other branch, and faſtened there by means of a little ſtick four fingers long, and hooked at the end juſt fitting the hole, and ſo brought into it, as juſt to ſtop the flying back of the other branch. Then there is to be placed beyond the nooſe ſome bait of a fruit, or inſect, as a cherry, a pear, or a worm, or any other thing of which the bird, intended to be taken, is known to be fond; this is to be ſet in ſuch a manner, that the bird can no way get at it but by ſetting its feet on the ſmall ſtick which ſupports the nooſe and ſtops the hole. The weight of the bird will throw down the ſtick, and the bird will then be caught by the legs, and tied faſt to the branch where the hole is, by the flying back of the other branch where the packthread is faſtened.

There is yet another method in uſe for the taking many kinds of birds, from the partridge or pheaſant to the black-bird. This is made in the following manner, and is to be placed either on the ground, or on a tree, buſh, or hedge, according to the nature of the bird intended to be taken by it. A ſtraight and even piece of willow, or ſallow, is to be choſen, of about ſix feet long, and of the thickneſs of a walking cane; this is to be ſharpened at one end, and ſtuck down into the ground, and at the other end there is to be faſtened a ſmall crook; then two holes are to be made in the ſtick, the one big enough to admit a gooſe-quill, the other ſmaller: and a piece of ſtick is to be choſen, which being bent, will ſpring back to its ſtraightneſs again, ſuch as holly, or the like: this ſhould be about three feet long, and the larger end of it is to be fixed in the larger hole of the firſt ſtick; the ſmaller end muſt have faſtened to it a packthread, at the end of which there is a nooſe of horſehair: this is to be brought through the ſmaller hole, and be pegged in ſo ſlightly, as juſt to prevent its flying back of itſelf. Then the ſpringe or nooſe is to be ſpread on the peg, and a bait, proper for the bird to be taken, is to be placed at a proper diſtance; ſo that the bird cannot come at it but by treading on the peg, which will give way under its weight, and the ſtick, to which the packthread is faſtened, will fly back, and the bird will be conſequently caught in the nooſe, and have its legs drawn cloſe to the other ſtick.

SPRINGFIELD, the *Aaggavan* of the Indians, in *Geography*, a poſt-town of America, in the ſtate of Maſſachuſetts, and county of Hampſhire, on the E. ſide of Connecticut river; 97 miles W.S.W. of Boſton. This townſhip was incorporated in 1645, and contains 2767 inhabitants, a congregational church, a court-houſe, and a number of dwelling-houſes, many of which are ſpacious and elegant. The town lies chiefly on one ſpacious ſtreet, running parallel with the river. A ſtream from the hills, at the eaſtward of this town, falls into this ſtreet and forms two branches, which run in oppoſite directions, one northerly and the other ſoutherly, along the eaſtern ſide of the ſtreet, ſupplying the inhabitants with a ſupply of water for domeſtic uſes. This place has a conſiderable inland trade, with a paper-mill, arſenal and armoury.—Alſo, a town of New Hampſhire, in the county of Cheſhire, containing 814 inhabitants.—Alſo, a town of Vermont, in the county of Windſor, on the W. ſide of Connecticut river, oppoſite to Charleſtown in New Hampſhire, containing 2556 inhabitants.—Alſo, a poſt-townſhip of New York, at the northern extremity of Otſego county; 58 miles W. of Albany; its area being equal to about ſix miles ſquare. Its ſurface is undulated with hills and vallies, and well divided into arable, meadow, and grazing lands. The ſoil in the vallies is principally a deep rich mould. It has ſeveral mill-ſtreams; three houſes for worſhip, one for Preſbyterians, one for Congregationaliſts, and one for Baptiſts; and twelve or thirteen ſchool-houſes. In 1810 it contained 1846 inhabitants, principally compoſed of Engliſh, Iriſh, Dutch, and Scots emigrants. It derives its name from a large, deep ſpring.—Alſo, a town of New Jerſey, in the county of Eſſex, on Rahway river, which furniſhes fine mill-ſeats; 8 or 10 miles N.W. of Elizabeth town; containing 2360 inhabitants, of whom 45 are ſlaves.—Alſo, a poſt-town of New Jerſey, in Burlington county, having good ſoil, and famous for its cheeſe. The inhabitants, who are principally Quakers, having three meeting-houſes, amount to 1500. The buſineſs is chiefly tranſacted at a village called Job's Town, 10 miles from Burlington. In this townſhip is a hill, called mount Piſgah, which furniſhes ſtone for building. This townſhip has a grammar-ſchool.—Alſo, a townſhip of Pennſylvania, in Montgomery county, containing 550 inhabitants.—Alſo, a townſhip of Pennſylvania, in Bucks county, containing 1287 inhabitants.—Alſo, a townſhip of Pennſylvania, in Delaware county, containing 541 inhabitants.—Alſo, a townſhip of Pennſylvania, in Huntingdon county, containing 751 inhabitants.—Alſo, a townſhip of Pennſylvania, in Mercer county, containing 330 inhabitants.—Alſo, a townſhip of Ohio, in the county of Champaign, containing 598 inhabitants.—Alſo, a poſt-town in Hampſhire county, Virginia, 140 miles from Waſhington.—Alſo, a poſt-town in Waſhington county, Kentucky, 629 miles from Waſhington.—Alſo, a townſhip of Ohio, in the county of Columbiana, containing 601 inhabitants.—Alſo, a townſhip of Ohio, in the county of Hamilton, containing 2063 inhabitants.—Alſo, a townſhip of Ohio, in Jefferſon county, containing 746 inhabitants.—Alſo, a townſhip of Ohio, in the county of Muſkingum, containing 919 inhabitants.—Alſo, a townſhip of Ohio, in Portage county, containing 510 inhabitants.—Alſo, a townſhip of Ohio, in Roſs county, containing 972 inhabitants.—Alſo, a town

town of Kentucky, in Waſhington county, containing 249 inhabitants.—Alſo, a poſt-town in Robertſon county, Teneſſee, 763 miles from Waſhington.

SPRINGHILL, a townſhip of Pennſylvania, in Fayette county, containing 1837 inhabitants, of whom nine are ſlaves.—Alſo, a townſhip of the Indiana territory, in the county of Clark, containing 1107 free inhabitants and ſeven ſlaves.

SPRINGVILLE, a townſhip of the Indiana territory, in the county of Clark, containing 1380 free inhabitants and 13 ſlaves.

SPRINGY or ELASTIC *Body*. See ELASTIC *Body*.

SPRINGY *Land*, in *Agriculture*, ſuch as is ſubject to the breaking forth of ſmall oozing ſprings. It is a ſort of ground very troubleſome to the farmer in the cultivation, as requiring much draining, and other management, to render it proper for cropping. See DRAINING *of Land*; and SOIL. See alſo SPRING-*Draining*.

SPRINTZNSTAIN, in *Geography*, a town of Auſtria; 7 miles S. of Aigen.

SPRIT, in *Agriculture*, a term ſometimes made uſe of to ſignify a young ſprout or ſhoot, as in the caſe of new-ſown grain of any kind. Thus, new-ſown corn is often ſaid to be juſt ſprit, by the farmer. It alſo denotes, in ſome caſes, ſprouted corn; as that which is grown or ſprit in the ſheaf or ſtraw, in the field, from moiſt weather.

SPRIT, in *Sea Language*, is a ſmall boom, or pole, which croſſes the ſail of a boat diagonally, from the maſt to the upper hindmoſt corner of the ſail, which it is uſed to extend and elevate; the lower end of the ſprit reſts in a ſort of wreath or collar, called the *ſnotter*, which encircles the maſt in that place: ſails of this kind are accordingly called ſpritſails. See SAIL.

SPRITSAIL, a ſquare ſail uſed under the bowſprit.

SPRITSAIL-*Topſail*, a ſquare ſail uſed under the jib-boom, but is no longer to be ſupplied in the navy.

SPRITTING, in *Agriculture*, a term applied to the act or proceſs of germinating, ſprouting, or ſhooting forth, either in the work of vegetation, or the operation of malting barley, or other kinds of grain. It is of much conſequence, in both theſe caſes, that the proceſs takes place in a proper manner; as, without it, neither good and perfect field ſeed-crops nor malt can be produced. In moiſt or wet harveſt ſeaſons, the ſpritting of the grain, or other matters, in the ſheaf or ſtouk, in the field, is often of much injury, inconvenience, and loſs to the farmer, and ſhould always be guarded againſt as much as poſſible, by proper ſtouking, hutting, mowing, or ſome other means in ſuch a ſituation. See HARVESTING *Grain*.

SPROD, among the fiſhermen of many parts of England, a name given to the ſalmon while in his ſecond year's growth.

SPROE, in *Geography*, a ſmall iſland of Denmark, ſituated in the Great Belt. Veſſels which paſs the Great Belt in winter are often obliged to ſhelter here, though there is only one farm on the iſland. During winter the poſt regularly ſtops here; and an ice-boat, conducted by five men, is provided for the convenience of paſſengers, letters, &c.; 8 miles N.W. of Corſoer. N. lat. 55° 22′. E. long. 10° 59′.

SPROTTAU, a town of Sileſia, in the principality of Glogau, on a river of the ſame name, at its conflux with the Bober; 21 miles W.S.W. of Glogau. N. lat. 51° 32′. E. long. 15° 32′.—Alſo, a river of Sileſia, which runs into the Bober, at the town of Sprottau.

SPROUT, in *Agriculture* and *Gardening*, the common name of the young ſhoot, offſet, or ſucker, which is thrown or ſent off from any part of a vegetable of the plant, tree, or ſhrub kind.

Fruit-trees and ſhrubs, which are deſigned for production, muſt conſtantly be kept pretty free from theſe ſorts of ſprouts, ſhoots, and ſuckers, or their capability of affording good fruit will be much leſſened and reſtricted. This is particularly the caſe in the gooſeberry and currant ſhrubs, which ſcarcely produce any at all, where they are let remain. See OFFSET and SUCKER.

In hedge plants, however, the ſending off numerous ſprouts or ſhoots from the inferior and bottom parts of their roots and ſtems, is often of very conſiderable utility, in rendering the lower portions of the fences more thick and cloſe, where it does not too much injure the growth and ſtrength of the plants which are made uſe of for the purpoſe, as is ſometimes the caſe. See HEDGE and QUICKSET *Hedge*.

In the practice of gardening, ſprouts or ſhoots are occaſionally, though not frequently, employed for raiſing new crops of vegetables of the ſame kind as the original plants. This is ſometimes the caſe in the cabbage, and a few other ſimilar kinds, as well as in ſome ſorts of tree and ſhrubby plants.

But though the ſlips of the ſprouts or ſhoots, in the cabbage tribe of plants, will readily take root and grow, when planted out while they are in a young ſtate, they are only proper to be made uſe of in this way in an occaſional manner, in particular caſes and circumſtances; as, for inſtance, in planting them for ſeed in any particularly good and valuable ſort. In which caſe, ſome of the beſt ſlips of the ſprouts, in the more early crops, may be taken off, on the approach of the autumnal ſeaſon, and be planted out in rows, at the diſtance of about two feet from each other, giving them frequent waterings at firſt, when they will take root and grow ſo as to eſtabliſh themſelves in a ready manner, ſhooting up to form ſeed-ſtems in the enſuing ſpring, from which ſeed of the moſt perfect kind may be collected and ſecured.

The ſprouts, ſuckers, and ſhoots, of plants of the tree or ſhrub kinds are, in ſome caſes, ſlipped off and uſed in raiſing young trees and ſhrubs of the ſame ſorts as the originals, with the greateſt certainty, and in the moſt eaſy and expeditious manner. In ſuch intentions, the ſlips or ſhoots are, for the moſt part, taken off in the early ſpring, or towards the autumn, and planted out in rows in the nurſery grounds, at ſuitable diſtances, according to their nature and habits of growth; or placed in pots, to be ſet out in the open ground, or to be forced forward by the heat of the hot-beds, in the ſtoves, hot-houſes, frames, and other ſimilar compartments of the garden. They are afterwards, as ſoon as they have ſtricken or taken full root, in many caſes, removed and put out in different ways, according to circumſtances, and their particular nature and habits, as is ſhewn in ſpeaking of the culture of the different ſorts, under their proper heads.

SPROUTS, *Eſculent*, the fine, ſmall, young, tender, green ſhoots, which are ſent off and produced from the ſides or other parts of different kinds of culinary vegetables or plants, and made uſe of as human food at different periods and ſeaſons of the year. There is a great number of garden vegetables which afford ſprouts of this nature, and ſome in conſiderable abundance as crops for this purpoſe; as thoſe of the *braſſica* tribe in particular, as ſeen below.

In ſome herbaceous eſculent plants the young ſprouts are excellent eating, as in the cabbage kinds, and ſome others, affording a very profitable after-crop. The ſprouts produced on the ſtalks of the early-cut cabbages often alſo cabbage into tolerable little firm heads towards autumn, in the ſugar-loaf cabbage particularly, and other forward kinds; producing abundance of fine ſprouts in ſummer, which, being gathered while young and green, conſtitute ſome of the moſt excellent culinary greens of the ſeaſon. Likewiſe forward ſavoys, being cut early in autumn, the remaining ſtalks produce fine large ſprouts the ſame year, fit for uſe in the early part of winter: later crops of the ſame plants produce alſo abundance of ſmall ſprouts in the ſpring; and the borecole is remarkable for its great production of ſprouts towards ſpring, emitted all along the ſmall ſtems from the very bottom to the top: alſo, purple brocoli never fails to produce a ſecondary crop of excellent ſprouts, furniſhed with little tender heads.

In the culture of all the varieties of the cabbage kind, it is proper, therefore, after gathering the main heads, to leave a quantity of the ſtalks of the beſt and more forward crops, of the reſpective ſorts, to produce ſprouts; and if, towards autumn or winter, and other ſeaſons, the ground ſhould be wanted for other crops, the ſtalks may be removed, and trenched in by the roots in another place, not in a ſhady bye corner, as often practiſed, nor placed too cloſe, as the ſprouts would, in ſuch caſes, prove ſmall and trifling, and be liable to be eaten up by ſlugs; but in an open ſituation, in rows a foot aſunder: in which method the ſprouts will continue their growth in much greater perfection, though probably not in ſo good condition as if the ſtalks had remained undiſturbed.

As the ſtalks of cauliflowers and cauliflower-brocoli rarely produce any ſprouts, it is needleſs to leave them ſtanding on the ground, after their heads have been cut from them.

The ſprouts of this kind which are produced in the ſummer and autumnal ſeaſons are by much the fineſt, and continue the longeſt in perfection; yet, though the ſpring ſprouts may be of a ſmaller ſize, and continue a much ſhorter time before they run up for producing ſeed, they are, notwithſtanding, often found highly advantageous, uſeful, and acceptable at ſuch a ſeaſon, on account of the great deficiency of other ſorts of green vegetable products, and for the variety which they afford at the table.

All ſprouts of this nature, and for this uſe, ſhould conſtantly be plucked or taken off from the ſtems of the old plants while they are in their young, full, and early growth, in order that they may boil in a green and tender manner; as they are liable to become hard and ſticky, when left to an old ſtate of growth, and are not by any means ſo ſaleable in the market.

SPROUTS or *Shoots of Potatoes, Planting of.* Theſe are the ſprouts, ſhoots, or running branches, which are ſent off from them in their early growth. Such young ſprouts or ſhoots have lately had different experiments made with them, by which it has been ſhewn, that they are capable of being uſed with advantage in raiſing crops of this very neceſſary root, in ſome caſes. In Suſſex, the earl of Egremont, according to the writer of the corrected account of the agriculture of that diſtrict, has taken much intereſt in trials for raiſing them in this way.

In regard to the method of breaking off the ſprouts or ſhoots from the potatoes, there is no reaſon, it is ſaid, to be apprehenſive how or in what manner they are taken off; and if the ſprouts or ſhoots, after they have been ſeparated from the potatoe, be put into a baſket, and have a little earth thrown over them, they will keep in this ſtate, it is aſſerted, if not immediately wanted, for months. The kidney potatoe, after its ſecond cropping, is noticed to decreaſe in the number of its ſprouts or ſhoots. No ſort is ſuppoſed to equal the red cluſter kind. The early kidney comes up before any other ſort; the cluſter is the next; and the ox-noble the laſt. The cluſter throws out more ſprouts or ſhoots than any other kind, even ſo far as up to thirty at a time.

The ſprouts or ſhoots are planted promiſcuouſly from one to ſix or ſeven inches in length. Until the third or fourth month after planting, the ſprouts or ſhoots have, it is ſaid, but a ſmall apple, not above the ſize of the end of a perſon's finger; but afterwards they wonderfully increaſe their ſize. Hence it follows, it is ſuppoſed, that the eye, having a greater and more ſubſtantial root to ſupport the vegetative power of the plant, comes eaſier to perfection; but that the ſprout or ſhoot, though ſtationary at firſt, will in the end more than equal the other in produce; and if to this be added the ſaving of ſeed, the advantage will be ſtill more conſiderable.

Hence it is ſaid, that it may be inferred, that this method of cultivating the potatoe, which is practiſed at Petworth, in the above county, with ſucceſs, merits the attention of farmers, and probably of garden cultivators alſo. For an early market it is the only method, it is thought, of raiſing them; and beſides, the ſeed and expences of cutting are ſaved.

It has been long known that the potatoe is capable of being readily raiſed by planting the ſprouts or ſhoots, and recourſe has, for a conſiderable length of time, been had to it, in ſome meaſure, for the production of early crops, in the county of Lancaſter.

The want of ſubſtance in the ſprouts or ſhoots would ſeem to be a great objection to the ſprout manner of raiſing potatoe crops, as there muſt be a deficiency of ſupport in the early growth of the plants which conſtitute ſuch crops; as it has been found that even ſmall cuttings, where the eyes are preſerved, are not ſo good for raiſing full crops, on account of their want of ſubſtance, as thoſe of large ones; and ſcooped eyes, as ſets, have now almoſt been wholly rejected by cultivators, in conſequence of their defect of ſubſtantial nutrient matter for the ſupport of the young plant in its firſt or very infant growth. The matter remains, however, to be fully cleared up, and placed in a decided point of view, by more full and more correct trials made directly in this intention, as the ſprouts or ſhoots are unqueſtionably the natural modes in which the plants are raiſed. See POTATOE and SOLANUM.

SPROUT-*Hill*, a name ſometimes given to the ant-hill. See ANT-*Hill*.

The moſt ready way of removing ſprout-hills is probably by frequent heavy rolling of the land, immediately on their firſt appearance. The turning of a ſtream of water over the ground, where it can be conveniently done, may alſo ſometimes perhaps be effectual in the ſame intention. There are different implements and machines which perform this ſort of work in a very complete, expeditious, and effectual manner, that may be had recourſe to for the purpoſe. See SWARD-*Cutter*, and STRIKING *Ant-hill Machine*.

SPROUTING, the germination or firſt ſending forth of youg ſprouts from ſeeds, cuttings, or plants.

The ſprouting and early growth of almoſt all ſorts of field and garden ſeeds and plants are greatly promoted by placing them to proper depths, in properly dry and ſuitably rich ſoils and ſituations, as well as by a nice attention to their culture, while they are in their young riſing ſtate or condition. This is particularly the caſe in the latter ſorts of ſeeds and plants.

SPRUCE, *Eſſence of*, a fluid extract, prepared by coction of the twigs of the wild pine or Scotch fir. See Pinus *Sylveſtris.*

Spruce-*Beer*, a beverage made of the eſſence of ſpruce, fermented with ſugar or moloſſes and water.

Spruce, in *Geography*, a ſmall American lake of New Hampſhire, near Cheſterfield.

Spruce *Creek*, an American creek, which winds its courſe through the marſhes from the mouth of Piſcataqua river five or ſix miles to Kittery, in York county, Maine.

SPRUNT, in *Rural Economy*, a term ſignifying a ſteep road, or one on which there is much difficulty in paſſing with teams, and which requires great exertion in them.

SPRY, in *Agriculture*, a name ſometimes applied to the flat broom which is uſed with the caſting ſhovel, in the operation of cleaning grain, for ſweeping off the chaffy materials that collect in the work.

Spry *Harbour*, in *Geography*, a bay on the ſouth-eaſt coaſt of Nova Scotia. N. lat. 44° 42′. W. long. 62° 40′.

SPUD, in *Agriculture*, a tool or implement of the fork ſort, with three broad prongs of conſiderable ſtrength, which is uſeful for ſeveral different purpoſes. See Hop.

SPUDING, the practice or operation of digging over the hop-grounds, by means of the ſpud, in different diſtricts. This ſort of work ſhould always be fully, carefully, and expeditiouſly performed, as a great deal of the ſucceſs of the crops depends upon theſe circumſtances. See Hop.

SPULLERS *of Yarn*, in our *Old Writers*, perſons that work at the *ſpole*, or *wheel*. It alſo denotes triers of yarn, to ſee if it be well ſpun, and fit for the loom.

SPUN-Hay, in the *Military Art*, hay twiſted in ropes, very hard, for an expedition in the winter time; each trooper carrying as much as he can behind him.

SPUNGE, or Sponge, *Spongia*, in *Natural Hiſtory*, a kind of marine ſubſtance, found adhering to rocks, ſhells, &c. under cover of the ſea-water, or on the ſides of the rocks about the ſhore. See Spongia.

The ancients diſtinguiſhed two kinds, *male* and *female:* but the moderns make only one kind; which, however, they diſtinguiſh, with regard to its texture, into *coarſe* and *fine.*

Naturaliſts have been embarraſſed in all ages, whether to range ſpunge in the animal, mineral, or vegetable family. Some would have it a concretion formed of the ſea-mud; others have commonly ſuppoſed it to be a vegetable production: but it is now allowed to be, like the corallines, of animal origin; being the fabric and habitation of ſome ſpecies of worm or polype.

Dr. Peyſſonel has actually diſcovered and deſcribed the worms that form four different ſpecies of ſpunges, without having it in their power to dilate and contract them, as ſome naturaliſts have ſuppoſed; the ſpunges being altogether inanimate bodies, and inſenſible to the touch, or to any motion of the ſea, or any other accident, and formed by the juice or ſlaver which is depoſited by the worms that inhabit them. Phil. Tranſ. vol. l. art. 78. p. 590, &c.

Mr. Ellis, to whoſe obſervations on productions of this kind the public are much indebted, informs us, that if we carefully examine a ſmall part of one of thoſe ſpunges, whoſe ramifications are large and diſtinct, in the microſcope, we ſhall find that they riſe from many ſmall tubes: theſe, as they extend themſelves upwards, ſend outſide branches in various directions, which inoſculate, and, uniting thus with each other, form a compound reticulation quite through the inſide of the whole maſs. In viewing the extremities of the upper or laſt ſhoots, we may perceive ſmall openings at the end of their fibres; and as we trace theſe fibres back from the opening downwards, we ſee a ſoft whitiſh ſubſtance, which fills the internal hollow part of all the ramifications through the whole ſpunge; which ramifications have much the appearance of tranſparent catgut of an amber colour, and are, without doubt, the lodgments of animals of a particular claſs. For though we cannot diſtinguiſh either veſicles, or cells, or diſcover any other kind of organization, than that of a hollow tube variouſly inflected, and wrought together into a multitude of agreeable forms, ſome branched like corals, ſome expanded like a fungus, ſome riſing up ſtraight like a column; others broad at top, with a narrow baſe, and hollow like a funnel, with regular cavities, entrances, or apertures, which are nearly alike in all ſpunges of the ſame ſpecies; yet, from many obvious reſemblances to divers other claſſes of ſea productions, which are found to be of animal conſtruction, and from the chemical analyſes of ſpunges in general, there ſeems ſufficient reaſon for referring them to the claſs of animal productions. Ellis's Nat. Hiſt. of Corallines, &c. p. 78.

Spunge, or *Sponge*, in *Chemiſtry* and the *Materia Medica*, is the *ſpongia officinalis*, for an account of which, ſee Spongia. This ſpecies of ſpunge is found chiefly in the Mediterranean and Red ſeas.

On ſome of the iſlands of the Archipelago, the inhabitants are trained from their infancy to dive for ſpunges, which are generally found attached to the bottom of the rocks. This ſubſtance, formerly ſuppoſed to be of a vegetable nature, but determined by the obſervations of Mr. Ellis (ſee Phil. Tranſ. vol. lv.) to be of animal origin, has been, not long ago, examined by Mr. Hatchett, in the courſe of his valuable experiments on the component parts of animal membrane. (See Phil. Tranſ. vol. xc. p. 352, &c.) The ſpunges particularly examined by this ingenious chemiſt, are the S. cancellata, S. oculata, S. infundibuliformis, S. palmata, and S. officinalis. When the ſpunges had been immerſed in nitric acid (diluted with three meaſures of diſtilled water) during fourteen or ſixteen days, the acid became pale yellow, and was changed to an orange colour, by the addition of pure ammonia. After this proceſs the ſpunges became more or leſs tranſparent, and were conſiderably ſoftened. In this ſtate, if they were touched with ammonia, the part thus touched aſſumed a deep orange colour, inclining to a browniſh-red; and when much ſoftened by the acid, (if afterwards immerſed in ammonia,) they were completely diſſolved, and formed a deep orange-coloured ſolution. When digeſted with boiling diſtilled water, the ſpunges afforded a portion of animal jelly or gelatin (ſee Gelatin), which was precipitated by infuſion of oak-bark. In conſequence of their loſs of gelatin, which was imparted to the water, the ſpunges became leſs flexible, and more rigid; and the remaining part, when dry, crumbled between the fingers; or, when moiſt, was torn eaſily, like wetted paper. From theſe properties it appears, that ſpunges only differ from the horny ſtems of the gorgoniæ, and from the antipathes, by being of a finer and more cloſely woven texture; and this is particularly obſervable by comparing the coarſe ſpunges (ſuch as S. cancellata) with the finely reticulated parts of certain gorgoniæ, eſpecially the gorgonia flabellum, when diveſted of the external membrane. When the ſpunge, either in its natural ſtate, or eſpecially when its gelatin has been extracted by long boiling with water, is boiled with lixivium of cauſtic potaſh, it is completely diſſolved in it, and forms an animal ſoap. Spunge, when heated in a cloſe veſſel, gives out an ammoniacal fetid ſmoke, and is reduced to a black charcoal, which, after incineration, leaves a ſmall quantity of common ſalt and ſome carbonate of lime. The principal conſtituents of ſpunge, according to Mr. Hatchett's experiments, are animal gelatin, albumen (which ſee), a ſmall portion of common ſalt, and carbonate of lime. Spunge, when cleaned and fit for uſe, is of a browniſh-yellow colour, ſoft, light, and very porous; abſorbing rapidly by capillary attraction as much as it can contain of any fluid in which it is immerſed, and again yielding it when compreſſed.

Spunge is a very uſeful ſubſtance in the arts. In its uſual form it is never employed as a remedy; but in ſurgery, it is a very uſeful inſtrument on various occaſions.

A ſpunge applied to bleeding veſſels has been found a very ſucceſsful method of ſtopping the effuſion of blood. Phil. Tranſ. N° 478. p. 33.

For this purpoſe, a very dry and ſolid piece, of a cubical or conical form, ſhould be applied in cloſe contact with the veſſel, and retained by proper compreſſion; and it will ſoon adhere with great force. Very large arteries have been prevented from bleeding by this application.

Dry ſpunge, from its property of imbibing and ſwelling by moiſture, is ſometimes uſed as a tent for dilating wounds and ulcers: for this purpoſe, after being carefully freed from the ſmall ſtones generally lodged in it, it is dipt in melted wax, and the wax ſqueezed out from it in a preſs. Lewis.

Taken inwardly, it choaks; and is, for that reaſon, cut ſmall, and fried or dipped in honey, and given to quadrupeds to kill them, which it ſeldom fails to do, by ſwelling and preventing the paſſage of the food into the inteſtines.

The officinal preparation of ſpunge for medical purpoſes is the "ſpungia uſta," or burnt ſpunge. The London Pharmacopeia directs to cut ſpunge into ſmall pieces, and to bruiſe it, that it may be thus freed from any adhering extraneous ſubſtance; then to burn it in a covered iron veſſel, until it become black and friable; and, laſtly, to reduce it to a very fine powder. Burnt ſponge conſiſts of carbonate and phoſphate of lime, ſubcarbonate of ſoda, and charcoal. The principal active ingredient is the ſubcarbonate of ſoda; but it is aſſerted, that a mixture of this principle and charcoal does not produce the effects of burnt ſpunge. This ſubſtance is tonic, deobſtruent, and antacid. It has been much recommended in bronchocele, ſcrophulous affections, and hepatic eruptions. The doſe is from ʒj to ʒiij, mixed into the form of an electuary, with powdered cinnamon and honey. In bronchocele the patient is directed to ſwallow the portion of electuary very ſlowly, from a ſuppoſition that ſome local effect is produced. See Bronchocele.

Some have pretended to cure the leproſy with it, and others extol it againſt the bite of a mad dog; but theſe laſt are virtues not univerſally received.

In ſpunges are found a kind of ſtones called *cyſtiolithi*, held good for the worms in young children, and to this purpoſe given in powder.

Spunge, in the *Manege*, is the extremity, or point of a horſe's ſhoe, that anſwers to the heel of his foot; upon it the calkins are to be made. Thick ſpunge ruins the horſe's heels, and therefore ought never to be uſed. See Shoeing *of Horſes.*

Spunges, *Pyrotechnical*, are made of the large muſhrooms or fungous excreſcences growing on old oaks, aſhes, firs, &c. which, being boiled in common water, then dried and well beaten, are put into a ſtrong ley, prepared with ſaltpetre, and again dried in an oven.

Theſe make the black match or tinder brought from Germany, uſed to receive and ſuſtain the fire ſtruck from a flint and ſteel, &c.

Spunge is uſed, in *Gunnery*, for a cylinder of wood, from ten to twelve inches long, of the ſame diameter with the rammer, with a piece of ſheep or lamb-ſkin wound about its end, to ſerve for ſcouring great guns when diſcharged, before they be charged with freſh powder; hence called *ſpunging*. In ſmall guns it is commonly fixed to the other end of the handle of the rammer; but has a ſeparate one in thoſe of a larger calibre.

SPUNGING. See Spunge.

SPUNK, a term uſed indifferently for half-rotten wood, match for guns, and a ſubſtance growing on the ſides of trees. See Agaric.

SPUN-YARN, among *Sailors*, a ſmall line or cord, formed of two or three rope-yarns twiſted together by a winch; the yarns, of which it is uſually made at ſea, are drawn out of the ſtrands of old cables, or other ropes, and are knotted together, and tarred. It is employed for ſeveral purpoſes, particularly to faſten one rope to another, to ſeize block-ſtrops to the ſhrouds, and to ſerve ropes which are liable to be chafed, &c.

SPUR was anciently a piece of the armour of a cavalier, faſtened to the talary, that is, the hind part of that piece of a complete armour which covers the legs and feet.

The word is derived from the German, *ſpohr*; or rather the Saxon, *ſpora*; or Daniſh, *ſpor*; which all ſignify the ſame.

At preſent, the ſpur is a piece of iron, or other metal, conſiſting of two branches encompaſſing the horſeman's heel, and a rouelle or rowel in form of a ſtar, advancing out behind, to prick the horſe.

Louis le Debonnair forbad eccleſiaſtics the profane faſhion of wearing ſpurs. Anciently the difference between the knight and eſquire was, that the knight wore gilt ſpurs, whence the appellation of *eques auratus*; and the ſquire, ſilvered ones.

Two ſorts of ſpurs ſeem to have been in uſe about the time of the Conqueſt, one called a pryck, having only a ſingle point, like the gaffle of a fighting-cock; the other conſiſting of a number of points of conſiderable length, radiating from and revolving upon a centre, thence named the rouelle, or wheel-ſpur. Delineations of the firſt occur in the ſeals of moſt of our kings and great barons, prior to the reign of Edward III., and alſo on the engraved and ſculptured figures of croſs-legged knights. The rouelle is ſometimes found on figures of equal antiquity; inſtances occurring of the ſame perſon being delineated with the pryck-ſpur on one ſeal, and the rouelle on another. Some ſpecimens of the pryck-ſpur are ſtill to be found in the cabinets of the curious.

Spur, *Order of the Golden*, in Rome, is ſuppoſed by ſeveral writers to have been inſtituted by pope Pius IV., in 1559. The badge is a ſtar of eight points argent, and between the two bottom points a ſpur or.

Spur, in *Agriculture*, the name of a vegetable diſeaſe, which frequently attacks rye, and which ſometimes likewiſe damages wheat. It is found that the grains which have the ſpur are thicker and longer than the ſound ones, and generally project beyond their huſks, appearing ſometimes ſtraight, and ſometimes more or leſs crooked; and that their outſides are brown or black; their ſurface is rough, and three furrows may frequently be perceived in them, which run from end to end. Their outward end is always thicker than that which ſticks to the chaff, and the moſt ſwollen end is ſometimes ſplit into two or three parts. It is not unuſual to find on their ſurfaces cavities which ſeem to have been made by inſects. Further, that when a ſpired grain is broken, in the middle or centre of it is ſeen a pretty white flower, covered with another flower, which is reddiſh or brown. Though this vitiated flower has ſome conſiſtency, it may nevertheleſs be crumbled between the fingers. M. Aimen has ſometimes found this powder almoſt as black as that of ſmutty wheat. Theſe grains, when put into water, ſwim at firſt, and afterwards ſink to the bottom. If chewed, they leave a bitter taſte on the tongue. The chaff appears ſound, though what is outmoſt is ſomewhat browner than when the ears are ſound. But all the grains of the ſame ear are not ever attacked with the ſpur. The grains which have this diſtemper ſtick leſs to the ſtalks than ſound grains do. And the above writer imputes the diſtemper to the grains not being impregnated; and aſſerts, that he has not ever found a germ in grains which had the ſpur.

It may be noticed, that it has been ſuppoſed by ſome that fogs, dews, rain, and the moiſture of the earth, may give the diſtemper to rye, but without any ſufficient reaſon. M. Tillet is however ſtrongly inclined to think that it is occaſioned by an inſect, which turns the rye into a kind of *gall;* and he ſuſpects a ſmall caterpillar as being the cauſe of this miſchief, but cannot ſpeak affirmatively on this point. It has been abſurdly ſuppoſed to affect thoſe who conſume the bread made from grain thus diſeaſed with a ſort of dry gangrene in the extreme parts of the body. The nature of this diſeaſe in grain, like thoſe of many others, is ſtill far from being fully inveſtigated, ſo as to form any correct notion of the means of removing or preventing it.

Spurs, in *Old Fortifications*, denote walls that croſs a part of the rampart, and join to the town-wall.

Spurs, in *Ship-Building*, large pieces of timber, the lower ends of which are fixed againſt the ſide of the bildge-ways, and the upper ends fayed and bolted to the ſhip's ſide, to ſupport the ſhip in launching. They have been much diſcontinued of late years.

Spur-*Shell*, a ſpecies of the cochlea.

SPURGE, in *Botany*. See Euphorbia.

Spurge-*Laurel*, or *Mezereon*, *Laureola*, or *Daphne*. See Daphne, and Daphne *Mezereum*.

Spurge, *Olive*, the Engliſh name of a genus of plants, called by ſome botaniſts *chamelæa;* which ſee.

Others have made the olive ſpurge a ſpecies of euphorbia, or ſpurge. See Euphorbia.

Spurge, *Sun*, a name by which ſome call ſeveral ſpecies of *tithymalus;* which ſee.

Spurge-*Root*, in the *Materia Medica*. See Esulæ *Radix*.

SPURGEN, in *Geography*, a town of America, in North Carolina; 22 miles N.N.E. of Saliſbury.

SPURIOUS Diseases, in *Medicine*, are ſuch as, in ſome ſymptoms, cannot be brought under any diſtinct head, and, therefore, are called by the name of others with which they moſt agree. Whence, alſo, they are often denominated *baſtards*, *nothi*.

Such are a ſpurious or baſtard pleuriſy, a ſpurious peripneumony, a baſtard quinſey, and the like. See Pleurisy, Peripneumony, &c.

Spurious *Fleſh*, is an appellation given by ſome to the fleſh of the lips, gums, and that of the glands, &c.

Spurious *Medals*. See Medals.

Spurious *Ribs*. See Ribs.

Spurious *Suture*. See Suture.

SPURKETS, in a *Ship*. See Spirketting.

SPURN Head, in *Geography*, a cape of England, at the S.E. extremity of the county of York, at the mouth of the Humber, on which is a light-houſe. N. lat. 53° 38′. E. long. 0° 18′.

SPURNESS, the ſouth cape of Sunda, one of the Orkney iſlands. N. lat. 59° 7′. W. long. 2° 35′.

SPURNWATER, in *Ship-Building*, a channel left above the ends of a deck, to prevent the water from coming any further.

SPURRE, in *Ornithology*, a name given by many to the bird more commonly called the ſea-ſwallow.

SPURREY, in *Botany*. See Spergula.

Spurrey, *Corn*, in *Agriculture*, the common name of a plant of the weed kind, which is common in many parts and ſituations. It ſeldom riſes above ſix inches in height, flowers in the beginning of July, ripens its ſeed in Auguſt, and is an annual plant. When it is troubleſome as a weed, the beſt method of exterminating it is by ſummer fallows, and cutting it down before it can ſcatter its ſeeds, which are very ſmall.

Two ſpecies of this plant, however, are ſaid to be cultivated in Holland and Flanders, for the winter food for cattle, when there is a ſcarcity of graſs. It is ſaid to enrich the milk of cows, ſo as to make it afford excellent butter; and the mutton fed on it is preferable to that fed on turnips. Hens eat this plant and its ſeeds greedily, and they are ſuppoſed to make them lay a great number of eggs.

It is a plant which is ſown twice a year; the firſt time in April and May, to be ready in June or July; and the ſecond time after the rye-harveſt, to ſerve the cattle in November and December. The uſual allowance of ſeed is about twelve pounds to the acre.

It is ſaid, that though not cultivated in the county of Berks, it grows there in an abundant manner, and that the ſeeds of it might be eaſily collected in any quantity. The cultivation of it has been recommended, by way of trial, on the poor ſoils about Frilſham and Yattendon, in the above diſtrict, by the writer of the account of the agriculture of the county, on the ſuggeſtion of an intelligent perſon. It is ſtated alſo, that Roucel, in his "Flora du Nord de la France," has conſidered it as an excellent late fodder for cows; and that it is made uſe of in the above countries, as well as in Germany, both in its green ſtate, and when made into hay.

It is likewiſe ſuggeſted, that as the knotted ſort of ſpurrey, though perhaps not equally grateful to animals, naturally over-runs the peat-pits in the Kennets, in the above county, it might therefore be ſown with certain effect in ſuch ſituations.

Spurrey, *Purple*, an annual weed in dry ſandy meadows, and corn-fields of the ſame dry quality. There are other ſorts which are troubleſome in wet hedges and woodlands.

SPUR-WAY, in *Rural Economy*, a term applied to a bridle, or horſe-way, or road through incloſed lands or fields, and free to any one to ride in by right of cuſtom or uſage.

SPUR-WING, in *Geography*, a river of America, in the ſtate of Maine, which runs through Scarborough, W. of Cape Elizabeth, and is navigable a few miles for veſſels of 100 tons.

SPUTT, a river of England, in the county of Weſtmoreland, which runs into the Ken.

SPUTUM, in *Medicine*, &c. the ſpittle or excrement voided at the mouth. See Saliva.

An examen of the ſputum is of great conſequence in phthiſical caſes: and Bennet, in his "Theatrum Tabidorum," applies himſelf in a particular manner to it. The *ſputum ſanguinis* is a very dangerous ſymptom in that diſeaſe.

SPY, a perſon paid to watch the actions, motions, &c. of another, particularly as to what paſſes in an army.

The uſe of ſpies is a kind of clandeſtine practice or deceit in war. Spies are generally puniſhed capitally, and immediately when they are diſcovered in a camp; and, ſays Vattel, not unjuſtly, there being ſcarcely any other way to prevent the miſchief they may do. For this reaſon, a man of honour, who would not expoſe himſelf to die by the hand of a common executioner, ever declines ſerving as a ſpy; he counts it beneath him, as it can ſcarcely be done without ſome kind of treachery. The ſovereign, therefore, cannot lawfully require ſuch a ſervice from his ſubjects, unleſs in ſome ſingular caſe, and that of the laſt importance. The mercenaries are allured to it by great rewards. If thoſe whom a ſovereign employs make a voluntary offer, or if they be not the enemy's ſubjects, or have no connection with him, he may unqueſtionably make uſe of their ſervice, without offence to juſtice or honour; but it may be aſked, is it lawful, is it decent, to ſolicit the enemy's ſubjects to act as ſpies, and betray him? Let the following paragraph ſerve as a reply.

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It may be noticed, that it has been ſuppoſed by ſome that fogs, dews, rain, and the moiſture of the earth, may give the diſtemper to rye, but without any ſufficient reaſon. M. Tillet is however ſtrongly inclined to think that it is occaſioned by an inſect, which turns the rye into a kind of *gall;* and he ſuſpects a ſmall caterpillar as being the cauſe of this miſchief, but cannot ſpeak affirmatively on this point. It has been abſurdly ſuppoſed to affect thoſe who conſume the bread made from grain thus diſeaſed with a ſort of dry gangrene in the extreme parts of the body. The nature of this diſeaſe in grain, like thoſe of many others, is ſtill far from being fully inveſtigated, ſo as to form any correct notion of the means of removing or preventing it.

Spurs, in *Old Fortifications,* denote walls that croſs a part of the rampart, and join to the town-wall.

Spurs, in *Ship-Building,* large pieces of timber, the lower ends of which are fixed againſt the ſide of the bildge-ways, and the upper ends fayed and bolted to the ſhip's ſide, to ſupport the ſhip in launching. They have been much diſcontinued of late years.

Spur-*Shell,* a ſpecies of the cochlea.

SPURGE, in *Botany.* See Euphorbia.

Spurge-*Laurel,* or *Mezereon, Laureola,* or *Daphne.* See Daphne, and Daphne *Mezereum.*

Spurge, *Olive,* the Engliſh name of a genus of plants, called by ſome botaniſts *chamelæa;* which ſee.

Others have made the olive ſpurge a ſpecies of euphorbia, or ſpurge. See Euphorbia.

Spurge, *Sun,* a name by which ſome call ſeveral ſpecies of *tithymalus;* which ſee.

Spurge-*Root,* in the *Materia Medica.* See Esulæ *Radix.*

SPURGEN, in *Geography,* a town of America, in North Carolina; 22 miles N.N.E. of Saliſbury.

SPURIOUS Diseases, in *Medicine,* are ſuch as, in ſome ſymptoms, cannot be brought under any diſtinct head, and, therefore, are called by the name of others with which they moſt agree. Whence, alſo, they are often denominated *baſtards, nothi.*

Such are a ſpurious or baſtard pleuriſy, a ſpurious peripneumony, a baſtard quinſey, and the like. See Pleurisy, Peripneumony, &c.

Spurious *Fleſh,* is an appellation given by ſome to the fleſh of the lips, gums, and that of the glands, &c.

Spurious *Medals.* See Medals.

Spurious *Ribs.* See Ribs.

Spurious *Suture.* See Suture.

SPURKETS, in a *Ship.* See Spirketting.

SPURN Head, in *Geography,* a cape of England, at the S.E. extremity of the county of York, at the mouth of the Humber, on which is a light-houſe. N. lat. 53° 38'. E. long. 0° 18'.

SPURNESS, the ſouth cape of Sunda, one of the Orkney iſlands. N. lat. 59° 7'. W. long. 2° 35'.

SPURNWATER, in *Ship-Building,* a channel left above the ends of a deck, to prevent the water from coming any further.

SPURRE, in *Ornithology,* a name given by many to the bird more commonly called the ſea-ſwallow.

SPURREY, in *Botany.* See Spergula.

Spurrey, *Corn,* in *Agriculture,* the common name of a plant of the weed kind, which is common in many parts and ſituations. It ſeldom riſes above ſix inches in height, flowers in the beginning of July, ripens its ſeed in Auguſt, and is an annual plant. When it is troubleſome as a weed, the beſt method of exterminating it is by ſummer fallows, and cutting it down before it can ſcatter its ſeeds, which are very ſmall.

Two ſpecies of this plant, however, are ſaid to be cultivated in Holland and Flanders, for the winter food for cattle, when there is a ſcarcity of graſs. It is ſaid to enrich the milk of cows, ſo as to make it afford excellent butter; and the mutton fed on it is preferable to that fed on turnips. Hens eat this plant and its ſeeds greedily, and they are ſuppoſed to make them lay a great number of eggs.

It is a plant which is ſown twice a year; the firſt time in April and May, to be ready in June or July; and the ſecond time after the rye-harveſt, to ſerve the cattle in November and December. The uſual allowance of ſeed is about twelve pounds to the acre.

It is ſaid, that though not cultivated in the county of Berks, it grows there in an abundant manner, and that the ſeeds of it might be eaſily collected in any quantity. The cultivation of it has been recommended, by way of trial, on the poor ſoils about Friliham and Yattendon, in the above diſtrict, by the writer of the account of the agriculture of the county, on the ſuggeſtion of an intelligent perſon. It is ſtated alſo, that Roucel, in his "Flora du Nord de la France," has conſidered it as an excellent late fodder for cows; and that it is made uſe of in the above countries, as well as in Germany, both in its green ſtate, and when made into hay.

It is likewiſe ſuggeſted, that as the knotted ſort of ſpurrey, though perhaps not equally grateful to animals, naturally over-runs the peat-pits in the Kennets, in the above county, it might therefore be ſown with certain effect in ſuch ſituations.

Spurrey, *Purple,* an annual weed in dry ſandy meadows, and corn-fields of the ſame dry quality. There are other ſorts which are troubleſome in wet hedges and woodlands.

SPUR-WAY, in *Rural Economy,* a term applied to a bridle, or horſe-way, or road through incloſed lands or fields, and free to any one to ride in by right of cuſtom or uſage.

SPUR-WING, in *Geography,* a river of America, in the ſtate of Maine, which runs through Scarborough, W. of Cape Elizabeth, and is navigable a few miles for veſſels of 100 tons.

SPUTT, a river of England, in the county of Weſtmoreland, which runs into the Ken.

SPUTUM, in *Medicine,* &c. the ſpittle or excrement voided at the mouth. See Saliva.

An examen of the ſputum is of great conſequence in phthiſical caſes: and Bennet, in his "Theatrum Tabidorum," applies himſelf in a particular manner to it. The *ſputum ſanguinis* is a very dangerous ſymptom in that diſeaſe.

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SQUALLY *Land*, a term ſometimes applied to that ſort of ground which is of the irregularly wet thin kind.

SQUALUS, the *Shark*, in *Ichthyology*, a genus of fiſhes of the order Chondropterigious, or, according to more modern naturaliſts, of the Cartilaginous order: the generic character is as follows. The mouth is ſituated beneath the anterior part of the head, with numerous teeth diſpoſed in rows. On each ſide the neck, in moſt of the ſpecies, there are five ſpiracles of a ſemilunar ſhape. The body is oblong, and ſomewhat cylindrical.

The animals of this genus are altogether marine; and are ſaid to be rarer in the Baltic than in any other ſea: they are viviparous, and are obſerved to produce more young at a time than the rays; but each is included, as is the caſe with thoſe fiſhes, in a quadrangular capſule or involucrum, each extremity of which is extended into a long, contorted, cartilaginous thread of great length. Many of the ſharks are ſaid to emit a phoſphoric light during the darkneſs of night: they are chiefly of a ſolitary nature, and, in general, devour, with the moſt indiſcriminating voracity, almoſt every animal ſubſtance, whether living or dead. A few ſpecies are ſaid to feed chiefly on fuci, and other marine vegetables. There are about thirty-four ſpecies enumerated by Gmelin, which are ſeparated into different ſections.

Species.

A. *With temporal Orifice and anal Fin.*

ISABELLA. The firſt dorſal fin is oppoſite the abdominal. It inhabits the ſouthern Pacific ocean, and has been obſerved about the coaſts of New Zealand. It is thirty inches long; in colour it is yellowiſh; the teeth are compreſſed, ſhort, triangular, furniſhed on each ſide the baſe with a ſmaller lobe, and diſpoſed in ſix rows; the tongue is very ſhort and thick; the dorſal fin is ſubquadrangular; the ſecond placed oppoſite the anal fin; the pectoral fins are very large; the ventral are ſeparate, and pointed behind.

* **CANICULAR**; Spotted Dog-fiſh. Noſtrils ſurrounded with a lobe and vermiform appendage; the ventral fins are diſtinct. This inhabits moſt ſeas, is about four or five feet long, is very voracious, and feeds chiefly on fiſh; the body is of a reddiſh-brown, with large diſtinct ſpots, which are black above, but white beneath, a little compreſſed at each end: the ſkin when dried is uſed for various purpoſes. The head is ſmall; ſnout ſhort; eyes oblong; pupil ſea-green, iris white; the mouth is wide and oblong, with three rows of teeth; the tongue is cartilaginous, and with the palate rough; the vent is before the middle of the body; the firſt dorſal fin behind the ventral, the ſecond leſs, and nearly oppoſite the anal; the tail is narrow, ending below in a ſharp angle.

* **CATULUS**; Leſſer Spotted Dog-fiſh. This ſpecies is ſpecifically deſcribed as having noſtrils covered with a lobe and vermiform appendage; the ventral fins are connected. It inhabits the Northern, Mediterranean, and Indian ſeas. Its habit is rather ſlender; in length it is from two to three feet; the head is large; ſnout prominent, and ſlightly pointed; the ſkin is rough; the body cylindric; the colour pale brick-red, marked with very numerous, ſmall, rounded, blackiſh or duſky ſpots; the abdomen is whitiſh; both the dorſal fins are placed much nearer to the tail than the head; the ventral fins are connate, large, and of a ſlightly pointed form; the anal fin is ſmall; the tail is long, bilobate, with the lower lobe continued to a conſiderable diſtance beneath. It is a moſt voracious fiſh. According to Mr. Pennant, it breeds from nine to thirteen young at a time; it is numerous on our own coaſts, and very injurious to the fiſheries. The liver, when taken or taſted as food, is highly noxious, cauſing a long-continued ſtupor, ſucceeded by an univerſal itching, with a total peeling off of the cuticle.

STELLARIS. Lobes of the noſtrils double. This is found in the European ocean, and is from two to ſix feet long; it feeds chiefly on cruſtaceous animals, molluſcæ, and leſſer fiſh; the body is reddiſh, with unequal blackiſh ſpots; beneath it is of a dirty aſh, and reſembles the S. canicula, but the ſpots are larger and fewer; the ſnout is a little longer, the tail ſomewhat ſhorter, and the noſtrils nearly cloſed; it brings forth about twenty at a time. The dorſal fins are equal; the firſt a little behind the middle of the body, the ſecond a little behind the anal.

* **GALEUS**; Tope. Teeth nearly triangular, ſerrate on the inner edge. This ſpecies is of conſiderable ſize, often meaſuring ſeveral feet in length, though the ſpecimens uſually ſeen about the Britiſh coaſts ſcarcely exceed the length of about five feet. In its habits it reſembles the white SHARK (which ſee), being a very bold and rapacious fiſh, attacking ſuch as happen to be accidentally expoſed to it with great violence and rapidity; its ſhape is rather ſlender; its colour pale cinereous above, and whitiſh beneath; the noſe is long, flat, and pointed; the noſtrils are ſituated near the mouth, and behind each eye is a ſmall orifice; the teeth are numerous, diſpoſed in three rows, ſmall, very ſharp, triangular, and ſerrate on their inner edge. The firſt dorſal fin is placed about the middle of the back, and is rather large; the ſecond is ſmall, and ſituated near the tail, which is ſmall, and terminates in two unequal lobes, of which the lower is the broadeſt. It has been aſſerted by able and well-informed naturaliſts, that this fiſh is ſo bold as to purſue its prey to the very edge of the ſhore, and even to attack thoſe who are walking near the water's edge. It is ſuppoſed to be the fiſh mentioned by the name of *canicula*, which is deſcribed as highly dangerous to thoſe employed in diving for corals, ſponges, &c.

* **MUSTELUS**; Smooth Hound. The teeth of this ſpecies are very ſmall and obtuſe; it has ſhort pectoral fins. The fiſh of this ſpecies are of a ſlender habit; their ſnouts are ſlightly ſharpened, and lengthened; the firſt dorſal fin is large, and placed nearly in the middle of the back; the ſecond nearly oppoſite the anal fin; the tail is ſhaped as in moſt others of this tribe, or ſlightly bilobate; the lower lobe is continued to ſome diſtance beneath; the teeth are very numerous, ſmall, ſlightly convex, and ſet as in RAYS (which ſee.) The general colour of the animal is of a greyiſh-brown, paler or whiter beneath; ſometimes varies in being marked above by numerous white ſpots. The ſtomach in this fiſh is furniſhed with ſeveral appendices, ſituated near the pylorus; it is found on our own coaſts, and in other European ſeas, and alſo in the Indian ſea, and when full grown it is about two feet long.

CIRRATUS. The noſtrils have a worm-ſhaped appendage. This ſpecies inhabits the American and Pacific ſeas, and is from one to five feet long; the body is coated with large flat ſhining ſcales; when young it is ſpotted with black. The head is depreſſed; the ſnout is ſhort, obtuſe; the eyes and temporal orifice ſmall; lips thick at the ſides; teeth numerous, ſharp, long, dilated at the baſe; the two hindmoſt ſpiracles are approximate; the vent is in the middle; the firſt dorſal fin is oppoſite the ventral; the anal is ſmall; the tail is about a quarter as long as the body.

BARBATUS. The gape of the mouth is bearded with vermiform appendages. It is found about the coaſts of New Holland, and is from three to four feet long; the body is covered with ſmall, hard, ſmooth ſhining ſcales, and marked with black ſpots, round and angular, ſurrounded with a white circle. The head is large, depreſſed, and ſhort; the teeth are lanceolate, in many rows; cirri unequal, about an inch and a half long, and branched before. The temporal orifice is large; vent in the middle; firſt dorſal oppoſite the vent; the tail ſubdivided.

Tigrinus. Tail elongated; the two hindmoſt ſpiracles are confluent. It inhabits the Indian ocean, and grows to the length of fifteen feet; the body is thick, oblong, black, with irregular white ſpots and bands; feeds on teſtaceous animals and crabs. The head of this ſpecies is broad, flat, and ſloping on the fore-part; the mouth tranſverſe, with two cirri; the upper lip is thick and prominent; the teeth are minute, thoſe on the upper jaw are moveable, and rough like a raſp; the tongue is thick, ſhort; the eyes are ſmall, oblong, and the pupil is blue; the iris is black; belly broad; pectoral fins ſhort, broad; firſt dorſal oppoſite the ventral; the ſecond is oppoſite the anal; the tail is compreſſed on each ſide, thin like a leaf at the end; the fin is long, and notched at the tip.

Africanus. Body with ſeveral parallel, longitudinal, blackiſh bands above. This, as its ſpecific name imports, is found in the African ocean, and is about two feet and a half long; the body is covered with minute ſubquadrate ſcales; above it is glaucous, beneath whitiſh.

Ocellatus. On each ſide of the neck is a large, round, black blotch, ſurrounded with white. It inhabits the Pacific ocean and New Holland, is two feet and a half long; the body is long, cinereous, dotted; beneath it is of a greeniſh-aſh colour.

Zygæna. Head very broad, hammer-ſhaped. It inhabits the Mediterranean, American, and Indian ſeas; grows to ſix feet long, and to the weight of five hundred pounds; it is the moſt rapacious of all its tribe. See Shark.

Tiburio. The head is very broad, heart-ſhaped. It inhabits the South American ſeas. It very much reſembles the laſt, except that the head, inſtead of being widened on each ſide into a long proceſs, is rather ſubtriangular, and rounded off in front; the fins are glaucous.

Griseus. Spiracles ſix on each ſide. It inhabits the Mediterranean; is two feet and a half long; the body is of a mouſe colour, a little rough; in the dried ſkin there is the appearance of ſmall ſcales, with an elevated line in the middle.

Vulpes; Sea-fox, or Long-tailed Shark. This ſpecies inhabits the Mediterranean ſea, and often wanders on the Britiſh coaſts; is ſeven feet long; the body above is of a blueiſh-aſh colour; beneath it is paler; the ſcales are very minute. This is a very voracious fiſh. It is diſtinguiſhed by its plump, ſhort, ſubovate body, and very long tapering tail; the head is ſmall and pointed; the firſt dorſal fin is triangular, and placed on the middle of the back; the ſecond is ſet above the beginning of the tail, which gradually tapers to the tip, and is furniſhed with a ſhallow fin or proceſs beneath, running from the baſe to the tip, which is ſharp and ſlightly bilobate; the pectoral fins are of conſiderable ſize; the eyes are large; the mouth ſmall; the teeth triangular, ſmall, and diſpoſed in three rows. The colour of the fiſh is duſky aſh above, and whitiſh beneath. It grows to the length of thirteen or fourteen feet; the tail meaſures more than half the length of the whole animal. It is an inhabitant of the Mediterranean and other ſeas, and is conſidered as a voracious and artful fiſh; but the name of ſea-fox is applied to it rather from the length of its tail than from its ſuppoſed ſagacity.

Longicaudus. Upper jaw with two cirri; the tail is long, as its ſpecific name denotes; the head is obtuſe; the noſtrils near the mouth; there are four ſpiracles.

Appendiculatus; Botany Bay Shark. Upper jaw with two jagged, cartilaginous appendages, and four others on each ſide between the firſt and the ſpiracles. This inhabits New South Wales; is nineteen inches long; the body is brown, with three rows of large pale ſpots, dark within, rounded and nearly equal for half its length, and then growing ſuddenly very ſmall. It is an extremely fierce animal. The head is broad, but angular; the mouth is placed near the end of the head; it has nine teeth in front, which are ſharp, crooked, and in three rows, with a great number of ſmall ones on each ſide; the eyes are projecting; dorſal fins placed far back; the pectoral near the ſpiracles; ventral near the middle of the body; the anal more than half way between the laſt and the tail, with a fin-like projection behind it to the end of the tail.

B. *With the anal Fin, but no temporal Orifice.*

* Glaucus; Blue Shark. The ſides of the tail are ſmooth; the lower part of the back with a triangular dent. This is found in our own and almoſt all other ſeas. See Shark.

* Cornubicus; Probeagle Shark. The ſnout of this ſpecies is projecting, ſharp; body round, depreſſed and angulate near the tail. It inhabits the Britiſh coaſts; is from three to four feet long; the body above is of a deep blue, beneath it is ſilvery; round, except near the tail, where it is depreſſed. This ſpecies is ſlightly deſcribed by Pennant, from an engraving which he found in Borlaſe's Hiſtory of Cornwall, which was copied by Mr. Jago, who was eſteemed a very obſervant and ſkilful ichthyologiſt. A ſpecimen obſerved in 1793, on the coaſt of Haſtings, is deſcribed in the third volume of the Linnæan Tranſactions. Its length from the tip of the ſnout to the extremity of the tail, was three feet ten inches; the colour of the body was a deep blue on the back, and white or ſilvery beneath; the ſhape was round, except for about ſix inches from the tail, where it was depreſſed; at about an inch from the tail was a ſemilunar or lunar impreſſion, the points of which were towards the tail; where the body was depreſſed, the ſides were raiſed into a ſharp angle or elevated line, of about eight inches in length, running to the middle of the tail, or a little beyond; the noſe was prominent, and ſharp; and on either ſide, from the noſe to the eyes, were numerous perforations or minute pores; the tail was of a lunar form, the upper lobe nearly a third longer than the lower.

* Cambricus; Beaumaris Shark. Snout ſhort, blunt; body cylindrical, angulate near the tail. This is chiefly found on the Britiſh coaſts; is ſeven feet long; very much reſembles the laſt, except that it does not taper ſo much towards each end; the body is of a lead-colour, and ſmoothiſh.

Cinereus. Seven ſpiracles on each ſide. It inhabits the Mediterranean; is three feet long; the body is glaucous, and a little rough.

* Maximus; Baſking Shark. Teeth conic, not ſerrate. See Shark.

* Carcharias; White Shark. In this ſpecies the teeth are triangular. This is the moſt dreadful and voracious of all animals. See Shark.

C. *With temporal Orifice, but no anal Fin.*

* Spinosus. Body covered over with large mucronate

tubercles. This is about four feet in length; the colour is grey-brown above, whitiſh beneath; the body is roughened with ſcattered unequal tubercles, conſiſting of a broad round baſe, and curved, ſharp-pointed tip; in ſome they are bifid; eyes large; ſnout prominent and conic; its gape is moderate; the teeth of a ſquariſh ſhape, compreſſed, cornered at the margins, and placed in ſeveral rows; dorſal fins placed near the tail, the firſt oppoſite the ventral, which are ſet at an unuſual diſtance from the head, and are almoſt as large as the pectoral; the tail is angular.

* ACANTHIAS; Picked Dog-fiſh. Dorſal fins ſpinous; the body is roundiſh; a variety has an ocellate body. This ſpecies inhabits moſt ſeas; it is about three feet and a half long; the body above is blackiſh, dotted ſparingly with white; the ſides are white, inclining to violet, with a few angulate tranſverſe furrows, beneath white; the fleſh is often ſalted and eaten.

JACKSONII. Eyes with a prominence over them on each ſide; before each of the dorſal fins is a ſtrong ſpine. This inhabits Port Jackſon, New Holland. It is not more than two feet long; the body is tapering, ſkin rough, above brown, beneath paler; the head is ſomewhat convex; teeth numerous, in many rows, larger as they are placed backwards, forming a bony plate.

SPINAX. Body beneath blackiſh. It is found in the Indian ocean; and, in its ſpinous back-fins, it very much reſembles the laſt.

SQUAMOSUS. Body coated with ſmall oblong ſcales. The body of this is three feet long, thick, round, reſembling the next, except in having a longitudinal elevated line of ſcales down the middle.

CENTRINA. Body nearly triangular. It is from three to four feet in length; the body above is brown, carinate, beneath whitiſh, broad; ſkin covered with hard, erect tubercles; the fleſh is very hard.

INDICUS. Back variegated, unarmed; teeth acute. It inhabits the Indian ocean.

AMERICANUS. Dorſal fins unarmed, the hinder one larger, ventral large near the tail. It is found in the South American ſeas; is three feet long; body round; ſcales ſmall, angular.

* SQUATINA; Angel Fiſh. Pectoral fins very large, and notched on the fore-part. This ſpecies inhabits the Northern ſeas, and is from ſix to eight feet long; it feeds on leſſer fiſh, and brings forth thirteen young at a time. The body above is cinereous, rough, with ſmall recurved prickles; beneath it is ſmooth, white. In its ſhape it approaches very nearly to the Ray genus.

D. *Without Teeth.*

MASSASA. Pectoral fins long. An inhabitant of the Red ſea.

KUMAL. Pectoral fins ſhort; the mouth with four cirri. It inhabits the Red ſea.

SQUALUS is alſo a name given by Varro, Columella, Salvian, and others, to a ſpecies of cyprinus, diſtinguiſhed by Artedi by the name of the oblong cyprinus with long ſcales, and with the pinna ani containing eleven rays, and commonly known with us under the name of *chub* or *chevin*.

The generality of authors call it *capito* and *cephalus*, but it is very improper to give diſtinct generical names to fiſh, which are genuine ſpecies of other genera.

The name ſqualus is originally Latin; it is uſed by Pliny, and many other of the old Roman authors, and is derived from the word *ſqualor*, becauſe this fiſh is found to delight in impure and dirty places.

SQUAM, in *Geography*, an American lake, partly ſituated in the townſhip of Holderneſs in Grafton county, New Hampſhire, and partly in Strafford county; about five miles long and four broad.—Alſo, a river of New Hampſhire, the outlet of the above lake, which, after running a ſouth-weſt courſe, joins the Pemigewaſſet, at the town of New Cheſter, 10 miles above the mouth of the Winepiſcogee branch.

SQUAM *Beach*, lies on the ſea-coaſt of New Jerſey, between Barnegat inlet and Cranberry new inlet.

SQUAM *Harbour*, lies on the north-eaſt ſide of Cape Amen, in the ſtate of Maſſachuſetts. *Squam* (Pidgeon-hill) lies in N. lat. 42° 40′. W. long. 70° 36′.

SQUAMARIA, in *Botany*, from *ſquama*, a ſcale, in alluſion to its ſcaly root, or ſubterraneous ſtem, is Rivinus's appellation for the Toothwort (ſee LATHRÆA); and is ſtill uſed generically by Haller and Scopoli, though only ſpecifically by Linnæus. The ſcales in queſtion, bearing a great reſemblance in every thing but hardneſs to the human fore-teeth, have given riſe to the Engliſh name, and to that of *Dentaria*, uſed by Matthiolus. But this plant muſt not be confounded with the Linnæan DENTARIA. See that article.

SQUAMIS, in *Ichthyology*, a name given by Albertus, and others, to the fiſh called by us the monk, or angel-fiſh, by the generality of authors *ſquatina*, and by the old Greek writers *rhine*. See SQUALUS.

SQUAMOSÆ *Suturæ Additamentum*, in *Anatomy*, the portion of ſuture which connects the poſterior inferior length of the parietal to the maſtoid part of the temporal bone. See CRANIUM.

SQUAMOSE CULM, among *Botaniſts*. See STALK.

SQUAMOSE *Root*, one compoſed of, or covered with leſſer flakes. See ROOT.

SQUAMOUS, in *Anatomy*, a ſuture of the head, made by the thin edge of one bone overlapping a correſponding thin edge of another.—Alſo, the portion of the temporal bone entering into the formation of the *ſquamoſæ ſuturæ additamentum*. See CRANIUM.

SQUARCIONE, FRANCESCO, in *Biography*, a painter, born at Padua in 1394, more and better known as the founder of a ſchool of art, than for any particular works of his own production. The ſchool he maintained was furniſhed with deſigns and veſtiges of antiquity, which he had acquired not only in Italy, but alſo in Greece, whither he travelled for the purpoſe; and it was at one time attended by upwards of 130 ſtudents, ſo that he acquired from it the reſpectable title of the father of the young painters. One picture of his is more particularly noticed by Lanzi, which was formerly in the church of the Carmelites at Padua, and afterwards in the private poſſeſſion of the Conte de Lazara, repreſenting St. Jerome ſurrounded by three ſaints; and he ſpeaks of it in terms of praiſe for ſo early a production. It was painted, according to an inſcription upon it, for the noble family of Lazara, in 1452, and is ſigned Franceſco Squarcione. He died in 1474, at the age of 80.

SQUARE, QUADRATUM, in *Geometry*, a quadrilateral figure, whoſe angles are right, and ſides equal.

SQUARE, *To find the Area of a.* Seek the length of one ſide; multiply this by itſelf; and the product is the area of the ſquare. Thus, if the length of a ſide be 345, the area will be 119025; and if the ſide of a ſquare be 10, the area will be 100.

Since, then, a decempeda contains 10 feet, a foot 10 digits, &c. a ſquare decempeda contains 100 ſquare feet, a ſquare foot 100 ſquare digits, &c.

SQUARE, *the Properties of a*, are, that its angles are all right, and, conſequently, its ſides perpendicular; that it is divided into two equal parts, by a diagonal; that the diagonal of a ſquare is incommenſurable to the ſide.

SQUARES, *for the Ratio of.* They are to each other in the duplicate ratio of their ſides. *E. gr.* a ſquare whoſe ſide is double another, is quadruple of that other ſquare.

SQUARE *of the Cube.*
SQUARE *of the Surdeſolid.* } See POWER.

SQUARE *Number,* in *Arithmetic* and *Algebra,* is the product ariſing from multiplying any number by itſelf. Thus, $9 = 3.3$, $16 = 4.4$, $25 = 5.5$, &c. are ſquare numbers: and ſince, by the rules of algebra, $-3 \times -3 = 9$; $-4 \times -4 = 16$; $-5 \times -5 = 25$, &c.; it follows, that the ſquare root of every poſitive number has two different roots; the one *plus,* or affirmative; the other *minus,* or negative; while the ſquare root of every negative number is imaginary, or impoſſible.

Square numbers have ſeveral remarkable properties, of which the following are ſome of the moſt intereſting, *viz.*

1. Every ſquare number is of one of the forms $4n$ or $4n + 1$; that is, every ſquare, when divided by 4, will leave either 0 or 1 for a remainder: and underſtanding this expreſſion ſtill in the ſame ſenſe, the following table will expreſs the forms of ſquare numbers to the moduli, or diviſors, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

Moduli.	Poſſible Forms of Squares.				
3	$3n$	$3n + 1$			
4	$4n$	$4n + 1$			
5	$5n$	$5n \pm 1$			
6	$6n$	$6n + 1$	$6n + 3$	$6n + 4$	
7	$7n$	$7n + 1$	$7n + 2$	$7n + 4$	
8	$8n$	$8n + 1$	$8n + 4$		
9	$9n$	$9n + 1$	$9n + 4$	$9n + 7$	
10	$10n$	$10n \pm 1$	$10n \pm 4$	$10n \pm 5$	
11	$11n$	$11n + 1$	$11n + 3$	$11n + 5$	$11n + 9$
12	$12n$	$12n + 1$	$12n + 4$	$12n + 9$	

2. And hence, by excluſion, we may derive the following table of impoſſible forms, *viz.*

Moduli.	Impoſſible Forms for Squares.				
3	$3n + 2$				
4	$4n + 2$	$4n + 3$			
5	$5n + 2$	$5n + 3$			
6	$6n + 2$	$6n + 5$			
7	$7n + 3$	$7n + 5$	$7n + 6$		
8	$8n \pm 2$	$8n \pm 3$	$8n + 7$		
9	$9n + 2$	$9n \pm 3$	$9n + 5$	$9n + 8$	
10	$10n \pm 2$	$10n \pm 3$			
11	$11n + 2$	$11n + 6$	$11n + 7$	$11n + 8$	$11n + 10$
12	$12n \pm 2$ $12n + 10$	$12n + 3$	$12n \pm 5$	$12n + 6$	$12n + 8$

Theſe formulæ, as they involve no higher power of the indeterminate n than the firſt, are called *linear* forms; but, by means of them, we eaſily arrive at a variety of *quadratic* formulæ, which it is extremely uſeful to be acquainted with, in practiſing the Diophantine or indeterminate analyſis.

If a perſon, unacquainted with theſe excluſions, were required to find two ſuch numbers, that double the ſquare of the one, added to triple the ſquare of the other, ſhould be a ſquare, he would ſee nothing impoſſible in the propoſition, and might, therefore, loſe many uſeleſs hours in the reſearch; whereas, by a little attention to the impoſſible and poſſible forms, he would find the problem abſolutely impoſſible, and hence ſpare himſelf much uſeleſs labour.

3. The method of deducing impoſſible quadratic forms from the linear ones above given, will be ſeen immediately from a ſingle example. Let it be required to aſcertain whether the equation, $2x^2 + 3y^2 = w^2$, be poſſible or impoſſible. Firſt, we may aſſume x, y, and w, prime to each other; for if x and y have a common diviſor, w muſt have the ſame, and the whole equation may be divided by it; whereby it will be reduced to another equation $2x'^2 + 3y'^2 = w'^2$, in which theſe quantities have no longer a common diviſor, or, in other words, they are prime to each other.

Since, then, x and y are prime to each other, they cannot be both of the form $3n$; for, in this caſe, they would have a common diviſor 3. Let then, firſt, x^2 be of the form $3n$, and y^2 of the form $3n + 1$; then $2x^2$ is of the form $3n'$, and $3y^2$ of the form $3n' + 3$, and conſequently their ſum will have the form $3n$, which is impoſſible, becauſe, in this caſe, w and x would have a common diviſor 3; and if we ſuppoſe x^2 of the form $3n + 1$, and y^2 of the form $3n$; then $2x^2 + 3y^2$ is of the form $3n + 2$, which is an impoſſible form: and, laſtly, if we aſſume both of the form $3n + 1$, then $2x^2 + 3y^2$ would have again the ſame impoſſible form $3n + 2$; therefore, in no caſe can $2x^2 + 3y^2 = w^2$ be poſſible in integral numbers.

In the ſame manner a variety of other impoſſible forms may be deduced, of which the following are thoſe which moſt commonly occur.

(5) *Modulus* 3.

$$2t^2 + 3u^2 = w^2$$
$$5t^2 + 3u^2 = w^2$$
$$8t^2 + 3u^2 = w^2$$
$$(3p + 2)\,t^2 + 3u^2 = w^2$$

(6) *Modulus* 5.

$$2p^2 \pm 5u^2 = w^2$$
$$3p^2 \pm 5u^2 = w^2$$
$$7t^2 \pm 5u^2 = w^2$$
$$(5p \pm 2)\,t^2 \pm 5u^2 = w^2$$

Or the two latter general forms may be rendered more comprehenſive, by the introduction of another indeterminate q; obſerving only that, in this caſe, the quantity muſt always be prime to the modulus. With this condition, the two latter may be written thus:

$$(3p + 2)\,t^2 + 3qu^2 = w^2, \text{ and}$$
$$(5p \pm 2)\,t^2 \pm 5qu^2 = w^2.$$

(7) *Modulus* 7.

$$(7p + 3)\,t^2 \pm 7qu^2 = w^2$$
$$(7p + 5)\,t^2 \pm 7qu^2 = w^2$$
$$(7p + 6)\,t^2 \pm 7qu^2 = w^2$$

(8) *Modulus* 11.

$$(11p + 2)\,t^2 \pm 11qu^2 = w^2$$
$$(11p + 6)\,t^2 \pm 11qu^2 = w^2$$
$$(11p + 7)\,t^2 \pm 11qu^2 = w^2$$

(9) *Modulus* 13.

$$(13p \pm 2)\,t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 5)\,t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 6)\,t^2 \pm 13qu^2 = w^2$$
$$(13p \pm 7)\,t^2 \pm 13qu^2 = w^2$$

(10) *Modulus* 17.

$$(17p \pm 3)\,t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 5)\,t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 6)\,t^2 \pm 17qu^2 = w^2$$
$$(17p \pm 7)\,t^2 \pm 17qu^2 = w^2$$

A great variety of impoſſible forms might have been given to other moduli; but the above are ſufficient for our preſent purpoſe.

There are alſo many formulæ, which, though poſſible ſingly, become impoſſible in pairs: ſuch are the following:

$$11.\begin{cases} x^2 + y^2 = z^2 \\ x^2 - y^2 = w^2 \end{cases} \qquad 12.\begin{cases} x^2 + y^2 = 2w^2 \\ x^2 - y^2 = 2z^2 \end{cases}$$

$$13.\begin{cases} 2x^2 + y^2 = z^2 \\ 2x^2 - y^2 = w^2 \end{cases} \qquad 14.\begin{cases} x^2 + 2y^2 = 2z^2 \\ x^2 - 2y^2 = 2w^2 \end{cases}$$

$$15.\begin{cases} x^2 + 2y^2 = z^2 \\ x^2 - 2y^2 = w^2 \end{cases} \qquad 16.\begin{cases} 2x^2 + y^2 = 2z^2 \\ 2x^2 - y^2 = 2w^2 \end{cases}$$

Theſe might alſo be carried to a much greater extent, and many collateral properties drawn from them relative to the impoſſibility of ſome higher powers: we muſt not, however, carry the ſubject farther in this place. The reader, who is deſirous of more detailed information, may conſult Barlow's "Elementary Inveſtigation of the Theory of Numbers," where this part of the doctrine of numbers is carried to a conſiderable extent. We ſhall merely ſelect a few other diſtinct properties of ſquares, as they are given by the ſame author, in his "Mathematical Dictionary."

17. The ſum of two odd ſquares cannot be a ſquare.

18. An odd ſquare, taken from an even ſquare, cannot leave a ſquare remainder.

19. If the ſum of two ſquares be itſelf a ſquare, one of the three ſquares is diviſible by 5.

20. Square numbers muſt terminate in one of the digits 0, 1, 4, 5, 6, or 9.

21. No number of repetend digits can be a ſquare.

22. The area of a rational right-angled triangle cannot be equal to a ſquare.

23. The two following ſeries are remarkable for being ſuch, as, when reduced to improper fractions, the ſum of the ſquares of each numerator and denominator is a complete ſquare; or, which is the ſame, they are the ſides of rational right-angled triangles. Theſe ſeries are as follow, *viz.*

$$1\tfrac{1}{3},\ 2\tfrac{3}{5},\ 3\tfrac{3}{7},\ 4\tfrac{4}{9},\ 5\tfrac{5}{11},\ \text{\&c. \&c.}$$
$$1\tfrac{7}{8},\ 2\tfrac{11}{12},\ 3\tfrac{15}{16},\ 4\tfrac{19}{20},\ 5\tfrac{23}{24},\ \text{\&c. \&c.}$$

24. The ſecond differences of conſecutive ſquare numbers are equal to each other, thus:

Squares	1,	4,	9,	16,	25,	&c.
Firſt difference	3,	5,	7,	9,	&c.	
Second difference	2,	2,	2,	&c.		

To theſe we may alſo add the following; which are more particularly applicable to the indeterminate and Diophantine analyſis.

25. If a number be the ſum of two ſquares, its double is alſo the ſum of two ſquares; for

$$(x^2 + y^2) \times 2 = (x + y)^2 + (x - y)^2.$$

Hence alſo, the ſum of two ſquares multiplied by any power of 2, is the ſum of two ſquares.

26. The product of two numbers, each being the ſum of two ſquares, is itſelf the ſum of two ſquares; for

$$(x^2 + y^2) \times (x'^2 + y'^2) = \begin{cases} (xx' + yy')^2 + (xy' - x'y)^2, \text{ or} \\ (xx' - yy')^2 + (xy' + x'y)^2 \end{cases}$$

$$\begin{array}{ll} \text{Thus,} & 5 = 2^2 + 1^2 \\ & \underline{13 = 3^2 + 2^2} \\ \text{Product} & \underline{65 = 8^2 + 1^2 \text{ or } 7^2 + 4^2} \end{array}$$

27. The product of the ſum of four ſquares, by the ſum of four other ſquares, is itſelf the ſum of four ſquares; thus

$$(w^2 + x^2 + y^2 + z^2) \times (w'^2 + x'^2 + y'^2 + z'^2) = \begin{cases} (ww' + xx' + yy' + zz')^2 + (wx' - xw' \\ \qquad + yz' - y'z)^2 + \\ (y'w - xz' - yw' + zx')^2 + (wz' + xy' \\ \qquad - yx' - zw')^2 \end{cases}$$

as will appear by the developement of theſe formulæ.

28. Every integral number is either a ſquare, or the ſum of two, three, or four ſquares.

The latter is one of the celebrated numerical theorems of Fermat, which was firſt demonſtrated by Lagrange.

For a variety of other properties, ſee the works above referred to.

We ſhall conclude this article with a table of the ſquares and cubes of all numbers from 1 to 1200. A table of the ſquare and cube roots, to the ſame extent, is given under the article ROOT.

TABLE of Squares and Cubes to 1200.

No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.
1	1	1	61	3721	226981	121	14641	1771561	181	32761	5929741
2	4	8	62	3844	238328	122	14884	1815848	182	33124	6028568
3	9	27	63	3969	250047	123	15129	1860867	183	33489	6128487
4	16	64	64	4096	262144	124	15376	1906624	184	33856	6229504
5	25	125	65	4225	274625	125	15625	1953125	185	34225	6331625
6	36	216	66	4356	287496	126	15876	2000376	186	34596	6434856
7	49	343	67	4489	300763	127	16129	2048383	187	34969	6539203
8	64	512	68	4624	314432	128	16384	2097152	188	35344	6644672
9	81	729	69	4761	328509	129	16641	2146689	189	35721	6751269
10	100	1000	70	4900	343000	130	16900	2197000	190	36100	6859000
11	121	1331	71	5041	357911	131	17161	2248091	191	36481	6967871
12	144	1728	72	5184	373248	132	17424	2299968	192	36864	7077888
13	169	2197	73	5329	389017	133	17689	2352637	193	37249	7189057
14	196	2744	74	5476	405424	134	17956	2406104	194	37636	7301384
15	225	3375	75	5625	421875	135	18225	2460375	195	38025	7414875
16	256	4096	76	5776	438976	136	18496	2515456	196	38416	7529536
17	289	4913	77	5929	456533	137	18769	2571353	197	38809	7645373
18	324	5832	78	6084	474552	138	19044	2628072	198	39204	7762392
19	361	6859	79	6241	493039	139	19321	2685619	199	39601	7880599
20	400	8000	80	6400	512000	140	19600	2744000	200	40000	8000000
21	441	9261	81	6561	531441	141	19881	2803221	201	40401	8120601
22	484	10648	82	6724	551368	142	20164	2863288	202	40804	8242408
23	529	12167	83	6889	571787	143	20449	2924207	203	41209	8365427
24	576	13824	84	7056	592704	144	20736	2985984	204	41616	8489664
25	625	15625	85	7225	614125	145	21025	3048625	205	42025	8615125
26	676	17576	86	7396	636056	146	21316	3112136	206	42436	8741816
27	729	19683	87	7569	658503	147	21609	3176523	207	42849	8869743
28	784	21952	88	7744	681472	148	21904	3241792	208	43264	8998912
29	841	24389	89	7921	704969	149	22201	3307949	209	43681	9129329
30	900	27000	90	8100	729000	150	22500	3375000	210	44100	9261000
31	961	29791	91	8281	753571	151	22801	3442951	211	44521	9393931
32	1024	32768	92	8464	778688	152	23104	3511808	212	44944	9528128
33	1089	35937	93	8649	804357	153	23409	3581577	213	45369	9663597
34	1156	39304	94	8836	830584	154	23716	3652264	214	45796	9800344
35	1225	42875	95	9025	857375	155	24025	3723875	215	46225	9938375
36	1296	46656	96	9216	884736	156	24336	3796416	216	46656	10077696
37	1369	50653	97	9409	912673	157	24649	3869893	217	47089	10218313
38	1444	54872	98	9604	941192	158	24964	3944312	218	47524	10360232
39	1521	59319	99	9801	970299	159	25281	4019679	219	47961	10503459
40	1600	64000	100	10000	1000000	160	25600	4096000	220	48400	10648000
41	1681	68921	101	10201	1030301	161	25921	4173281	221	48841	10793861
42	1764	74088	102	10404	1061208	162	26244	4251528	222	49284	10941048
43	1849	79507	103	10609	1092727	163	26569	4330747	223	49729	11089567
44	1936	85184	104	10816	1124864	164	26896	4410944	224	50176	11239424
45	2025	91125	105	11025	1157625	165	27225	4492125	225	50625	11390625
46	2116	97336	106	11236	1191016	166	27556	4574296	226	51076	11543176
47	2209	103823	107	11449	1225043	167	27889	4657463	227	51529	11697083
48	2304	110592	108	11664	1259712	168	28224	4741632	228	51984	11852352
49	2401	117649	109	11881	1295029	169	28561	4826809	229	52441	12008989
50	2500	125000	110	12100	1331000	170	28900	4913000	230	52900	12167000
51	2601	132651	111	12321	1367631	171	29241	5000211	231	53361	12326391
52	2704	140608	112	12544	1404928	172	29584	5088448	232	53824	12487168
53	2809	148877	113	12769	1442897	173	29929	5177717	233	54289	12649337
54	2916	157464	114	12996	1481544	174	30276	5268024	234	54756	12812904
55	3025	166375	115	13225	1520875	175	30625	5359375	235	55225	12977875
56	3136	175616	116	13456	1560896	176	30976	5451776	236	55696	13144256
57	3249	185193	117	13689	1601613	177	31329	5545233	237	56169	13312053
58	3364	195112	118	13924	1643032	178	31684	5639752	238	56644	13481272
59	3481	205379	119	14161	1685159	179	32041	5735339	239	57121	13651919
60	3600	216000	120	14400	1728000	180	32400	5832000	240	57600	13824000

Table of Squares and Cubes to 1200.

No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.
241	58081	13997521	301	90601	27270901	361	130321	47045881	421	177241	74618461
242	58564	14172488	302	91204	27543608	362	131044	47437928	422	178084	75151448
243	59049	14348907	303	91809	27818127	363	131769	47832147	423	178929	75686967
244	59536	14526784	304	92416	28094464	364	132496	48228544	424	179776	76225024
245	60025	14706125	305	93025	28372625	365	133225	48627125	425	180625	76765625
246	60516	14886936	306	93636	28652616	366	133956	49027896	426	181476	77308776
247	61009	15069223	307	94249	28934443	367	134689	49430863	427	182329	77854483
248	61504	15252992	308	94864	29218112	368	135424	49836032	428	183184	78402752
249	62001	15438249	309	95481	29503629	369	136161	50243409	429	184041	78953589
250	62500	15625000	310	66100	29791000	370	136900	50653000	430	184900	79507000
251	63001	15813251	311	96721	30080231	371	137641	51064811	431	185761	80062991
252	63504	16003008	312	97344	30371328	372	138384	51478848	432	186624	80621568
253	64009	16194277	313	97969	30664297	373	139129	51895117	433	187489	81182737
254	64516	16387064	314	98596	30959144	374	139876	52313624	434	188356	81746504
255	65025	16581375	315	99225	31255875	375	140625	52734375	435	189225	82312875
256	65536	16777216	316	99856	31554496	376	141376	53157376	436	190096	82881856
257	66049	16974593	317	100489	31855013	377	142129	53582633	437	190969	83453453
258	66564	17173512	318	101124	32157432	378	142884	54010152	438	191844	84027672
259	67081	17373979	319	101761	32461759	379	143641	54439939	439	192721	84604519
260	67600	17576000	320	102400	32768000	380	144400	54872000	440	193600	85184000
261	68121	17779581	321	103041	33076161	381	145161	55306341	441	194481	85766121
262	68644	17984728	322	103684	33386248	382	145924	55742968	442	195364	86350888
263	69169	18191447	323	104329	33698267	383	146689	56181887	443	166249	86938307
264	69696	18399744	324	104976	34012224	384	147456	56623104	444	197136	87528384
265	70225	18609625	325	105625	34328125	385	148225	57066625	445	198025	88121125
266	70756	18821096	326	106276	34645976	386	148996	57512456	446	198916	88716536
267	71289	19034163	327	106929	34965783	387	149769	57960603	447	199809	89314623
268	71824	19248832	328	107584	35287552	388	150544	58411072	448	200704	89915392
269	72361	19465109	329	108241	35611289	389	151321	58863869	449	201601	90518849
270	72900	19683000	330	108900	35937000	390	152100	59319000	450	202500	91125000
271	73441	19902511	331	109561	36264691	391	152881	59776471	451	203401	91733851
272	73984	20123648	332	110224	36594368	392	153664	60236288	452	204304	92345408
273	74529	20346417	333	110889	36926037	393	154449	60698457	453	205209	92959677
274	75076	20570824	334	111556	37259704	394	155236	61162984	454	206116	93576664
275	75625	20796875	335	112225	37595375	395	156025	61629875	455	207025	94196375
276	76176	21024576	336	112896	37933056	396	156816	62099136	456	207936	94818816
277	76729	21253933	337	113569	38272753	397	157609	62570773	457	208849	95443993
278	77284	21484952	338	114244	38614472	398	158404	63044792	458	209764	96071912
279	77841	21717639	339	114921	38958219	399	159201	63521199	459	210681	96702579
280	78400	21952000	340	115600	39304000	400	160000	64000000	460	211600	97336000
281	78961	22188041	341	116281	39651821	401	160801	64481201	461	212521	97972181
282	79524	22425768	342	116964	40001688	402	161604	64964808	462	213444	98611128
283	80089	22665187	343	117649	40353607	403	162409	65450827	463	214369	99252847
284	80656	22906304	344	118336	40707584	404	163216	65939264	464	215296	99897344
285	81225	23149125	345	119025	41063625	405	164025	66430125	465	216225	100544625
286	81796	23393656	346	119716	41421736	406	164836	66923416	466	217156	101194696
287	82369	23639903	347	120409	41781923	407	165649	67419143	467	218089	101847563
288	82944	23887872	348	121104	42144192	408	166464	67917312	468	219024	102503232
289	83521	24137569	349	121801	42508549	409	167281	68417929	469	219961	103161709
290	84100	24389000	350	122500	42875000	410	168100	68921000	470	220900	103823000
291	84681	24642171	351	123201	43243551	411	168921	69426531	471	221841	104487111
292	85264	24897088	352	123904	43614208	412	169744	69934528	472	222784	105154048
293	85849	25153757	353	124609	43986977	413	170569	70444997	473	223729	105823817
294	86436	25412184	354	125316	44361864	414	171396	70957944	474	224676	106496424
295	87025	25672375	355	126025	44738875	415	172225	71473375	475	225625	107171875
296	87616	25934336	356	126736	45118016	416	173056	71991296	476	226576	107850176
297	88209	26198073	357	127449	45499293	417	173889	72511713	477	227529	108531333
298	88804	26463592	358	128164	45882712	418	174724	73034632	478	228484	109215352
299	89401	26730899	359	128881	46268279	419	175561	73560059	479	229441	109902239
300	90000	27000000	360	129600	46656000	420	176400	74088000	480	230400	110592000

SQUARE NUMBERS.

TABLE of Squares and Cubes to 1200.

No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.
481	231361	111284641	541	292681	158340421	601	361201	217081801	661	436921	288804781
482	232324	111980168	542	293764	159220088	602	362404	218167208	662	438244	290117528
483	233289	112678587	543	294849	160103007	603	363609	219256227	663	439569	291434247
484	234256	113379904	544	295936	160989184	604	364816	220348864	664	440896	292754944
485	235225	114084125	545	297025	161878625	605	366025	221445125	665	442225	294079625
486	236196	114791256	546	298116	162771336	606	367236	222545016	666	443556	295408296
487	237169	115501303	547	299209	163667323	607	368449	223648543	667	444889	296740963
488	238144	116214272	548	300304	164566592	608	369664	224755712	668	446224	298077632
489	239121	116930169	549	301401	165469149	609	370881	225866529	669	447561	299418309
490	240100	117649000	550	302500	166375000	610	372100	226981000	670	448900	300763000
491	241081	118370771	551	303601	167284151	611	373321	228099131	671	450241	302111711
492	242064	119095488	552	304704	168196608	612	374544	229220928	672	451584	303464448
493	243049	119823157	553	305809	169112377	613	375769	230346397	673	452929	304821217
494	244036	120553784	554	306916	170031464	614	376996	231475544	674	454276	306182024
495	245025	121287375	555	308025	170953875	615	378225	232608375	675	455625	307546875
496	246016	122023936	556	309136	171879616	616	379456	233744896	676	456976	308915776
497	247009	122763473	557	310249	172808693	617	380689	234885113	677	458329	310288733
498	248004	123505992	558	311364	173741112	618	381924	236029032	678	459684	311665752
499	249001	124251499	559	312481	174676879	619	383161	237176659	679	461041	313046839
500	250000	125000000	560	313600	175616000	620	384400	238328000	680	462400	314432000
501	251001	125751501	561	314721	176558481	621	385641	239483061	681	463761	315821241
502	252004	126506008	562	315844	177504328	622	386884	240641848	682	465124	317214568
503	253009	127263527	563	316969	178453547	623	388129	241804367	683	466489	318611987
504	254016	128024064	564	318096	179406144	624	389376	242970624	684	467856	320013504
505	255025	128787625	565	319225	180362125	625	390625	244140625	685	469225	321419125
506	256036	129554216	566	320356	181321496	626	391876	245314376	686	470596	322828856
507	257049	130323843	567	321489	182284263	627	393129	246491883	687	471969	324242703
508	258064	131096512	568	322624	183250432	628	394384	247673152	688	473344	325660672
509	259081	131872229	569	323761	184220009	629	395641	248858189	689	474721	327082769
510	260100	132651000	570	324900	185193000	630	396900	250047000	690	476100	328509000
511	261121	133432831	571	326041	186169411	631	398161	251239591	691	477481	329939371
512	262144	134217728	572	327184	187149248	632	399424	252435968	692	478864	331373888
513	263169	135005697	573	328329	188132517	633	400689	253636137	693	480249	332812557
514	264196	135796744	574	329476	189119224	634	401956	254840104	694	481636	334255384
515	265225	136590875	575	330625	190109375	635	403225	256047875	695	483025	335702375
516	266256	137388096	576	331776	191102976	636	404496	257259456	696	484416	337153536
517	267289	138188413	577	332929	192100033	637	405769	258474853	697	485809	338608873
518	268324	138991832	578	334084	193100552	638	407044	259694072	698	487204	340068392
519	269361	139798359	579	335241	194104539	639	408321	260917119	699	488601	341532099
520	270400	140608000	580	336400	195112000	640	409600	262144000	700	490000	343000000
521	271441	141420761	581	337561	196122941	641	410881	263374721	701	491401	344472101
522	272484	142236648	582	338724	197137368	642	412164	264609288	702	492804	345948408
523	273529	143055667	583	339889	198155287	643	413449	265847707	703	494209	347428927
524	274576	143877824	584	341056	199176704	644	414736	267089984	704	495616	348913664
525	275625	144703125	585	342225	200201625	645	416025	268336125	705	497025	350402625
526	276676	145531576	586	343396	201230056	646	417316	269586136	706	498436	351895816
527	277729	146363183	587	344569	202262003	647	418609	270840023	707	499849	353393243
528	278784	147197952	588	345744	203297472	648	419904	272097792	708	501264	354894912
529	279841	148035889	589	346921	204336469	649	421201	273359449	709	502681	356400829
530	280900	148877000	590	348100	205379000	650	422500	274625000	710	504100	357911000
531	281961	149721291	591	349281	206425071	651	423801	275894451	711	505521	359425431
532	283024	150568768	592	350464	207474688	652	425104	277167808	712	506944	360944128
533	284089	151419437	593	351649	208527857	653	426409	278445077	713	508369	362467097
534	285156	152273304	594	352836	209584584	654	427716	279726264	714	509796	363994344
535	286225	153130375	595	354025	210644875	655	429025	281011375	715	511225	365525875
536	287296	153990656	596	355216	211708736	656	430336	282300416	716	512656	367061696
537	288369	154854153	597	356409	212776173	657	431649	283593393	717	514089	368601813
538	289444	155720872	598	357604	213847192	658	432964	284890312	718	515524	370146232
539	290521	156590819	599	358801	214921799	659	434281	286191179	719	516961	371694959
540	291600	157464000	600	360000	216000000	660	435600	287496000	720	518400	373248000

SQUARE NUMBERS.

TABLE of Squares and Cubes to 1200.

No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.
721	519841	374805361	781	609961	476379541	841	707281	594823321	901	811801	731432701
722	521284	376367048	782	611524	478211768	842	708964	596947688	902	813604	733870808
723	522729	377933067	783	613089	480048687	843	710649	599077107	903	815409	736314327
724	524176	379503424	784	614656	481890304	844	712336	601211584	904	817216	738763264
725	525625	381078125	785	616225	483736625	845	714025	603351125	905	819025	741217625
726	527076	382657176	786	617796	485587656	846	715716	605495736	906	820836	743677416
727	528529	384240583	787	619369	487443403	847	717409	607645423	907	822649	746142643
728	529984	385828352	788	620944	489303872	848	719104	609800192	908	824464	748613312
729	531441	387420489	789	622521	491169069	849	720801	611960049	909	826281	751089429
730	532900	389017000	790	624100	493039000	850	722500	614125000	910	828100	753571000
731	534361	390617891	791	625681	494913671	851	724201	616295051	911	829921	756058031
732	535824	392223168	792	627264	496793088	852	725904	618470208	912	831744	758550528
733	537289	393832837	793	628849	498677257	853	727609	620650477	913	833569	761048497
734	538756	395446904	794	630436	500566184	854	729316	622835864	914	835396	763551944
735	540225	397065375	795	632025	502459875	855	731025	625026375	915	837225	766060875
736	541696	398688256	796	633616	504358336	856	732736	627222016	916	839056	768575296
737	543169	400315553	797	635209	506261573	857	734449	629422793	917	840889	771095213
738	544644	401947272	798	636804	508169592	858	736164	631628712	918	842724	773620632
739	546121	403583419	799	638401	510082399	859	737881	633839779	919	844561	776151559
740	547600	405224000	800	640000	512000000	860	739600	636056000	920	846400	778688000
741	549081	406869021	801	641601	513922401	861	741321	638277381	921	848241	781229961
742	550564	408518488	802	643204	515849608	862	743044	640503928	922	850084	783777448
743	552049	410172407	803	644809	517781627	863	744769	642735647	923	851929	786330467
744	553536	411830784	804	646416	519718464	864	746496	644972544	924	853776	788889024
745	555025	413493625	805	648025	521660125	865	748225	647214625	925	855625	791453125
746	556516	415160936	806	649636	523606616	866	749956	649461896	926	857476	794022776
747	558009	416832723	807	651249	525557943	867	751689	651714363	927	859329	796597983
748	559504	418508992	808	652864	527514112	868	753424	653972032	928	861184	799178752
749	561001	420189749	809	654481	529475129	869	755161	656234909	929	863041	801765089
750	562500	421875000	810	656100	531441000	870	756900	658503000	930	864900	804357000
751	564001	423564751	811	657721	533411731	871	758641	660776311	931	866761	806954491
752	565504	425259008	812	659344	535387328	872	760384	663054848	932	868624	809557568
753	567009	426957777	813	660969	537367797	873	762129	665338617	933	870489	812166237
754	568516	428661064	814	662596	539353144	874	763876	667627624	934	872356	814780504
755	570025	430368875	815	664225	541343375	875	765625	669921875	935	874225	817400375
756	571536	432081216	816	665856	543338496	876	767376	672221376	936	876096	820025856
757	573049	433798093	817	667489	545338513	877	769129	674526133	937	877969	822656953
758	574564	435519512	818	669124	547343432	878	770884	676836152	938	879844	825293672
759	576081	437245479	819	670761	549353259	879	772641	679151439	939	881721	827936019
760	577600	438976000	820	672400	551368000	880	774400	681472000	940	883600	830584000
761	579121	440711081	821	674041	553387661	881	776161	683797841	941	885481	833237621
762	580644	442450728	822	675684	555412248	882	777924	686128968	942	887364	835896888
763	582169	444194947	823	677329	557441767	883	779689	688465387	943	889249	838561807
764	583696	445943744	824	678976	559476224	883	781456	690807104	944	891136	841232384
765	585225	447697125	825	680625	561515625	885	783225	693154125	945	893025	843908625
766	586756	449455096	826	682276	563559976	886	784996	695506456	946	894916	846590536
767	588289	451217663	827	683929	565609283	887	786769	697864103	947	896809	849278123
768	589824	452984832	828	685584	567663552	888	788544	700227072	948	898704	851971392
769	591361	454756609	829	687241	569722789	889	790321	702595369	949	900601	854670349
770	592900	456533000	830	688900	571787000	890	792100	704969000	950	902500	857375000
771	594441	458314011	831	690561	573856191	891	793881	707347971	951	904401	860085351
772	595984	460099648	832	692224	575930368	892	795664	709732288	952	906304	862801408
773	597529	461889917	833	693889	578009537	893	797449	712121957	953	908209	865523177
774	599076	463684824	834	695556	580093704	894	799236	714516984	954	910116	868250664
775	600625	465484375	835	697225	582182875	895	801025	716917375	955	912025	870983875
776	602176	467288576	836	698896	584277056	896	802816	719323136	956	913936	873722816
777	603729	469097433	837	700569	586376253	897	804609	721734273	957	915849	876467493
778	605284	470910952	838	702244	588480472	898	806404	724150792	958	917764	879217912
779	606841	472729139	839	703921	590589719	899	808201	726572699	959	919681	881974079
780	608400	474552000	840	705600	592704000	900	810000	729000000	960	921600	884736000

TABLE of Squares and Cubes to 1200.

No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.	No.	Squares.	Cubes.
961	923521	887503681	1021	1042441	1064332261	1081	1168561	1263214441	1141	1301881	1485446221
962	925444	890277128	1022	1044484	1067462648	1082	1170724	1266723368	1142	1304164	1489355288
963	927369	893056347	1023	1046529	1070599167	1083	1172889	1270238787	1143	1306449	1493271207
964	929296	895841344	1024	1048576	1073741824	1084	1175056	1273760704	1144	1308736	1497193984
965	931225	898632125	1025	1050625	1076890625	1085	1177225	1277289125	1145	1311025	1501123625
966	933156	901428696	1026	1052676	1080045576	1086	1179396	1280824056	1146	1313316	1505060136
967	935089	904231063	1027	1054729	1083206683	1087	1181569	1284365503	1147	1315609	1509003523
968	937024	907039232	1028	1056784	1086373952	1088	1183744	1287913472	1148	1317904	1512953792
969	938961	909853209	1029	1058841	1089547389	1089	1185921	1291467969	1149	1320201	1516910949
970	940900	912673000	1030	1060900	1092727000	1090	1188100	1295029000	1150	1322500	1520875000
971	942841	915498611	1031	1062961	1095912791	1091	1190281	1298596571	1151	1324801	1524845951
972	944784	918330048	1032	1065024	1099104768	1092	1192464	1302170688	1152	1327104	1528823808
973	946729	921167317	1033	1067089	1102302937	1093	1194649	1305751357	1153	1329409	1532808577
974	948676	924010424	1034	1069156	1105507304	1094	1196836	1309338584	1154	1331716	1536800264
975	950625	926859375	1035	1071225	1108717875	1095	1199025	1312932375	1155	1334025	1540798875
976	952576	929714176	1036	1073296	1111934656	1096	1201216	1316532736	1156	1336336	1544804416
977	954529	932574833	1037	1075369	1115157653	1097	1203409	1320139673	1157	1338649	1548816893
978	956484	935441352	1038	1077444	1118386872	1098	1205604	1323753192	1158	1340964	1552836312
979	958441	938313739	1039	1079521	1121622319	1099	1207801	1327373299	1159	1343281	1556862679
980	960400	941192000	1040	1081600	1124864000	1100	1210000	1331000000	1160	1345600	1560896000
981	962361	944076141	1041	1083681	1128111921	1101	1212201	1334633301	1161	1347921	1564936281
982	964324	946966168	1042	1085764	1131366088	1102	1214404	1338273208	1162	1350244	1568983528
983	966289	949862087	1043	1087849	1134626507	1103	1216609	1341919727	1163	1352569	1573037747
984	968256	952763904	1044	1089936	1137893184	1104	1218816	1345572864	1164	1354896	1577098944
985	970225	955671625	1045	1092025	1141166125	1105	1221025	1349232625	1165	1357225	1581167125
986	972196	958585256	1046	1094116	1144445336	1106	1223236	1352899016	1166	1359556	1585242296
987	974169	961504803	1047	1096209	1147730823	1107	1225449	1356572043	1167	1361889	1589324463
988	976144	964430272	1048	1098304	1151022592	1108	1227664	1360251712	1168	1364224	1593413632
989	978121	967361669	1049	1100401	1154320649	1109	1229881	1363938029	1169	1366561	1597509809
990	980100	970299000	1050	1102500	1157625000	1110	1232100	1367631000	1170	1368900	1601613000
991	982081	973242271	1051	1104601	1160935651	1111	1234321	1371330631	1171	1371241	1605723211
992	984064	976191488	1052	1106704	1164252608	1112	1236544	1375036928	1172	1373584	1609840448
993	986049	979146657	1053	1108809	1167575877	1113	1238769	1378749897	1173	1375929	1613964717
994	988036	982107784	1054	1110916	1170905464	1114	1240996	1382469544	1174	1378276	1618096024
995	990025	985074875	1055	1113025	1174241375	1115	1243225	1386195875	1175	1380625	1622234375
996	992016	988047936	1056	1115136	1177583616	1116	1245456	1389928896	1176	1382976	1626379776
997	994009	991026973	1057	1117249	1180932193	1117	1247689	1393668613	1177	1385329	1630532233
998	996004	994011992	1058	1119364	1184287112	1118	1249924	1397415032	1178	1387684	1634691752
999	998001	997002999	1059	1121481	1187648379	1119	1252161	1401168159	1179	1390041	1638858339
1000	1000000	1000000000	1060	1123600	1191016000	1120	1254400	1404928000	1180	1392400	1643032000
1001	1002001	1003003001	1061	1125721	1194389981	1121	1256641	1408694561	1181	1394761	1647212741
1002	1004004	1006012008	1062	1127844	1197770328	1122	1258884	1412467848	1182	1397124	1651400568
1003	1006009	1009027027	1063	1129969	1201157047	1123	1261129	1416247867	1183	1399489	1655595487
1004	1008016	1012048064	1064	1132096	1204550144	1124	1263376	1420034624	1184	1401856	1659797504
1005	1010025	1015075125	1065	1134225	1207949625	1125	1265625	1423828125	1185	1404225	1664006625
1006	1012036	1018108216	1066	1136356	1211355496	1126	1267876	1427628376	1186	1406596	1668222856
1007	1014049	1021147343	1067	1138489	1214767763	1127	1270129	1431435383	1187	1408969	1672446203
1008	1016064	1024192512	1068	1140624	1218186432	1128	1272384	1435249152	1188	1411344	1676676672
1009	1018081	1027243729	1069	1142761	1221611509	1129	1274641	1439069689	1189	1413721	1680914269
1010	1020100	1030301000	1070	1144900	1225043000	1130	1276900	1442897000	1190	1416100	1685159000
1011	1022121	1033364331	1071	1147041	1228480911	1131	1279161	1446731091	1191	1418481	1689410871
1012	1024144	1036433728	1072	1149184	1231925248	1132	1281424	1450571968	1192	1420864	1693669888
1013	1026169	1039509197	1073	1151329	1235376017	1133	1283689	1454419637	1193	1423249	1697936057
1014	1028196	1042590744	1074	1153476	1238833224	1134	1185956	1458274104	1194	1425636	1702209384
1015	1030225	1045678375	1075	1155625	1242296875	1135	1288225	1462135375	1195	1428025	1706489875
1016	1032256	1048772096	1076	1157776	1245766976	1136	1290496	1466003456	1196	1430416	1710777536
1017	1034289	1051871913	1077	1159929	1249243533	1137	1292769	1469878353	1197	1432809	1715072373
1018	1036324	1054977832	1078	1162084	1252726552	1138	1295044	1473760072	1198	1435204	1719374392
1019	1038361	1058089851	1079	1164241	1256216039	1139	1297321	1477648619	1199	1437601	1723683599
1020	1040400	1061208000	1080	1166400	1259712000	1140	1299600	1481544000	1200	1440000	1728000000

SQUARE *Root*, a number conſidered as the root of a ſecond power or ſquare number: or a number, by whoſe multiplication into itſelf a ſquare number is generated. See ROOT.

To extract the Square Root out of any given Number, ſee EXTRACTION *of Roots*.

SQUARE, *Norma*, is an inſtrument made of wood or metal, ſerving to deſcribe and meaſure right angles; ſuch is L E M, *Plate* XIV. *Geometry*, *fig*. 10.

It conſiſts of two rules or branches faſtened perpendicularly at one of their extremes. When the two branches are moveable on a joint, it is called a *bevel*.

To examine whether or not a ſquare be exact, deſcribe a ſemicircle, A E F, of any length, at pleaſure; and therein, from each extreme of the diameter, A and F, draw right lines to a point taken at pleaſure in the periphery, as E: to the ſides of the angle, A E F, apply the ſquare, ſo as its vertex may fall on F. If this be poſſible, that ſquare is juſt.

SQUARE, *The*, an inſtrument uſed in drawing, which conſiſts of a flat ruler *h g* (*fig*. 11.), at one end of which are faſtened two tranſverſe pieces; one of them, *a b*, fixed at right angles to it, and the other, *c d*, moveable round the centre *f*, ſo as to be fixed at any angle required. Theſe tranſverſe pieces are applied cloſe to the ſide of the drawing-board, which is a ſmooth board made in the form of a ſquare, or parallelogram, while the ruler lies upon it; and by ſliding them along the board, lines may be drawn parallel to one another with much leſs trouble than by the help of a parallel ruler. By the fixed tranſverſe, lines may be drawn parallel to one ſide of the board, and perpendicular to the other; and, by the moveable tranſverſe, lines that have any degree of obliquity to the ſides of the boards, may be drawn parallel to one another: and if, without moving the tranſverſe, the ruler be removed to the other ſide of the board, lines may be drawn perpendicular to them. But if the obliquity be very great, it will be impoſſible to apply the ſquare, ſo as to interſect the lines at right angles in ſome parts of the board. In this caſe recourſe muſt be had to a parallel ruler.

SQUARE, *Geometrical*, a compartiment frequently added on the face of the quadrant, called alſo line of ſhadows and quadrant.

SQUARE, *Gunner's*. See QUADRANT.

SQUARES, *Magic*. See MAGIC *Square*.

SQUARE, in *Glaſs-Making*, an inſtrument with which the conciator, or founder, ſtirs and mixes together the metal, when in fuſion in the melting-pots. When this inſtrument is grown red-hot, it is always to be quenched in a pail of water, otherwiſe the metal will ſtick to it.

SQUARE, in the *Manege*, is uſed for working in a ſquare. The piſte or tread of a volt, inſtead of being always circular, and traced upon a circumference round a centre, ought to be imagined as if it formed four ſtraight equal lines laid in a ſquare, and equally removed from the centre or the pillar, which repreſents it in the middle of the manege-ground; ſo that, to work in a ſquare, is to ride along each of theſe four lines, turning the hand at every corner, and ſo paſſing from one line to another.

SQUARE, *The*, in the *Military Art*, a particular form into which troops are thrown on critical occaſions; particularly to reſiſt the charge of cavalry.

SQUARE *Battalion*, *Hollow*, and *Solid*. See the ſeveral articles.

SQUARE *Cap*. See CAP.

SQUARE *Character*. See HEBREW.

SQUARE *Foot*, *Nails*, *Niche*, *Pedeſtal*, *Pillar*, *Roof*, and *Winding-ſtairs*. See the ſubſtantives.

SQUARE, in *Sea Language*, a term peculiarly appropriated to the yards and their ſails, implying that they hang at right angles with the maſt or keel, or that they are of greater extent than uſual.

Thus, when the yards are ſo balanced by their lifts, as to hang at right angles with the maſt, they are ſaid to be ſquare by *the lifts*; when they hang perpendicular to the ſhip's length, they are called ſquare by *the braces*; but when they lie in a direction perpendicular to the plane of the keel, they are ſquare by *the lifts and braces*; or, in other words, they hang directly acroſs the ſhip, and parallel to the horizon.

The yards are ſaid to be very ſquare when they are of extraordinary length; and the ſame epithet is then applied to their ſails, which by conſequence acquire an additional breadth.

SQUARE *of an Anchor*, denotes the upper part of the ſhank. See ANCHOR.

SQUARE-*Body*, in *Ship-Building*, all the midſhip part of the ſhip, or that between the cant-bodies, whoſe timbers ſtand at right angles, or ſquare with the keel.

SQUARE-*Maker*, a ſhipwright, who cuts the butts of the planks when required to receive the oakum, and prepares the work ready for the caulkers.

SQUARE-*Ribbands*, the ſame as horizontal ribbands. See RIBBANDS.

SQUARE-*Rigged*, is an epithet applied to a ſhip which has long yards at right angles with the length of the deck, and low maſts; and hence it is uſed in contradiſtinction to all veſſels whoſe ſails are extended by ſtays or lateen-yards, or by booms and gaffs; the uſual ſituation of which is nearly in the plane of the keel.

Hence, ſquare-ſail is a ſail extended to a yard, which hangs parallel to the horizon, as diſtinguiſhed from the other ſails, which are extended by booms and ſtays, placed obliquely. This ſail is only uſed in fair winds, or to ſcud under in a tempeſt. In the former caſe it is furniſhed with a large additional part, called the bonnet, which is then attached to its bottom, and removed when it is neceſſary to ſcud. Falconer.

SQUARE-*Sterned*, a term applied to ſhips having broad ſterns, and the butts of the planks of the bottom ending on the wing-tranſom. All Britiſh ſhips are now built upon this principle, whilſt many of other nations are ſtill conſtructed by the ancient methods; hence we ſo frequently hear the phraſe of "ſquare-ſterned and Britiſh-built," as our practice in this reſpect juſtly claims the ſuperiority over that of all other nations.

SQUARE-*Timbers*, the timbers which ſtand at right angles, or ſquare with the keel. See SQUARE-*Body*.

SQUARE-*Tuck*, a name given to the after-part of a veſſel's bottom, when terminated in the ſame direction up and down as the wing-tranſom; and the planks of the bottom end in a rabbet at the fore-ſide of the faſhion-piece.

SQUARE *Handkerchief*, in *Geography*, a cluſter of iſlets and rocks in the Atlantic, formerly called "Bazos de Babuca;" extending above 100 miles in circumference. N. lat. 21°. W. long. 69°.

SQUARE *Iſland*, a ſmall iſland in the N. part of lake Superior. N. lat. 48° 40′. W. long. 87° 22′.—Alſo, an iſland near the E. coaſt of Labrador. N. lat. 52° 54′. W. long. 55° 34′.

SQUARING, in *Mathematics*. See QUADRATURE.

SQUARING *the Circle*, is the making a ſquare whoſe area ſhall be equal to the area of a given circle.

The beſt mathematicians have found it impoſſible to ſolve this problem ſo as to be preciſely exact; but they can eaſily come ſo near it, as not to err ſo much in the area as a grain of ſand would cover in a circle, whoſe diameter is equal to the diameter of Saturn's orbit. The following proportions are near enough to the truth for any real uſe that can ariſe from this problem.

As 100000000 is to the diameter of the given circle, ſo is 88622692 to the ſide of the ſquare required. Therefore,

If the Diameter of the Circle be	The Side of the Square will be
100000000	88622692.
10000000	8862269.2
1000000	886226.92
100000	88622.692
10000	8862.2692
1000	886.22692
100	88.622692
10	8.8622692
1	0.88622692

And, as 100000000 is to the ſide of a given ſquare, ſo is 112837917 to the diameter of a circle very nearly equal to the ſquare. Therefore,

If the Side of the Square be	The Diameter of the Circle will be
100000000	112837917.
10000000	11283791.7
1000000	1128379.17
100000	112837.917
10000	11283.7917
1000	1128.37917
100	112.837917
10	11.2837917
1	1.12837917

See CIRCLE, DIAMETER, and QUADRATURE.

SQUARTIA, in *Ichthyology*, a ſpecies of fiſh found in the Eaſt Indies, the ſkin of which makes the ſhagreen.

SQUASH GOURD, in *Gardening*, the common name of a particular ſort of gourd-plant, with erect ſtems or ſtalks. See CUCURBITA.

SQUASH *Pear-tree*. See PEAR-*tree*.

SQUATAROLA, in *Ornithology*, a name given by the Venetians to the grey plover, or *pluvialis cinerea*.

SQUATINA, in *Ichthyology*, the *monk-fiſh*, a ſpecies of the ſqualus, called, in Italian, the *peſce angelo*, and thence in Engliſh the angel-fiſh and monk-fiſh. See SQUALUS.

SQUATINATORIA, a name by which ſome authors have called the *rhinobatos*, a ſea-fiſh of a ſort of middle nature between the monk-fiſh, or angel-fiſh, and the ray.

SQUATT, in *Mineralogy*, a term given by the Engliſh miners to a peculiar ſort of bed of ore, leſs valuable than a load or vein, becauſe of its reaching but a little way.

Though the ore of the ſquatts is generally very rich and good, not inferior in quality to the beſt vein-ore, the miners are often diſappointed, on finding theſe ſquatts inſtead of the right veins, after a long ſearch. In the tin countries, the way of ſearching for mines is by looking after the SHOAD-*ſtones*, which ſee.

Theſe upper parts of the veins have been waſhed off, and carried down the ſides of the hills, in which the mines uſually lie, into the flat country; but they always lie in a regular and continued train, from the orifice of the mine to the fartheſt part of the train; ſo that when but one ſtone of this kind is found, the miners are certain of coming to the bed of metal, on tracing it up to its head by the train. This is a laborious and expenſive work, becauſe the ſtones never lie on the ſurface, but at the different depths of one to ten feet, or any depth between theſe. The ſquatts have their trains of ſhoad-ſtones as well as the regular veins, and when theſe are traced to the orifice, there is the appearance of a rich load, which the proprietor is not thoroughly undeceived in till the diggers come to the end of it.

The ſquatt is a bed of ore from three to ten fathoms long, and uſually is about half as broad as it is long; few are larger than this ſtandard, but many much leſs. This is always flat, and thence has its name; the round collections of ore of the ſame kind being called *bonnies*. The ſquatt communicates with no other load or vein, but is entire of itſelf, and its extremities terminate at once, without running into ſeveral little ſtrings, in the manner of thoſe of the right veins. It does not lie within walls, as the loads or veins always do, though it is always depoſited in the ſhelf, or faſt ground; that is, in ſtrata that have not been moved. Phil. Tranſ. N° 69.

SQUATUS, in *Ichthyology*, a name uſed by Pliny, and other of the old Roman authors, to expreſs the fiſh called by the old Greek writers *rhine*, and by the moderns *ſquatina*. See SQUALUS.

SQUIB *and Mince-meat Manures*, in *Agriculture*, are terms which are applied to thoſe ſorts which are collected in large towns, as the metropolis, and others. The former chiefly conſiſts of the more ſmall mixed powdery kinds, but the latter principally of the more reduced animal matters. They would both ſeem to be ſuperior to ſoot or malt-duſt in the trial of a writer in the Agricultural Report of the County of Middleſex. See SOOT and MANURE.

SQUIBS. See FIRE-*Works*.

SQUILACHI, in *Zoology*, the name by which the modern Greeks call the jackall, or *lupus aureus* of authors.

SQUILL. See SQUILLA.

SQUILL, *Officinal*, or *Sea-onion*, *Scilla Maritima*, in the *Materia Medica*. The roots, or rather the bulbs, of this ſpecies are the parts that are uſed in medicine. Of theſe bulbs there are two ſorts, the red and white, which are ſuppoſed to be accidental varieties; but for medicinal uſe the red is generally preferred, as it has been ſuppoſed to be more efficacious than the other. They grow naturally on ſea-ſhores, or in ditches where the ſalt-water flows in with the tide, in moſt of the warm parts of Europe; particularly on ſandy ſhores in Spain and in the Levant, from whence we are annually ſupplied with them. They ſhould be choſen large, plump, freſh, and full of a clammy juice. They are preſerved freſh in ſand; but as they are apt to ſpoil, it is beſt to keep them in the dried ſtate. However, the freſh bulb loſes in drying about four-fifths of its weight, without any conſiderable loſs of its taſte or virtue: hence four grains, which are the mean doſe of the dry bulb in powder, are equivalent to near a ſcruple of the freſh ſquill. Nevertheleſs, its acrimony, on which its virtue depends, is partially diſſipated by drying and long keeping; and completely deſtroyed by heat. The moſt convenient way of drying it is, after peeling off the outer ſkin, to cut the bulbs tranſverſely into thin ſlices, and expoſe them to a gentle warmth. The ancients, in order to abate the acrimony of the ſquill for certain purpoſes, after ſeparating the ſkin and fibres, encloſed it in a paſte made of flour and water, and then baked it in an oven, till the paſte became dry, and the ſquill thoroughly ſoft and tender. The ſquill, ſo prepared, was beaten with two-thirds its weight of flour, the mixture formed into troches, and dried with a gentle heat. Theſe troches were ſuppoſed to be alexipharmic, and on this account were uſed as an ingredient in theriaca, with which view they are ſtill retained. Water, wine, proof-ſpirit, and rectified ſpirit, extract the virtues both of the freſh and dry bulb. Nothing riſes in diſtillation with any of theſe menſtrua, the entire bitterneſs and pungency of the ſquill remaining concentrated in the inſpiſſated extracts: the ſpirituous extract is ſmaller in quantity than the watery, and its taſte is proportionally ſtronger, almoſt fiery. Alkalies conſiderably abate both the bitterneſs and acrimony of the ſquill: vegetable acids make little alteration in either of theſe reſpects. Theſe acids extract its virtue equally with watery or ſpirituous menſtrua; and, as an expectorant in diſorders of the breaſt, excellently coincide with it.

The expreſſed juice, when diluted with water, filtered, and boiled, yields white flakes of albumen. Nitrate of mercury and ſuperacetate of lead ſeparate from it white curdy precipitates. Infuſion of galls forms in it pale browniſh flakes; ſulphate of iron throws down a copious pale green precipitate: lime evolves ammonia. When the inſoluble part of dried ſquill is digeſted in muriatic acid, filtered, and ammonia added in exceſs, a copious precipitate is thrown down, which is oxalate of lime. Ether digeſted on dried ſquill acquires a pale green hue, and when evaporated on the ſurface of water, a thin pellicle of very bitter reſin is depoſited; while the water acquires an intenſely bitter taſte, and yields copious precipitates with ſolutions of acetate of lead and nitrate of ſilver. From theſe imperfect experiments, ſquills appear to contain extractive, albumen, a ſmall portion of reſin, mucus, carbonate of ammonia, the bitter principle, ſtarch, and oxalate of lime.

The root of the ſquill has been known in medicine in the early ages of Greece; ſo that the introduction of its medical uſe has been referred by ſome to Epimenides, and by others to Pythagoras. It is noticed by Dioſcorides, Hippocrates, Galen, Aëtius, Celſus, Pliny, Cælius Aurelianus, and the Arabian phyſicians. Its medical character has been retained ever ſince to ſuch a degree, that it is ſtill deſervedly held in high eſtimation, and frequently uſed. It ſeems, however, to manifeſt a poiſonous quality to ſeveral animals, as many medical writers have teſtified. If adminiſtered in large and repeated doſes, it not only excites nauſea, tormina, and violent vomitings, but it has been known to produce ſtrangury, bloody urine, hypercatharſis, cardialgia, hæmorrhoids, convulſions, with fatal inflammation and gangrene of the ſtomach and bowels. Nevertheleſs, under proper management, and in certain caſes and conſtitutions, it merits recommendation as a medicine of great practical utility, and real importance in the cure of many obſtinate diſeaſes. In ſmall doſes it is expectorant and diuretic; but in large doſes, emetic and purgative: but when theſe latter effects take place, the medicine is prevented from reaching the blood-veſſels and kidnies, and the patient derives no benefit from its diuretic efficacy. In ſuch caſes it ſhould be given in ſmaller doſes, at more diſtant intervals, or an opiate ſhould be joined to it, which, according to Dr. Cullen, will anſwer the ſame purpoſe. By repeated uſe the doſe may be increaſed, and the intervals of adminiſtering it diminiſhed; and accordingly, when the doſes are tolerably large, the opiate may be moſt conveniently employed to direct the operation of the ſquill more certainly to the kidnies. In caſes of dropſy, he ſays, when there is an effuſion of water into the cavities, and therefore leſs water paſſes to the kidnies, neutral ſalt, accompanying the ſquill, may be of uſe in determining it more certainly to the kidnies; and when it is perceived to take this courſe, he is perſuaded that it will be always uſeful, and generally ſafe, during the exhibition of the ſquills, to increaſe the uſual quantity of drink. The diuretic effects of ſquills have been ſuppoſed to be promoted by the addition of ſome mercurial; and Dr. Cullen is of opinion, that the leſs purgative preparations of mercury are beſt adapted to this purpoſe; accordingly he recommends a ſolution of corroſive ſublimate or oxymuriate of mercury, as the moſt proper, becauſe it is the moſt diuretic.

Wagner recommends the powder of ſquills, given with nitre, in hydropical ſwellings, and in a nephritis, and mentions ſeveral examples of cures which he performed, by giving patients from four to ten grains, with a double quantity of nitre.

When ſquill has been employed as a diuretic, it has been uſual to give it in powder, becauſe in this ſtate it is leſs apt to produce nauſea; and it has been cuſtomary to add neutral ſalts, as nitre, or cryſtals of tartar, eſpecially if the patient complained of much thirſt; others recommend calomel: and with a view to render the ſquills leſs offenſive to the ſtomach, it has been uſual to conjoin an aromatic.

In aſthmatic affections, or dyſpnœa, occaſioned by the lodgment of tenacious phlegm oppreſſing the lungs, or when the primæ viæ abound with mucous matter, it has been the expectorant uſually employed; and held in general eſtimation. As an expectorant, the ſquill may be ſuppoſed not only to attenuate the mucus, and thus facilitate its ejection, but by ſtimulating the excretory organ and mucous follicles, to excite a more copious excretion of it from the lungs, and thereby leſſen the congeſtion, upon which the difficulty of reſpiration very generally depends. Hence, in all pulmonic affections, excepting only thoſe of actual or violent inflammation, ulcer, and ſpaſm, the ſquill has been found to be a very uſeful medicine.

The root of ſquill is to the taſte very nauſeous, intenſely bitter and acrimonious; but without any perceptible ſmell: much handled, it exulcerates the ſkin. It is rendered more uſeful as an expectorant, when combined with nitrate of potaſs, tartarized antimony, or ipecacuanha; and in aſthma and dyſpnœa without fever, ſquill combined with ammoniacum is perhaps the beſt remedy we can employ.

Dr. Heſs ſays, he has cured the aſthma with the powder of ſquills. The efficacy of this powder, from four to twelve grains, in curing the aſthma, is atteſted by ſeveral. Med. Eſſ. Edinb. Com. Norimb. 1737, and 1739.

As an emetic, ſquill is very uncertain in its effect, producing in ſome perſons the moſt cruel vomiting, and in others exciting no nauſea in the largeſt doſes: nevertheleſs, when it readily and moderately induces vomiting, it proves more uſeful in hooping-cough and croup, than any other emetic.

For producing expectorant and diuretic effects moſt effectually, ſquill muſt be given in ſubſtance; but to excite vomiting, its infuſion in vinegar, or the oxymel, is more uſually employed. Of the dried ſquill, gr. j, in the form of a pill, may be given at firſt for a doſe, morning and evening, or every ſix hours; and the quantity gradually increaſed to grs. v or grs. vj, or till ſome degree of nauſea is induced, and its expectorant or diuretic operation obtained.

The officinal preparations of ſquills are the following: *viz. acetum ſcillæ*, *oxymel ſcillæ*, *pilulæ ſcillæ comp.*, *pulvis ſcillæ*, *ſyrupus ſcillæ maritimæ*, and *tinctura ſcillæ*. The “acetum ſcillæ,” or vinegar of ſquill, of the Lond. Ph. is prepared by macerating 1lb. of freſh ſquill root (bulb) dried in ſix pints of acetic acid, in a covered veſſel, for 24 hours; then expreſſing the liquor, and ſetting it aſide, that the feculencies may ſubſide; and laſtly, adding half a pint of proof-ſpirit to the clear liquor.

The “acetum ſcillæ maritimæ,” or vinegar of ſquill, of the Edinb. Ph. is prepared by macerating 2 oz. of the ſquill root (bulb) dried, with 2½ lbs. of diſtilled vinegar, for ſeven days; then expreſſing the liquor, and adding to it 3 oz. of alcohol; and when the feculencies have ſubſided, pouring off the clear fluids.

The "acetum ſcillæ," or vinegar of ſquill, of the Dub. Ph. is obtained by digeſting half a pound of freſh ſquill root (bulb) dried, with three pints of wine vinegar, for four days in a glaſs veſſel, with frequent agitation; then expreſſing the vinegar; and, after the feculencies have ſubſided, adding to it four fluid-ounces of rectified ſpirit.

This has been long uſed as an expectorant and diuretic in chronic catarrh, humoral aſthma, and dropſies. The doſe is from fʒſs to fʒij, given in cinnamon or mint-water. In large doſes it produces vomiting, and is occaſionally uſed as an emetic in the above-mentioned diſeaſes, when the ſtomach is loaded. For the "oxymel of ſquill," ſee OXYMEL *Scillæ*. For the "pills of ſquill," ſee PILLS.

The "pulvis ſcillæ," or powder of ſquill, of the Dub. Ph. is prepared by freeing ſquill roots (bulbs) from their membranous integuments, and cutting them in tranſverſe ſlices, then drying them upon a ſieve with a low degree of heat; and afterwards reducing them to powder, which muſt be preſerved in well-ſtopped glaſs phials.

The "ſyrupus ſcillæ maritimæ," or ſyrup of ſquill, of the Edinb. Ph. is formed of 2lbs. of vinegar of ſquill and 3½lbs. of refined ſugar powdered; diſſolving the ſugar by a gentle heat, ſo as to make a ſyrup. This ſyrup has the ſame properties, and is uſed for the ſame purpoſes, as the oxymel of ſquill. The doſe is from fʒj to fʒij, given in any aromatic diſtilled water.

The "tincture of ſquills" of the Lond. and Dub. Ph. is prepared by macerating 4oz. of recent ſquill root (bulb) dried, with two pints of proof-ſpirit, for 14 days, and filtering. The Dub. Ph. directs digeſtion for ſeven days, ſetting it aſide until the dregs are ſubſided, and pouring off the clear liquor. The doſe is from ♏ x to ♏ xxx, given in almond mixture, ammoniac mixture, or mucilage. Lewis. Woodville. Thomſon.

SQUILLS, *Wine of*, is an infuſion of the roots of ſquills in white wine for forty days, after which the ſquills are taken out, and the liquor preſerved for uſe. It is a gentle emetic, and is good againſt defluxions of rheum.

SQUILL, *White*, *Leſſer*, in *Botany*, a ſpecies of *pancratium*; which ſee.

SQUILL, *Squilla*, in *Natural Hiſtory*, a large claſs of animals, comprehending the ſhrimp, or *cancer crangon*; the crawfiſh, or *cancer fluviatilis*, or *cancer aſtacus* of Linnæus; the crab, or *cancer*; lobſter, or *cancer gammarus*; prawn, or *cancer ſquilla*. The *ſquilla* is alſo a genus deſcribed under CANCER: all which, according to Dr. Hill, make only one genus of inſects of the podaria kind. They properly belong to the genus of CANCER, under which they are deſcribed.

SQUILLA, in *Botany* and *Gardening*. See SCILLA.

SQUILLA *Aquæ Dulcis*, or *freſh-water ſhrimp*. Few perſons are aware of the damage done by the freſh-water ſhrimp among the ſmall fry of fiſh. This inſect is commonly very plentiful in ſtanding waters, and particularly in breeding-ponds, where they always have their prey in plenty before them; and often ſuffer none, or ſcarcely any of the numerous young fry hatched from the ſpawn of carp and tench, to live to grow up. They may be obſerved following the ſhoals of the young fry, and ſeizing multitudes one after another; and at other times lurking among the weeds to ſeize ſuch as ſtraggle by themſelves. If one of theſe inſects be put into a baſin of water with a dozen or two of theſe young fiſh, though as big as itſelf, it will very ſoon deſtroy them all. They kill numbers that they cannot eat, but leave them to rot.

SQUILLACE, in *Geography*, a ſea-port town of Naples, in Calabria Ultra, built on the verge of a rocky mountain, ſloping to the eaſt, about three miles from the ſea; and giving name to a gulf of the Mediterranean. It is the ſee of a biſhop, ſuffragan of Reggio, and contains eleven pariſhes and ſix convents. Virgil, for reaſons unknown, gave this city the epithet of "Navifragum," breaker of ſhips, as there are no hidden or apparent dangers attending the approach of veſſels; and we cannot ſuppoſe, that this correct poet ſhould be ſo negligent, as to confound the capacious bay of "Scyllacæum," as this is called, with the narrow paſs of Scylla in the Faro of Meſſina. In forming the body of Grecian commonwealths on the Italian ſhores, Athens furniſhed emigrants for Scyllacæum; but this ſettlement never made any figure in the confederacy. Rome ſent a colony hither. In the year 982 the emperor Otho II. was defeated under its walls by the forces of the Greeks. Montfort obtained this lordſhip in fee from Charles of Anjou; but in the next reign it was given to the Marſans. When this powerful houſe was overturned by the Aragoneſe, the fief was beſtowed upon that of Borgia, and was afterwards veſted in the marquis Gregori, who, from being a commiſſioner of the victualling office at Meſſina, roſe to be prime miniſter of Naples, and afterwards of Spain. Squillace prides itſelf on having given birth to Caſſiodorus, a ſtateſman of great abilities, and, conſidering the times he lived in, a very reſpectable author, beloved and honoured by Theodoric, and other Gothic monarchs. To this town, which was the place of his nativity, he retreated in his old age; and he amply deſcribes it; 33 miles S.S.E. of Coſenza. N. lat. 38° 48′. E. long. 16° 44′.

SQUINANCY, or ESQUINANCY. See QUINZY.

SQUINDER, in *Rural Economy*, a word ſignifying to burn inwardly, or in a ſmothering manner, as charcoal and ſome other ſubſtances are burnt.

SQUINTING, in *Medicine*, *Strabiſmus*, an irregular poſition and motion of the eyes, in which their axes do not converge to the object looked at.

It is certain, that when the axes of the eyes of perſons who do not ſquint are directed in different lines, objects are ſeen double; ſquinting perſons, however, do not ſee objects double. Yet it is well known that the principal reaſon which has been adduced for the ſingular phenomenon, that the images impreſſed upon the two eyes excite only one image in the mind, is, that the two images fall upon correſponding points of the eyes. The probability, therefore, is, that, in a ſquinting perſon, both eyes do not ſee the object looked at. In many caſes, indeed, "this is pretty evident to a by-ſtander," as ſir E. Home has remarked, "who is able to determine, that the direction of one of the eyes differs ſo much from that of the other, that it is impoſſible for the rays of light from any object to fall on the retinas of both; and therefore that one eye does not ſee the object. The ſame thing may be proved in another way. For ſince a ſmall deviation in the direction of either eye from the axis of viſion produces double viſion, any greater deviation muſt have the ſame effect, only increaſing the diſtance between the two images, till it becomes ſo great, that one eye only is directed to the object. In ſquinting there is evidently a greater deviation from the axis of viſion than in double viſion, and the object does not appear double: it is therefore not ſeen by both eyes." (See Phil. Tranſ. vol. lxxxvii. for the year 1797, p. 13.) It is manifeſt, indeed, that the perception is not diſtinct; but this, as Dr. Porterfield remarked, may be the reſult of habit and experience, by which the mind learns to correct the impreſſions of the ſenſes. (See Edin. Medical Eſſays, vol. iii. § 12.) In order to aſcertain the nature of this affection, it will be neceſſary to inveſtigate its varieties and cauſes.

Dr. Cullen was of opinion, that all the varieties of ſtrabiſmus, deſcribed by Sauvages and others, might be included under three ſpecies, which he deſignated by the appellations *habitualis*, *commodus*, and *neceſſarius*. The *firſt* of theſe may ariſe from the *habit* of uſing only one eye in viewing objects, while there is no defect either in the organ itſelf, or in the muſcles which move it. In this way children may learn to ſquint from having objects, which attract their attention, placed obliquely near the cradle; in which caſe it will be more eaſy to view them with the oppoſite eye alone, than to direct both towards the ſame point, and they will thus acquire the habit of neglecting the uſe and motions of the other eye. In a later period of life, the power of ſquinting voluntarily appears to be acquired by ſome by this practice of uſing one eye. Thus perſons who look much through teleſcopes, and of courſe employ one eye almoſt excluſively, may acquire the power of moving the one more than the other, or loſe a part of their command over the muſcles of the neglected eye.

Dr. Darwin mentions a ſingular caſe of ſquinting, in which the patient was equally expert in the uſe of either eye, but viewed every object preſented to him with only one eye at a time, and always with the eye on the ſide oppoſite the object. Thus, if the object was preſented on his right ſide, he viewed it with his left eye; and when it was preſented on his left ſide, he viewed it with his right eye. At the ſame time, Dr. Darwin found that he turned the pupil of that eye which was on the ſame ſide with the object in ſuch a direction, that the image of the object might fall on that part of the bottom of the eye where the optic nerve enters it, and where it would of courſe excite no impreſſion; and this inſenſible portion of the retina, Dr. Darwin aſcertained by ſome ingenious experiments to be four times greater in this patient than in ordinary perſons. When an object was held directly before this patient, he turned his head a little to one ſide, and obſerved it with but one eye, *viz.* with that moſt diſtant from the object, turning away the other in the manner juſt mentioned; and when he became tired with examining it with that eye, he turned his head the contrary way, and obſerved it with the other eye alone, with equal facility; but never turned the axes of both eyes on it at the ſame time. Phil. Tranſ. vol. lxviii. p. 86.

The *ſecond* ſpecies of ſquinting, however, which Dr. Cullen ſtyles *commodus*, and which is the effect of ſome imperfection in one of the eyes, is the moſt common form of the diſeaſe. It has generally been admitted, or aſcertained by experiment, in thoſe who have a confirmed ſquint of this nature, that one of the eyes is too imperfect to ſee diſtinctly. Of this, however, the patient is not always conſcious, as was evinced in a young lady, whoſe caſe is related by ſir Everard Home. Neither herſelf nor her friends believed that any defect of the eye exiſted; and upon being aſked if ſhe ſaw objects diſtinctly with both eyes, ſhe ſaid certainly, but that one was ſtronger than the other. To aſcertain the truth of this, he covered the ſtrong eye, and gave her a book to read, when, to her aſtoniſhment, ſhe found ſhe could not diſtinguiſh a letter, or any other near object. More diſtant objects ſhe could ſee, but not diſtinctly: when ſhe looked at a bunch of ſmall keys in the door of a book-caſe, about twelve feet from her, ſhe could ſee the bunch of keys, but could not tell how many there were.

The obſcurity of viſion in one eye, then, is the cauſe of this common ſpecies of ſquinting, and may occaſion this irregularity in the following way. The obſcure image, being ſo imperfectly formed in the weak eye, as to excite little attention in the mind, the uſe of the eye, and its uniform direction to the ſame object with the other, may have been neglected from the beginning; for as diſtinct viſion was obtained at once by the perfect eye, the end was anſwered, and therefore there was no neceſſity for any exertion to employ the other. Or on the other hand, in the effort to get rid of the confuſed image, the muſcles may have acquired an irregular and unnatural action. It is remarked by ſir E. Home, that the direction, which the eye takes under either of theſe circumſtances, is inwards, towards the noſe; becauſe the *adductor* muſcle is ſtronger, ſhorter, and its courſe more in a ſtraight line, than any of the other muſcles of the eye. Phil. Tranſ.

In the *third* ſpecies, or ſtrabiſmus *neceſſarius* of Cullen, the ſquinting is the reſult of ſome peculiarity or change in the form or ſituation of the eye or its parts; whence a perfect and diſtinct image of any object can only be obtained by an oblique direction of the axis of the eye. Dr. Porterfield has pointed out two varieties of this kind, ariſing, the one from an oblique poſition of the cryſtalline lens within the eye, by which the image of an external object is refracted out of the line of the axis of the eye;—and the other, from an oblique poſition and greater protuberancy of the cornea, which produces a ſimilar effect. (See Edin. Medical Eſſays, vol. iii. art. 12.) Theſe appear to be ſynonimous with the ſtrabiſmus *à cryſtallino*, and *S. myopum* of Sauvages (Noſol. Meth. claſs iv. gen. i. ſpec. 12 & 9.) Other partial diſeaſes of the eye may contribute to render oblique viſion the moſt convenient; ſuch as *leucoma*, *hypopion*, *pterygium*, &c. enumerated by Sauvages as conſtituting his eleventh ſpecies, *S. caligantium*.

Cure of Squinting.—The two firſt ſpecies of ſquinting, ariſing from the habit of uſing one eye only, or from the weakneſs or imperfection of the other, may be ſometimes cured. The third, which ariſes from ſome malformation of the eye or its parts, is ſcarcely remediable.

The principle of cure in the two firſt ſpecies is nearly the ſame; namely, the conſtant exerciſe of the neglected eye, whether naturally weak or not. This may be effected by covering the ſtrong eye, or that which is always employed, and confining the perſon to the uſe of the neglected or weak eye. For in this way, the muſcles of the latter, from conſtant action, will become perfect in the habit of directing the eye upon the object, gain ſtrength in that action, and acquire a power of adjuſting the eye. When this is eſtabliſhed in a ſufficient degree, the other eye may be ſet at liberty. The time that will be neceſſary for the cure, will depend upon the inveteracy of the habit, the length of time that the muſcles have been left to themſelves, and the degree of weakneſs of the ſight: for it is with difficulty that muſcles acquire an increaſed degree of action after having been long habituated to a more limited contraction. Dr. Darwin obſerves, that if the ſquinting has not been confirmed by long habit, and one eye be not much worſe than the other, a piece of gauze ſtretched on a circle of whalebone, to cover the beſt eye in ſuch a manner as to reduce the diſtinctneſs of viſion of this eye to a ſimilar degree of imperfection with the other, ſhould be worn ſome hours every day.

For the cure of the curious caſe related by the ſame ingenious phyſician, in which there was no defect in either eye, but merely a depraved habit of uſing both eyes ſeparately, Dr. Darwin ſays, "a gnomon of thin braſs was made to ſtand over his noſe, with a half circle of the ſame metal to go round his temples; theſe were covered with black ſilk, and by means of a buckle behind his head, and a croſs-piece over the crown of his head, this gnomon was managed ſo as to be worn without any inconvenience, and projected before his noſe about two inches and a half. By the uſe of this gnomon he ſoon found it leſs inconvenient to view all objects with the eye next to them, inſtead of the eye oppoſite to them.

"After this habit was weakened by a week's uſe of the gnomon, two bits of wood, about the ſize of a gooſe-quill, were blackened all but a quarter of an inch at their ſummits: theſe were preſented for him to look at, one being held on one ſide the extremity of his black gnomon, and the other on the other ſide of it. As he viewed theſe, they were gradually brought forwards beyond the gnomon, and then one was concealed behind the other. By theſe means, in another week, he could bend both his eyes on the ſame object for half a minute together.

"By the practice of this exerciſe before a glaſs, almoſt every hour in the day, he became in another week able to read for a minute together with his eyes both directed on the ſame objects; and I have no doubt, if he has patience enough to perſevere in theſe efforts, but he will in the courſe of ſome months overcome this unſightly habit." Phil. Tranſ. vol. lxviii. p. 89.

Philoſophers, as well as phyſicians, have adopted various hypotheſes, in order to account for this defect in viſion. It has been generally ſuppoſed to proceed, according to the preceding ſtatement, from the want of a due correſpondence in the muſcles of the eyes, which not acting in a proper concert with one another, are not able to point both eyes at one object. M. de la Hire apprehended, that this diſorder proceeded from a defect in the eye itſelf having the moſt ſenſible part of the retina not placed in the axis of the eye, but at ſome diſtance from it on one ſide or the other; and that, therefore, not the axis, but this more ſenſible part of the retina is turned towards the object on which the axis of the other eye is fixed, ſo that both axes are not directed to the ſame point.

He ſuppoſed ſquinting, alſo, ſometimes to be owing to the oblique ſituation of the cryſtalline humour in one of the eyes. Theſe hypotheſes are examined and refuted by Dr. Jurin, who, in order to account for this defect, conſiders the diſpoſition and ſituation of the eyes in a ſound ſtate. When we look directly forwards at a diſtant object, the pupil of each eye lies in the middle of the aperture formed by the eye-lids; ſo that the diſtance between the two pupils conſiſts of the breadth of the noſe and half the breadth of the aperture of each eye; and this diſtance between them is always preſerved, however obliquely we turn our eyes. In looking at near objects, the diſtance between the pupils is ſomewhat leſs, but ſtill it is always the ſame in all oblique directions of the eyes, as well as when we look ſtraight forwards; by which means the axes of both eyes are directed forwards to the ſame point, in both theſe caſes of looking at diſtant and near objects. But in thoſe who ſquint, when the pupil of the undiſtorted eye is ſeated in the middle of the aperture, as in looking directly forwards, the pupil of the other eye is drawn cloſe to the noſe, and conſequently, the diſtance between the two pupils is conſiderably leſs than in other perſons; and this leſs diſtance continues the ſame in all oblique directions for the eyes; ſo that two axes are never pointed at the ſame object, though the muſcles do ſo far act in concert with each other, as to move both eyes the ſame way at the ſame inſtant of time.

This vicious habit, Dr. Jurin obſerves, may eaſily be contracted by a child, if he is often laid into his cradle in ſuch a poſition as to be able to ſee either the light, or any other remarkable object, with one eye only: and when by this means he is brought to ſquint, and the habit is confirmed, he apprehends it will be in vain to attempt a cure by his wearing tubes, or ſhells, with ſmall holes to look through; for, notwithſtanding every help of this kind, he will continue to ſee through them diſtinctly with one eye only, and will ſtill diſtort the other. The true method of cure he takes to be the following: when the child is arrived at ſuch an age as to be capable of obſerving directions, place him, ſays he, directly before you, and let him cloſe the undiſtorted eye, and look at you with the other. When you find the axis of this eye fixed directly upon you, bid him endeavour to keep it in that ſituation, and open his other eye. You will now ſee the diſtorted eye turn away from you towards his noſe, and the axis of the other eye will be pointed towards you. But with patience and repeated trials, he will, by degrees, be able to keep his diſtorted eye fixed upon you, at leaſt for ſome little time, after the other is opened; and when you have brought him to keep the axes of both eyes fixed upon you, as you ſtand directly before him, it will be time to change his poſture, and to ſet him firſt a little on one ſide of you, and then to the other, and ſo to practiſe the ſame thing; and when in all theſe ſituations he can perfectly and readily turn the axes of both eyes towards you, the cure is effected. An adult perſon, he ſays, may practiſe all this by a glaſs, without a director, though not ſo eaſily as with one; but the older he is, the more patience will be neceſſary. Smith's Optics, Rem. p. 30.

M. Buffon infers, from a great number of obſervations, that the true and original cauſe of ſquinting is an inequality in the goodneſs, or in the limits of diſtinct viſion in the two eyes. When one of the eyes, he ſays, is much weaker than the other, we do not direct it towards the object, but make uſe of the ſtronger eye only: when the eyes are equally good, we ſee more diſtinctly with both eyes than with one, by about a thirteenth part; but when they are unequal in goodneſs, objects appear leſs diſtinct with both eyes than with one. It is no wonder, therefore, that perſons, ſubject to this inequality, chuſe to make uſe of one eye, and turn the other aſide. This inequality in the goodneſs of the eyes is the general cauſe of ſquinting, according to M. Buffon; and others, with reſpect to this, are accidental. All the perſons whom he examined, if they ſquinted at all, did ſo from this cauſe; and this effect is ſo neceſſary, that, he ſays, it is not poſſible to cure a perſon of ſquinting, whoſe eyes differ much in point of goodneſs, except, perhaps, by firſt bringing them nearer to an equality by means of glaſſes. To the ſame purpoſe Dr. Reid obſerves, that, having examined above twenty perſons who ſquinted, he found in all of them a defect in the ſight of one eye. And this writer is of opinion, that the centres of the two eyes of ſquinting perſons correſpond with them as with others, ſo that if they could be brought to the habit of directing their eyes aright to an object, they would not only remove a deformity, but likewiſe improve their ſight.

In examining the limits of diſtinct viſion in ſeveral children who did not ſquint, M. Buffon found, (contrary to Dr. Jurin's obſervation,) that they did not ſee by any means either ſo far off, or ſo near as adult perſons; ſo that, as we advance in age, the limits of diſtinct viſion are extended both ways; and this, he ſays, is one reaſon why children ſquint more than adult perſons.

When the eyes of thoſe perſons who ſquint do not differ much in point of goodneſs, M. Buffon thought that the moſt ſimple, the moſt natural, and the moſt effectual method of curing it, would be to cover the good eye for ſome time; for the diſtorted eye would thus be obliged to act and turn itſelf directly towards objects, and, by degrees, this would become natural to it.

The reaſon why thoſe perſons who ſquint generally turn the weak eye towards the noſe, he ſays, is, that in that ſituation, the direction of its axis is as diſtant as poſſible from that of the good eye: and beſides, in this place, the noſe conceals many objects from its view, ſo that this ſituation is the leaſt diſadvantageous to it of any other.

In ſome caſes, M. Buffon obſerves, that the eyes have what is commonly called a *caſt* only, in conſequence of the optic angle being too great or too ſmall, when they are of equal goodneſs. This, he ſays, is generally the reſult of habit, acquired very early, in conſequence of the miſmanagement of children, and that it is often eaſily cured. If the eye that ſquints be turned towards the temples, he ſays, he has generally found that there is no great inequality in the goodneſs of the two; and that, in this caſe, the cauſe being only a vicious habit, the cure has been completed by covering the good eye for a fortnight only. In order to judge with any certainty of the inequality of goodneſs in the two eyes, and the poſſibility of the cure of ſquinting, it is neceſſary, he ſays, to cover the good eye for ſome time, in order to exerciſe the bad eye, and give it an opportunity of gaining ſtrength, after which it will be more eaſy to judge whether the cure be poſſible or not. Acad. Par. 1743, p. 329. 342. Reid's Inq. into the Human Mind, p. 253—257. See *Phyſiology of the* Eye.

SQUINZANO, in *Geography*, a town of Naples, in the province of Otranto; 6 miles N.W. of Lecce.

SQUIRE, Samuel, in *Biography*, a learned Engliſh prelate, was born at Warminſter in 1714. He was educated at St. John's college, Cambridge, of which he became a fellow. After various inſtances of preferment, he obtained the vicarage of Greenwich, and was appointed clerk of the cloſet to the prince of Wales, his preſent majeſty. In 1760 he was promoted to the deanery of Briſtol; and in the following year he was advanced to the ſee of St. David's. He died in 1766, leaving behind him ſeveral works of reputation, beſides a number of ſingle ſermons. His principal pieces are as follow. In his profeſſion as a divine, he wrote "The ancient Hiſtory of the Hebrews vindicated;" "Indifference for Religion inexcuſable;" and "The Principles of Religion made eaſy to young Perſons." In claſſical literature, he publiſhed "Two Eſſays: (1) A Defence of the ancient Greek Chronology; (2) An Inquiry into the Origin of the Greek Language;" and an edition of "Plutarch de Iſide et Oſiride," Gr. and Engl., with commentaries and various readings. His works, as a political writer, are, "An Inquiry into the Nature of the Engliſh Conſtitution, or an hiſtorical Eſſay on the Anglo-Saxon Government both in Germany and England;" "An Eſſay on the Balance of Civil Power in England;" and "Remarks upon Mr. Carte's Specimen of the General Hiſtory of England." He left in MS. a Saxon grammar, compiled by himſelf. Dr. Squire was a fellow of the Royal and Antiquarian Societies. Gen. Biog.

SQUIRREL, Sciurus, formed of *σκια*, *ſhade*, and *ȣρα*, *tail*, becauſe the tail ſerves this animal for an umbrella, is a genus of animals deſcribed under Sciurus.

There is great diverſion in hunting the common Engliſh ſquirrel, and its fleſh is very delicate and well taſted. The only ſeaſon for hunting it is in autumn, and the beginning of winter, at which time the creature is fat; and the leaves being off the trees, it may be ſeen as it leaps from bough to bough, which, when purſued, it does with ſurpriſing agility.

In the ſummer they build their neſts, which the ſportſmen call *drays*, very artificially in the tops of trees, with ſticks, moſs, and ſuch other things as the woods afford: to their neſt they have two holes, and they ſtop up that on the ſide the wind blows, as Pliny has remarked; they fill this lodging, during the ſeaſon, with nuts and other fruits, which are to ſerve them in the ſevere weather, when the trees afford nothing. They ſleep in the midſt of this proviſion a great part of the winter, and that ſo ſoundly, that they will not be waked by ever ſo loud a noiſe made juſt under their drays; though at other times they fly out immediately on hearing any noiſe, even at a conſiderable diſtance.

In the ſpring the female is ſeen purſued from tree to tree by the males, feigning an eſcape from their embraces.

The tail of the ſquirrel, which is as large as the body, though compoſed almoſt entirely of hair, ſerves the creature in ſome ſort inſtead of wings; for by means of it the body is kept ſuſpended in the air, without any viſible ſinking, while the creature throws itſelf from the boughs of one tree to thoſe of another of equal height. But the more general leaps the ſquirrel takes, are from the outermoſt branches of a high tree to another ſomewhat lower at a diſtance: it is wonderful to ſee how far it will be carried in theſe leaps; and if it miſſes the tree it aims at, and by that means falls from the top of ever ſo high a tree to the ground, the tail ſupports it ſo well that it comes ſoftly down, and receives no harm. The hunting of the ſquirrel is moſt agreeably performed in woods of a young growth, the trees of which may be ſhaken by the hands; and it is neceſſary to take out ſome means of diſlodging them from the clefts of trees, in which they will take refuge, and from which they will never be removed by mere noiſe.

Many people uſually go together on this expedition, and ſometimes they carry bows and arrows for the diſlodging of the prey from theſe places; ſometimes bludgeons, or ſhort or thick ſtaves, loaded at one end with lead, to prevent their lodging in the tree when they are thrown up. The ſquirrel, which in its fright has taken refuge in any part of a tree, and is not to be diſlodged either by hallooing or ſhaking the tree, will always quit the place as ſoon as an arrow or bludgeon has been well aimed at it, and will give a farther chace.

The ſquirrel is always fond of a large oak in time of danger, and runs to the neareſt it can find, as ſoon as it ſees itſelf purſued: in ſome part of the upper boughs of this tree it ſits ſecure from the men and dogs, and as it is too troubleſome to the ſportſmen to climb every tree, the only method is to ſhoot arrows, and throw bludgeons at it; it is very ſeldom hurt by theſe, unleſs hit juſt upon the head, for its back-bone is ſo ſtrong, that it will bear nearly as hard a blow as a dog, without danger of hurt. So long as the ſtrength and ſpirits of the creature laſt, it always keeps in the tops of the higheſt trees; but when it grows weary, it comes down, and takes ſhelter in the hedges. The ſquirrel then ſoon becomes a prey to the dogs, or is very often killed upon the ground, in attempting to gain the hedge in places where there is no continued chain of trees by which it can come at it.

It is obſerved, that the gullet of this animal is very narrow, to prevent it from diſgorging its food in deſcending of trees, or in its leaps downwards.

SQUIRTING or Spurting *Cucumber*, in *Gardening*, the common name of a wild ſort of cucumber, which is ſometimes cultivated in gardens for the ſake of curioſity, and for the peculiar property which it poſſeſſes of inſtantly burſting the capſules of the ripe fruit, on being touched, with much elaſticity and violence, ſo as to throw the juice and ſeeds which they contain forcibly to a great diſtance all around, to the great ſurprize of thoſe who may have touched them. See MOMORDICA.

It likewiſe affords the medicinal ſubſtance known by the name of *elaterium*.

SQUIRZINA, in *Geography*, a town of the duchy of Warſaw; 50 miles W.N.W. of Poſen.

SRADHA, the name of a ceremony among the Hindoos, of a very intereſting and affecting nature; being obſequies in honour of departed anceſtors.

The Hindoo Pantheon furniſhes ſome particulars explanatory of this intereſting and affecting ceremony, which, the author tells us, is an oblation of daily recurrence with Brahmans and rigid Hindoos who can afford it. It is offered not only in honour of deceaſed anceſtors, but for their comfort; as the manes, as well as the gods connected with them, enjoy, like the gods of the Greeks, the incenſe of ſuch offerings; which are farther of an expiatory nature, ſimilar, it may be preſumed, in their efficacy, as well as in the motives that induce them, to the maſſes of the Romiſh church. Over theſe ceremonies of Sradha, Yama preſides, in his character of Sradhadeva, or lord of the obſequies. See SRADHADEVA and YAMA.

Mr. Colebrooke tells us (Aſ. Reſ. vol. vii.), that the prieſts, in the performance of the Sradha, meditate the gayatri, and thrice repeat "Salutation to the gods, to the manes of anceſtors, and to mighty ſaints; to Swaha (goddeſs of fire); to Swadha (the food of the manes); ſalutation to them for ever and ever." Of the gayatri, &c. of this quotation, ſee O'M, SWADHA, and SWAHA.

M. le Gentil found a ſtrong reſemblance between the funeral rites of the Chineſe and the Sradha of the Hindoos. On which ſir William Jones (Aſ. Reſ. vol. ii.) ſays, "that all the circumſtances which have been mentioned, under the two heads of literature and religion, ſeem collectively to prove, (as far as ſuch queſtion will admit of proof,) that the Chineſe and Hindoos were the ſame people; but having been ſeparated near four thouſand years, have retained few ſtrong features of their ancient conſanguinity; eſpecially as the Hindoos have preſerved their old language and ritual, while the Chineſe very ſoon loſt both. And the Hindoos have conſtantly intermarried among themſelves; while the Chineſe, by a mixture of Tartarian blood from the time of their firſt eſtabliſhment, have at length formed a race diſtinct in appearance from both Indians and Tartars."

In the third chapter of the Inſtitutes of Menu, the rules for the performance of the Sradha are detailed with prolixity. Among other particulars of the moſt important of thoſe ceremonies, we learn that Brahmans only ought to be invited to the feaſt, which forms one important rite; and ſuch Brahmans ſhould be of holy and learned habits. A Sudra, that is, one of the fourth or ſervile claſs, is urgently prohibited as a gueſt. Let the houſekeeper, it is ſaid, who knows his duty, perform each day a Sradha with boiled rice, and the like, or with water, or with milk, roots, and fruit; for thus he obtains favour from departed progenitors, &c. &c. &c.

The following extract is taken from Colebrooke's Diſſertation on the religious Ceremonies of the Hindoos, in the ſeventh volume of the Aſiatic Reſearches; which article contains much valuable matter, and many curious particulars of the Sradha, or feaſt attending funeral obſequies.

"A dying man, when no hopes of his ſurviving remain, ſhould be laid on a bed of Kuſa graſs (ſee KUSA), in the open air, his head ſprinkled with water drawn from the Ganges, and ſmeared with clay brought from the ſame river. A Salagrama ſtone (ſee SALAGRAMA) ſhould be placed near him, holy ſtrains from the Veda (ſee VEDA) ſhould be chaunted aloud, and leaves of holy baſil ſcattered over his head.

"When he expires, the corpſe muſt be waſhed, perfumed, and decked with wreaths of flowers, and carried by the neareſt relations to ſome ſpot in the foreſt, or near water: the funeral pile is lighted from the conſecrated fire maintained by the deceaſed. (See of this under our articles SAGNIKA and SAMI.) The neareſt relation applies the flaming brand to the pile, hung round with flowers; and the attendant prieſts recite the appropriate invocations: 'Fire! thou waſt lighted by him; may he, therefore, be reproduced from thee, that he may attain the regions of celeſtial bliſs. May this offering be auſpicious!' All who followed the corpſe walk round the pile, but may not view the fire. They then proceed to the river, and, after bathing, preſent oblations of water to the manes of the deceaſed, ſaying, 'May this oblation reach thee!' Elegiac verſes, ſuch as the following, are then recited.

"1. Fooliſh is he who ſeeks for permanence in the human ſtate; inſolid, like the ſtem of the plantain-tree; tranſient, like the foam of the ocean.

"2. When a body, formed of five elements, to receive the reward of deeds done in its own former perſon, reverts to its own five original principles, what room is there for regret?

"3. The earth is periſhable; the ocean, the gods themſelves paſs away: how ſhould not that bubble, mortal man, meet deſtruction?

"4. All that is low muſt finally periſh; all that is elevated muſt ultimately fall; all compounded bodies muſt end in diſſolution; and life be concluded by death."

Excluſive of the daily Sradhas, or feaſts, given by wealthy individuals, formal obſequies are performed ninety-ſix hours in every year, on particular days. "It ſhould be obſerved," Mr. Colebrooke tells us, reſpecting the practice of giving food at theſe obſequies, "that Brahmans generally give it to one or more of their own relations. A ſtranger, unleſs indigent, would be very unwilling to accept the food, or attend at a Sradha, for the purpoſe of eating it. The uſe of fleſh meat is poſitively enjoined to Hindoos at certain obſequies, and recommended at all. (See Inſt. of Menu, c. iii. v. 124. 268, &c.) But the precepts of their lawgivers are, by ſome, deemed obſolete in the preſent age; and are evaded by others, who acknowledge the cogency of theſe laws. Theſe commonly make a vow of abſtaining from fleſh meat, and conſider that vow as more binding than the precepts here alluded to. Others, again, not only eat meat at obſequies and ſolemn ſacrifices, but make it their common diet, in direct breach of their religion." It hence appears clear, that the idea ſo common in Europe, of the univerſal abſtinence of Hindoos from fleſh meat, is as erroneous as general. Some pages of the Hindoo Pantheon are devoted to prove this fact; and it is fully proved, that not only all Hindoos may, but that a great majority of thoſe who can obtain it, including Brahmans themſelves, actually do, eat meat.

The feaſt attendant on the ceremonies of the Sradha can be given only by the ſon, or grandſon, or male iſſue of the defunct; and as the greateſt importance is attached by Brahmans and others to the due performance of theſe ceremonies, default of male iſſue is deprecated as among the heavieſt of misfortunes. The Hindoo books, therefore, abound in inſtances of the efficacy of prayers, ſacrifices, alms to Brahmans, pilgrimages, auſterities, &c. in obtaining this grand object of comfort to departed ſouls. “ Appeaſing the manes,” by the Sradha, is as common in the mind of a Hindoo, as relieving the pains of purgatory by maſſes is in that of a Papiſt. Though the ceremonies differ, the principle is ſtrikingly ſimilar. Being childleſs is felt as an angry viſitation of the gods, inflicted partly for ſins in a former ſtate of exiſtence: they are, therefore, propitiated by alms, pilgrimages, &c. One mode of removing ſterility is by circumambulating an image, or tree, ſacred to ſome deity. (Of this ſee under PRADAKSHNA, the name of this ceremony.) If every thing fail, there is, however, ſtill a remedy by adoption, accompanied by certain ceremonies, expenſive, according to the means of the party. Another is by giving daughters in marriage with like ceremonies; all of which are minutely detailed in the ritual. For all theſe proceedings divine authority can be quoted. Holy men, or even divinities, in the times of their terreſtrial ſojournments, are related to have done the like. “ He,” ſays Menu, “ who has no ſon, may appoint a daughter to raiſe up a ſon for him, ſaying, ‘ The male child who ſhall be born from her in wedlock ſhall be mine, for the purpoſe of performing my obſequies.’

“ In this manner Dakſha himſelf, lord of created beings, anciently appointed all his fifty daughters to raiſe up ſons to him, for the ſake of multiplying his race.”

SRADHADEVA, in *Hindoo Mythology*, a name given to the Pluto of their infernal regions. It means lord of the Sradha, a feaſt often, by many daily, offered in commemoration of deceaſed anceſtors. (See SRADHA.) The more common name for the lord of the obſequies is *Yama*; which ſee.

SRAMANA, a name of the Eaſtern deity *Boodh*; which ſee.

Sakya, Sravaka, and Sugata, (which ſee,) are others of his names. So is Gotama, or Godama. The union of the firſt and laſt of theſe names, a little altered in the pronunciation, produced that of Somonocodom, by which he is called by ſome writers. See GODAMA.

SRAVAKA, the name of the laity of the Jainas, a ſect of ſchiſmatic Hindoos. Their prieſts are called Yati. (See JAINA and YATI.) A name alſo of the god Budha, or *Boodh*; which ſee. For a notice of the religion and cuſtoms of the ſect of Sravaka, ſee Moor on Hindoo Infanticide, p. 174. Among the Mahrattas, the Sravakas are called Shevari.

SRBORNICK, in *Geography*, a town of Boſnia; 40 miles N.N.E. of Boſnaſerai.

SREDNEI, an iſland in the Frozen ocean, at the mouth of the Indigirda, about 40 miles in circumference, of a triangular form. N. lat. 72° 52′. E. long. 154° 155°.—Alſo, a town of Ruſſia, in the government of Tobolſk; 20 miles N.N.W. of Taſſievſkoi.

SRI, in *Hindoo Mythology*, is a name given to ſeveral goddeſſes; ofteneſt perhaps to Lakſhmi, the goddeſs of proſperity and abundance. This name is in the firſt caſe Sris, which ſir William Jones remarked as reſembling, both in name and character, the goddeſs of abundance of the Latins; and he ſays, that in very ancient temples near Gaya there are images of Lakſhmi, with full breaſts, and a cord twiſted under her arm, like a horn of plenty, which looks very much like the old Grecian and Roman figures of Ceres. (See LAKSHMI.) The word Sri, however, although given as a name or epithet to the Ceres of India, and to the other great goddeſſes Parvati and Saraſwati, is not confined to them: it means fortunate, happy, &c. as well as bleſſed or divine; and is ſometimes prefixed to the names both of gods and men.

SRI BHAGAVATA, the title of a work in the Sanſcrit language, of great celebrity among the Hindoos. It is uſual to aſcribe this work to Vyaſa, the reputed compiler or author of the Vedas, Puranas, Mahabarat, and other works. But the real author of the Sri Bhagavata is Vopadeva, who, in attempting to revive the leading doctrines of Vyaſa, opened a door to the reconciliation of the various ſects of Hindoos, numerouſly divided and ſubdivided as they are, and, as far as hiſtorical evidence can be traced, ever have been. We muſt refer the reader to our article SECTS *of Hindoos*, for farther information on theſe points. (See alſo VYASA.) Under our article PURANA we have given a ſuccinct account of the mythological romances ſo called, that are ſo highly venerated in India as inſpired poems. Of theſe the Sri Bhagavata is reckoned the eighteenth and laſt; and whatever differences of opinion may exiſt, and very wide differences do exiſt, as to the antiquity and form of the other Puranas, it ſeems a point generally agreed on, that the Bhagavata is much more modern than the reſt, and cannot, in its preſent form, claim an age of more than ſix hundred years.

The main ſubject of the Bhagavat is the life and actions of Kriſhna; including the extravagant and myſtical details of his incarnation, miracles, debaucheries, and various fooleries; intermixed, however, with ſublime effuſions of pure theology and morals. (See MYSTICAL *Poetry*.) Like moſt of the other reſpected writings of the Hindoos, it contains much to applaud and admire; but more, whether viewed philoſophically or morally, to reprehend. It is compriſed in twelve books, and, like the other poems bearing the common denomination of Purana, contains, beſides the general thread of ſectarial theology interwoven throughout, five ſubjects, *viz.* primary creation, or creation of matter in the abſtract; ſecondary creation, or the production of ſubordinate beings, both ſpiritual and material; chronological account of their grand periods of time called Manwantara; genealogical riſe of families, particularly of thoſe who have reigned in India; and, laſtly, a hiſtory of the lives of particular families.

This work is in general eſtimation, and is found in moſt of the vulgar dialects of India, and in the Perſian language. It has alſo appeared in a very imperfect and abridged form, in French, under the title of Bagavadam, tranſlated from the Tamul verſion. Its title is derivable from Bhagavan, one of the names of Kriſhna and Viſhnu; and Bhagavan from Bhaga, meaning, it is ſaid, the author of exiſtence, or lord of nature. (See SIVA.) Sri is a prefixture of reſpect, extenſively applied. (See SRI.) The modern ſect, who adhere to the liberal doctrine expounded in this work, are called Bhagavatas. But we muſt again refer to our article SECTS *of Hindoos*, for an explanation of the nature of the Hindoo ſectarial diſtinctions. See alſo KRISHNA, for an account of the hero of the Bhagavat.

SRIDEVI, in *Hindoo Mythology*, is a name given by ſeveral ſects to the goddeſs of their adoration; ſuch individual goddeſs being called the ſakti, or energy of her lord. In explanation of this, we refer to our article SAKTI. Sridevi means the bleſſed goddeſs, and is given to all the three great goddeſſes, Lakſhmi, Parvati, and Saraſwati.

Sridevi is likewiſe the name of the wife of Dakſha, who was Brahma in a human ſhape. In this character ſhe ſeems to be both the daughter and mother of Parvati. See PIKESWARI and SRADHA.

SRIMANA, a name of Kartikya, the Hindoo regent of the firmament. See KARTIKYA.

SRIMANT, an appellation of reſpect uſed in the third perſon to the Peſhwa, or chief perſon of the Mahratta empire. See PESHWA.

SRINAGUR, in *Geography*. See SIRINAGUR.

SRIPADA, a name, or word, uſed among the Hindoos, meaning a divine footſtep, for which ſuppoſed impreſſions they have a very reverential feeling. On the top of the lofty mountain on the iſland of Ceylon, which European geographers call Adam's peak, the Hindoos fancy there is a ſripad; and accordingly pilgrimages are made to it from diſtant parts of India. Viſhnu, it is ſaid, alighted on this ſpot, and left the holy and indelible impreſſion. In the neighbourhood of temples, or at their threſhold, it is not unuſual to ſee a flat ſtone emboſſed or engraved with the impreſſion of two feet, joined from heel to toe; ſuch being the attitude of adoration: and it is ſaid that ſuch ſtones are the laſt terrene ſubſtance preſſed by the feet of the unhappy victims of ſuperſtition, who burn themſelves alive on the pile of their huſbands. They ſtep from theſe flat ſtones upon the pile, and then appertain more to the next world than to this. The next ſtep is into the preſence of the gods; or, in the caſe of temples, to their holy place.

The Hindoos are not the only people who have a veneration for the myſtical impreſſions of feet. The ſripad above mentioned on Ceylon was ſaid by our early zealous miſſionaries to have been left by Adam; they endeavouring to eſtabliſh the fact of that choſen iſland having been the Eden of our firſt parents. (See LANKA.) In the holy land, miraculous ſripada, or footſteps, are ſtill ſhewn and reverenced, as left by the laſt preſſure of our Saviour on the earth. On this ſubject the reader will find ſome intereſting diſcuſſion in Dr. Clark's Travels, vol. ii. p. 584.

SRIRANGA, a name of the Hindoo god Siva. The name is Ranga, with the epithet Sri prefixed, meaning holy or bleſſed. (See RANGA, SIVA, and SRI.) Seringapatam, or Seringapatan, means the city of Sriranga, or of the holy Ranga.

SRIVIRUPAKSHA, a name of Siva, the deſtructive or transforming power of the Hindoo divine triad. Virupakſha is ſaid to mean with *three eyes*, Siva being ſo gifted; and hence named *Trilokan*; which ſee. (See alſo SIVA.) An eminent Sanſcrit ſcholar tranſlates the name Virupakſha, "with a diſagreeable countenance." The epithet Sri prefixed means bleſſed or divine. See SRI and VIRUPAKSHA.

Madame Dacier, in a note on the ninth book of the Iliad, has a paſſage applicable to the mythological ſubject of this article. The ancients, ſhe ſays, gave the name of Jupiter not only to the god of heaven, but likewiſe to the god of hell, as is ſeen here by the epithet of "infernal Jove," and to the god of the ſea, as appears from Eſchylus. They thereby meant to ſhew, that one ſole deity governed the world; and it was to teach the ſame truth, that the ancient ſtatuaries made ſtatues of Jupiter, which had three eyes. Priam had one of them in that manner in the court of his palace, which was there in Laomedon's time. After the taking of Troy, when the Greeks ſhared the booty, it fell to the lot of Sthenelus, who carried it into Greece.

Siva, the Indian Jove, is, in like manner, deemed variouſly the god of the three regions of the univerſe, as denoted by his three eyes, trident, &c. See PARVATI and TRISULA.

SRODA, or SVODA, in *Geography*, a town of the duchy of Warſaw; 14 miles S.E. of Poſen.

SRSEM, or STRIM, a town of the duchy of Warſaw; 20 miles S. of Poſen.

SRSERED. See SERAT.

SSE-TCHUEN, a town of Corea; 33 miles S.W. of Tſin-tcheou.

SSIDA, a town of Japan, in the iſland of Niphon; 18 miles S. of Fitaqua.

SSIERPSCH, a town of the duchy of Warſaw; 16 miles N. of Ploczk.

SSOKAL, a town of Auſtrian Poland, in the palatinate of Belz; 10 miles N.E. of Belz.

SSUUS, a town of Japan, on the N. coaſt of Niphon; 20 miles S.E. of Noto.

ST, an indeclinable term, chiefly uſed to command ſilence. The Romans had theſe two characters written over the doors of the eating-rooms, as who ſhould ſay, *ſed tace*, or *ſilentium tene*.

Porphyry obſerves, the ancients made a point of religion of it, not to ſpeak a ſingle word in paſſing in or out of the doors.

STAAL, *Madame de*, in *Biography*, an ingenious French writer, firſt known by the name of Mademoiſelle de Launay, was daughter of a painter at Paris. Her father being obliged to quit the kingdom, ſhe was left in a ſtate of poverty. She had enjoyed the advantages of a good education at a priory in Rouen; but her patroneſs dying, ſhe was under the neceſſity of engaging herſelf as bed-chamber woman to the ducheſs of Maine; who ſoon diſcovering the talents of her ſervant, employed her in all the theatrical entertainments which ſhe gave at her ſeat of Sceaux. For ſome of theſe De Launay wrote verſes, and for others ſhe formed the plans, and thus obtained the perfect and unlimited confidence of her miſtreſs, and the friendſhip of all the men of wit and letters who frequented that court. Following the fortunes of her miſtreſs, ſhe was involved in the diſgrace incurred by the ducheſs during the regency of the duke of Orleans, and was two years a priſoner in the Baſtille. After her liberation, the ducheſs, as a reward for her fidelity, married her to M. de Staal, lieutenant, and afterwards captain, in the Swiſs guards. From her own deſcription, ſhe appears to have poſſeſſed few perſonal attractions, yet her gallantries were a great ſource of the vexations with which her life was diſquieted. She ſometimes loved without a return, and ſhe ſometimes attracted attentions to which ſhe paid no regard. She died in 1750, and after her death were printed, in 3 vols. 12mo. "Memoirs of her Life," written by herſelf. Theſe are agreeably written, and in a pure and elegant ſtyle. There has been added a fourth volume, containing two comedies acted at Sceaux, entitled "L'Engoûment," and "La Mode," the chief merit of which is ſaid to conſiſt in the ſprightlineſs of the dialogue. Her memoirs have been tranſlated into the Engliſh language.

STAATEN LAND, in *Geography*. See *New* ZEALAND.

STAATSBERG, an opulent farming neighbourhood in Clinton, Ducheſs county, New York, in which is a poſt-office; 70 miles from Albany, and 10 from Poughkeepſie.

STAATZ, a town of Auſtria; 5 miles W. of Falkenſtain.

STAAVIA, in *Botany*, was ſo called by Dahl, in compliment to Mr. Martin Staaf, of Gottenburgh, a great patron of botany, and an aſſiduous diſciple of the great Linnæus, to whom he formerly communicated many natural productions from China.—Dahl. Obſ. Bot. 14. Thunb. Prodr. 41. Willd. Sp. Pl. v. 1. 1144. Ait. v. 2. 35. Poiret in Lamarck Dict. v. 7. 363. (Leviſanus; Schreb. Gen. 149, excluding the reference to Gærtner.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Rhamni*, Juſſ.

Gen. Ch. *Common Calyx* hemiſpherical, many-flowered, imbricated, of numerous linear leaflets. Perianth ſuperior, erect, of one leaf, in five deep acute ſegments, permanent. *Cor.* Petals five, ſhort, oblong, obtuſe, nearly upright, with ſlender claws. *Stam.* Filaments five, awl-ſhaped, inſerted into the bottom of the calyx; anthers roundiſh. *Piſt.* Germen inferior, turbinate; ſtyles two, combined, capillary; ſtigmas ſimple. *Peric.* Berry coated, of five cells. *Seeds* ſolitary. *Common Receptacle* convex, villous, or chaffy.

Eſſ. Ch. Flowers aggregate. Stamens inſerted into the calyx. Styles two, united. Berry coated, with five ſeeds. Common receptacle chaffy.

1. S. *radiata.* Rayed Staavia. Willd. n. 1. Ait. n. 1. (Brunia radiata; Linn. Mant. 2. 209. Phylica radiata; Linn. Sp. Pl. 283. Chryſanthemum ericoides coronatum; Breyn. Cent. 165. t. 82.)—Leaves lanceolate-triangular. Coloured rays of the calyx ſhorter than the diameter of the head of flowers.—Native of the Cape of Good Hope. A greenhouſe plant in England, flowering in May and June, but of no ſtriking appearance. The ſtraight hairy branches of the buſhy *ſtem* are clothed with numerous, little, alternate, heath-like, ſmooth, glaucous *leaves*, on ſhort ſtalks. The *flowers* are corymboſe, four or five together at the ſummit of each branch, looking not unlike ſome ſmall kind of *Aſter.* The diſk is a quarter of an inch broad, reddiſh. *Rays* nearly the ſame in length, pale, obtuſe, recurved.

2. S. *glutinoſa.* Clammy Staavia. Willd. n. 2. Ait. n. 2. (Brunia glutinoſa; Linn. Mant. 210.)—Leaves linear-triangular. Coloured rays of the calyx rather longer than the diameter of the head of flowers.—From the ſame country. Introduced into England by Meſſrs. Lee and Kennedy in 1793. We find no figure that can be truſted, though Plukenet's t. 431. f. 1. bears ſome reſemblance to this ſpecies. The *leaves* are longer and more ſlender than the foregoing. *Flowers* ſolitary, full twice as large, with copious, long, and ſlender rays. The *diſk* is glutinous, perhaps from abundance of honey, and is covered in the dried ſpecimens with ſand, whence the name.

STAB, in *Geography,* a town of Bohemia, in the circle of Pilſen; 11 miles S.S.W. of Pilſen.

STABAT *Mater Doloroſa.* This celebrated elegy in monkiſh rhymes, written about the 14th century by Jacoponus, a minor Franciſcan friar, has been ſet by all the great maſters in Italy, and Roman Catholic compoſers in Germany; but by none in ſo happy and captivating a manner as by Pergoleſi.

STABBIA, in *Geography,* a town of Etruria; 11 miles S.S.W. of Piſtoya.

STABBING, in *Law.* See MANSLAUGHTER.

STABBING *of Hoven Cattle,* in *Rural Economy.* See HOVEN.

STABILI SUONI, in the *Ancient Greek Muſic,* were the extremes, or loweſt and higheſt ſounds of each tetrachord, which, ſounded together, conſtituted the diateſſaron, or 4th, that was never changed as the two middle ſtrings were, which were elevated or lowered according to the genera, and on that account were called *mobiles, mobili ſuoni.*

STABLE, in *Rural Economy,* a building or houſe conſtructed for horſes and other animals, being furniſhed with ſtalls and proper contrivances to contain their food and other matter.

Nothing conduces more to the health of a horſe than the having a good and wholeſome ſtable. The ſituation of a ſtable ſhould always be in a good air, and on a firm, dry, and hard ground, that in winter the horſe may come in and go out clean. It ſhould always be built ſomewhat on an aſcent, that the urine and other foulneſſes may be eaſily conveyed away by means of drains or ſinks cut for that purpoſe.

As there is no animal that delights more in cleanlineſs than the horſe, or that more abominates bad ſmells, care ſhould be taken that there be no hog-ſtie, hen-rooſt, or neceſſary-houſe, near the place where the ſtable is to be built; for the ſwallowing of feathers, which is very apt to happen when hen-rooſts are near, often proves mortal to horſes; and the ſteams of a bog-houſe, or hog's dung, will breed many diſtempers; and particularly they will bring on the farcy and blindneſs in many horſes. It is much better to build the walls of a ſtable of brick than of ſtone, for the former is always dry, the other often ſweats, and is very apt to be damp, and to cauſe rheums and catarrhs to horſes that are ſet in the ſtable in damp weather.

The walls ought to be made of a moderate thickneſs, both for the ſake of ſafety, and warmth in winter, and to keep off the heat of the ſun in the midſt of ſummer, which would ſpoil the horſe's appetite, and ſink his ſpirits. The windows ſhould be made on the eaſt and north ſides of the building, that the north air may be let in to cool the ſtables in ſummer, and for the benefit of the riſing ſun all the year round, eſpecially in winter.

The windows ſhould either be ſaſhed, or have large caſements, for the ſake of letting in air enough; and there ſhould always be cloſe wooden ſhutters, that the light may be ſhut out at pleaſure; by which means the horſe will be brought to ſleep in the middle of the day, as well as in the night, when it is judged proper that he ſhould do ſo.

Many pave the whole ſtable with ſtone; but it is much better to have that part which the horſe is to lie upon, boarded with oak-planks; for it will be not only eaſier, but more warm and comfortable to the animal.

The boards muſt be laid as even as poſſible, for this is the way to make the creature lie moſt at his eaſe, and in the moſt healthful poſture. The dealers in horſes generally, indeed, make the boards be laid higher toward the top, and ſlanting down: this ſhews a horſe to more advantage as he lies, but it is very uncomfortable to the creature, and his hinder parts are always ſlipping down, and the hind legs are often made ſubject to ſwellings by it.

The planks ſhould be laid croſſwiſe, not lengthwiſe; and there are to be ſeveral holes bored through them to receive the urine, and carry it off underneath the floor into ſome drain or common receptacle. The ground behind ſhould be raiſed to a level with the planks, that the horſe may always ſtand even, and the floor behind ſhould be paved with ſmall pebbles, and the place where the rack ſtands ſhould be well wainſcotted. There are to be two rings placed on each ſide of the ſtall for the horſe's halter to run through, and a logger is to be fixed to the end of this, ſufficient to poiſe it perpendicularly, but not ſo heavy as to tire the horſe, or to hinder him from eating. The beſt place for him to eat his corn in is a drawer, or locker, made in the wainſcot partition; this need not be large, and conſequently need not take up much room, ſo that it may be eaſily fixed, and taken out to clean at pleaſure; by this means the common dirtineſs of a fixed manger is to be avoided.

Many people are againſt having a rack in their ſtables; they give the horſe his hay ſprinkled upon his litter, and if they think he treads it too much, or too ſoon, they only nail up three or four boards, by way of a trough, to give it to him in. The reaſon of this is, that the continual lifting up of the head to feed out of the rack is an unnatural poſture for a horſe, which was intended to take his food up from the ground, and makes him, as they expreſs it, withycragged. In the way of ſprinkling the hay on the litter, or laying it in a trough even with the ground, he not only takes it up as if from the earth in a natural way, but can eat as he lies, which is a kind of indulgence, that a horſe takes great pleaſure in.

It is proper, however, in moſt caſes, to have ſome ſort of rack, or other contrivance, for the purpoſe of containing the hay, or other ſort of fodder which the horſe may want, and from which he might eat it with eaſe and convenience to himſelf. The beſt and moſt economical kinds are probably thoſe which are placed in an upright manner in receſſes in the walls, or in the corners and angles of the ſtalls.

When there is ſtable-room enough, partitions are to be made for ſeveral horſes to ſtand in; theſe ſhould always allow room enough for the horſes to turn about, and lie down conveniently in, and they ſhould be boarded up ſo high toward the head, that the horſes placed in ſeparate ſtalls may not be able to ſmell at one another, nor moleſt each other any way. One of theſe ſtalls ought to be covered in, and made convenient for the groom to lie in, in caſe of a great match, or the ſickneſs of a valuable horſe. Behind the horſes there ſhould be a row of pegs to hang up ſaddles, bridles, and other neceſſary utenſils; and ſome ſhelves for the hanging up bruſhes, &c. and the ſtanding of pots of ointment and other preparations.

The ſtables of the nobility are often incommoded by bins for oats placed in them, which take up a great deal of room with very little advantage. Dr. Plott has given us, in his Hiſtory of Oxfordſhire, a very convenient method, uſed by a gentleman of that county, to prevent this. It is done by making a conveniency to let the oats down from above, out of a veſſel like the hopper of a mill, whence they fall into a ſquare pipe of about four inches in diameter, let into the wall, which comes down into a cupboard alſo let into the wall, but with its mouth ſo near the bottom, that there ſhall never be more than about a gallon in the cupboard at a time; which being taken out, and given to the horſes, another gallon immediately ſucceeds it from above, without any trouble to the groom or any body elſe. By this means there is not an inch of room loſt in the lower part of the ſtable where the horſes ſtand: and there is this great conveniency beſide, that the oats are always kept ſweet by it, for every gallon that is taken away puts the whole quantity above in motion, by the running down of the gallon that ſupplies its place, and no muſtineſs ever comes where there is this continual airing and motion. There may eaſily be contrived two of theſe, the one for the oats, the other for ſplit-beans; and both of theſe may be let into the range of preſſes, the oats and beans being ſeparated above by partitions. The other requiſites for a ſtable are, a dung-yard, a pump, and a conduit; and if ſome pond or running river be near, it is much the better.

But with regard to farm-ſtables, it is not, however, neceſſary to attend ſo much to elegance in their conſtruction as in the above caſes; it is ſufficient to have them neat, handy, and convenient. And in order to this, they ſhould be ſituated ſo as to be contiguous to the other offices, with which they may have the greateſt connection or relation.

It has been obſerved by Mr. Beatſon, in the firſt volume of Communications to the Board of Agriculture, that in the contriving and fitting up of the racks and mangers in theſe buildings, great attention ſhould be had to economy and the convenience of labour. The moſt common and uſual method of making them, ſo as to extend quite acroſs the upper end of the ſtall, is a bad and expenſive practice, and which has much inconvenience in the foddering of the horſes; as, in order to ſave trouble, ſervants are very apt to ſtuff the racks full of hay, however large they may be, from which many bad conſequences ariſe, and much hay is loſt or deſtroyed by being pulled down and mixed with the litter, or trodden under the feet of the animals. Beſides, various bad effects reſult from the practice of ſuffering horſes to be continually ſtuffing themſelves with hay, as is well known to thoſe who are accuſtomed to the proper management of ſuch animals; as under their directions they are never permitted to have much hay in their racks at a time. Another diſadvantage alſo attends this mode of fitting up ſtalls, eſpecially for farm-horſes, as it ought to be the object to preſerve every thing; the hay-ſeeds are totally loſt, which, if good, and carefully ſecured, might be of great utility and value. And by the practice of placing the racks with ſo much inclination outwards, the ſeeds are alſo very apt to fall into the horſe's ears and eyes, which often cauſe diſagreeable effects. For theſe reaſons, it is ſuppoſed that racks ſhould have a perpendicular direction, not having a ſpace of more than fourteen or ſixteen inches from the wall; the bottom being ſparred, in order to let the ſeeds fall down through below, whence they may be removed by a ſort of ſliding ſhutter. Theſe advantages may alſo be neatly and conveniently obtained by leaving niches in the walls for the racks, on which plan the ſpars will be equal with the inſides of the walls. Where the niches and racks are made in the middle of the ſtalls, two feet, or two feet and a half wide, will in moſt caſes be ſufficient; they ſhould, however, be carried down low enough to admit of a ſmall box or drawer being placed under them, for the reception of the hay-ſeeds. Racks of this ſort may likewiſe be placed in the corners of the ſtalls, and be made in ſuch a way, as that one niche may ſerve two ſtalls. And they may be placed in the angles of the ſtalls without having any niche, and may be made of a ſemicircular form. But in whatever way they are formed, there ſhould conſtantly be a diviſion betwixt them, which is probably beſt made of deal. Where the racks are put in the corners of the ſtalls, it may, perhaps, be more advantageous to have them ſtraight than circular; but in whichever way they are formed, the farmer ſhould always have a hatch fixed for each ſtall, as by that means a great deal of time may be ſaved in feeding his horſes.

If the above methods be adopted, it muſt be unneceſſary to make a manger of the ſame width with the ſtall; as a box or drawer, ſixteen or eighteen inches long, and twelve or fourteen inches wide, will anſwer every intention perfectly well. But it ſhould be ſo contrived that it may be readily taken out and cleaned whenever it is fouled, or becomes furred with dirt. With the fixed mangers this can never be done.

Beſides this, there is another method of making ſtalls, which, as being cheaper and more economical, deſerves to be regarded by the farmer: on this plan the ſtable has neither racks nor mangers; the head of the ſtall is boarded about three feet from the ground, having a ſpace of about two feet from the wall, in which the hay is to be depoſited, the horſe pulling his hay from below, inſtead of drawing it from above; which is not only more natural, but prevents the waſte of hay, much of which drops down and is loſt when the horſe eats from a rack. But even in this conſtruction, it will be neceſſary to have the bottom ſparred within eight or ten inches of the ground, and a box, hopper, or hay-manger and drawer, ſo contrived as to receive the ſeeds of the hay: where there are double ſtalls, the boxes may be divided in the middle. Single ſtalls, where they can be conveniently made, ſhould, however, always be preferred, as being much more ſafe and convenient in different points of view, both for the horſes and perſons employed about them.

Further, it is likewiſe conceived, that the paving of ſtables is a matter of great importance, though it has been hitherto but little attended to: whether the ſtall ſhould have a ſlight declivity, or be perfectly level, has not, perhaps, yet been ſo fully determined as it ought. It would appear, however, to be more natural and eaſy for theſe animals to ſtand and reſt themſelves on a level ſurface, than on one that is ſloping, as it is evident that the tendons or ſinews of the paſtern joints muſt be kept more upon the ſtretch in the latter than in the former caſe. The main difficulty in regard to a level ſtall has been the conveying away of the moiſture; but this may be well effected by paving the ſtall perfectly level, and only leaving a ſmall drain in the middle, extending within two or three feet of the upper end of the ſtall; but which ſhould not be more than ſeven or eight inches wide at top, forming an angle at the bottom. The depth at the end neareſt the head of the ſtall need not be more than three or four inches deep, having as much ſlope as can be conveniently given it backwards, in order that it may carry the moiſture off quickly to the main drain, into which all the ſtall-drains ſhould have a fall, and the moiſture be diſcharged. And the ſmall ſtall-drains muſt alſo be covered with a piece of good ſtrong oak-plank, in which a great number of holes are bored, and which muſt be ſo faſtened, as to admit of its being readily raiſed up and let down; as by this means the drains may be waſhed, and kept clean and ſweet, as often as they are found to be furred up and obſtructed. And beſides theſe, main drains muſt be made at the end of the ſtalls, or in ſome other convenient ſituation, for carrying off the moiſture into the general receptacle. Where they are placed at the bottoms of the ſtalls, they ſhould not be cloſer to the ſtalls than two feet, in order that the ſtale of mares may get readily into them, which would not be the caſe if they were nearer, unleſs the pavement behind the ſtalls was made to decline a little towards them. Theſe main drains need not be more than ſeven or eight inches wide at the top, but they ſhould be covered with plank, in which holes are perforated for conveying away the moiſture and wetneſs. But with the view of ſaving the expence of making main drains within the ſtable, a ſhallow open drain may be made in the common way, with which the ſtall-drains may communicate by means of very ſmall grates at the ends. And it ſhould be obſerved, that the pavements or floors of the ſtalls ſhould have a very ſlight declination from their ſides towards the drains, to prevent moiſture ſtanding on them; an inch, or an inch and a half in the whole, will, however, be quite ſufficient for theſs purpoſes.

It may be noticed, in regard to the ſizes of ſtalls, that they differ much according to circumſtances; but four feet and a half in width are the leaſt they ſhould ever be made, and five feet are much better. The diviſions between them ſhould be high, ſo that ſtrange horſes may not ſee each other. But where ſtallions are kept, or young horſes required to be left looſe in a ſtall, they ſhould be ſo incloſed as to be incapable of doing miſchief. And for theſe purpoſes, one or more ſtalls may be ſparred to the top, or doors provided, which may be hung to the back poſts of the ſtable. Where this laſt method is followed, the ſtalls ſerve extremely well for keeping different mares and their foals ſeparate from others, as well as many other uſeful purpoſes in the buſineſs of horſe-management with the farmer.

But the writer of the Eaſt Lothian Agricultural Survey has remarked, that ſometimes ſtalls are made double; and as farm-horſes generally work in pairs, each pair that work together have one of theſe double ſtalls; for horſes are ſocial animals, and it is ſaid they feed better, and are more cheerful, when they live in ſociety. But even in this caſe it is proper they ſhould be faſtened to the oppoſite ſides of the ſtall, and that each horſe ſhould have his own rack and his own manger; for although they may ſeem to have a very great attachment to each other, yet if the dividing of their food is left to themſelves, it is more than probable they will quarrel about it, and that the ſtrongeſt horſe will have the beſt ſhare. But ſuch farm-ſtables as contain only one row of ſtalls, with one horſe in each ſtall, are, on the whole, the moſt uſeful and convenient; and if the ſtalls are ſufficiently large, and the diviſions between them raiſed ſufficiently high, not with ſpars, as often is the caſe, but with boards cloſely joined, each horſe will be allowed to eat his proportion of corn and hay equally, and allowed to take the neceſſary reſt, without danger of being diſturbed by a troubleſome neighbour. The ſtable ought to be well paved, and of a ſufficient breadth, to leave a ſpace of at leaſt ſix or ſeven feet behind each horſe, for a ſafe paſſage to the ſervants in hanging the harneſs upon the wall, &c. The pavement ſhould decline very gradually from the horſe's head backwards, towards the channel at his heels, which ſhould alſo decline, in the ſame gradual manner, towards one end of the ſtable, where the urine may be received into a reſervoir. Proper openings ſhould alſo be left in the walls, for the purpoſe of ventilation; theſe ſhould be fitted with ſliding or flap-boards, opened in the morning, when the horſes go out to work, and ſhut in the evening: in this way the ſtables will be properly ventilated; and every riſk of cold, from having theſe openings uncovered during the night, be avoided.

The ſmell of a ſtable, where the dung has been allowed to remain for a week or ten days, is intolerable; and the volatile alkali generated is ſo ſtrong as to penetrate and affect both the eyes and noſes of perſons entering into it, in a very diſagreeable manner. The conſequence is, the horſes are ſickened and enervated by the heat and offenſive ſmell during the night; a part of their food, being impregnated with the effluvia, is loathed and rejected; and, in the morning, when they are taken out to work, inſtead of the ſprightly appearance exhibited by animals that have been well fed and had a comfortable bed, their hanging ears and heavy ſluggiſh appearance diſtinctly mark the ſtate of the ſtables they have quitted.

However, in order to render the forming and conſtructing of the different internal parts of ſtables more clear and eaſy, it may be neceſſary to have recourſe to ſome account and explanation of them. In the old common and uſual modes of placing the racks and mangers in ſtables, as in ſome meaſure ſuggeſted above, the former are moſtly put in a ſlanting outward upward direction, ſo as that the top parts of them may have a projection or ſpace of two feet or more from the walls, while the lower parts reſt againſt them. The latter are conſtantly placed a little below and underneath them, moſtly extending quite acroſs the ſtalls. In theſe modes of fixing theſe internal parts of ſtables, there is ſeldom or ever any ſort of contrivances for either preſerving the ſeeds, or preventing their falling upon the heads of the horſes, while they are eating. Nor is the hay, or other fodder, guarded againſt being pulled out, trodden under foot, and waſted by the animals. They are conſequently very uneconomical in their nature and conſequences.

But in the improved methods of placing theſe internal parts, the poſitions of the racks, as well as the nature, dimenſions, and other circumſtances of the mangers, are quite different. In ſome caſes, the racks are fixed about fourteen inches from the walls, with but very little, if any, ſlant; having their bottom parts laid with ſmall ſpars, or thin narrow pieces of wood, in an open manner, ſo that the hay-ſeeds can fall down through between them, and be received in a drawer, or box, made for the purpoſe below, where they are capable of being drawn or taken out at pleaſure. A ſmall box, or trough, is placed in ſome convenient part, anſwering the purpoſe of a manger, and which is ſometimes made as a drawer, to put in and draw out as there may be occaſion. The diviſions of the ſtalls ſometimes riſe pretty high at the head parts, in the ordinary way; and, at other times, in a curving manner at the upper ends, from the tail-poſts to nearly the ceilings of the ſtables; and flap-doors, the height of the lower parts of the diviſions, are ſometimes faſtened with hinges to poſts, or the walls behind the horſes.

In other inſtances, the racks are placed in half-circular niches or receſſes in the walls of the ſtables, oppoſite the diviſions of the ſtalls; each niche being made to ſerve two ſtalls, by having a diviſion in the middle betwixt them; and the racks themſelves are ſometimes made in half-circular forms. The ſame kind of half-circular racks are occaſionally alſo put in the angles or corners of the ſtalls, without any niches; there being diviſions between them, ſo as that they may ſerve two ſtalls: but the racks, in theſe caſes, have not always the half-circular form, but are made and fixed up in a ſtraight manner.

In all theſe caſes, ſmall drawers or boxes ſerve as mangers, for the horſes to eat their provender out of, as may be neceſſary. There are ſome few other modes of fixing up racks and mangers in ſtables, as will be ſeen below; but theſe are probably the moſt eligible and convenient, as well as the moſt economical and leaſt expenſive in their nature and means of putting up.

The manner of fixing the window and the ſhutters in the windows of ſtables is important in ſeveral reſpects, as they contribute much to the proper regulation of the atmoſphere and ſtate of heat in them, as well as to other matters. They are both probably the beſt and moſt convenient, when ſuſpended and balanced upon two iron pins, fixed in the middle parts of them, ſo as to render them capable of turning and ſtanding in either or any direction, and to be readily wholly removed, in caſe of neceſſity. When the windows are made to ſlide up and down, the ſhutters may alſo be fixed in this way with advantage and good effect. By theſe means the air may be eaſily let out or in, and be regulated in an exact manner, which will be of much advantage in different caſes and circumſtances of ſtable management. There is ſometimes a hopper ſort of contrivance in ſtables, where neither racks nor mangers are employed, which is broad at the top, and has about fourteen inches width in the bottom part; being ſparred, in order that the ſeeds may drop through into a drawer made for the purpoſe below. In each corner there is a ſmall box for corn, which ſerves as a manger; the hopper part being divided in the middle, ſo as to ſerve two ſtalls as hay-mangers. This is a neat and convenient mode in ſome caſes, though rather expenſive in making and putting up.

There are ſtill other contrivances in fitting up racks and ſtalls for preventing the unneceſſary waſte of labour and food, as well as to guard againſt the inconveniencies of hay-ſeeds falling into the eyes and ears of horſes, which have been ſuggeſted by experienced farmers in other countries. In one ſet of contrivances in this intention, the racks are placed in an upright manner, and the perpendiculars of them are made to fall on the inner edges of the troughs below, which have ſhelving leaves. In theſe caſes, when the animals pull out the hay from the racks, the waſte parts fall on the leaves, and thus ſlide down into the troughs, where they are ſecured from being ſpoiled by the breath of the horſes; while the diſtance between the bottoms of the racks and the troughs is quite ſufficient for the admiſſion of the heads of the horſes, ſo as that they may get at the hay which is dropped. The racks, in theſe caſes, are two feet four inches in depth, and two feet at top from the edge parts of them; being planed within, in order that the hay may fall to the bottoms of the racks gradually, in proportion as it diminiſhes in quantity, and the animals be ſaved the trouble of a long reach, which they are often obliged to make in the ſtables which are fitted up in the old uſual manner. The animals are fed and ſupplied with the fodder from the entry, which is ſix feet in width; the hay being dropped through a trap-door from the ſtore-room above the ſtable. This plan is the ſuggeſtion of Mr. Weſt, an intelligent North American farmer. Another plan in the ſame intention has been propoſed by Mr. Cooper, of another part of the ſame country, in which the racks of the ſtalls of the ſtables have a ſomewhat different conſtruction and poſition, being formed with what are called *ſlats*, or thin ſtrips or pieces of wood. In theſe the advantages are ſuppoſed to be very great, as the upright ſlats prevent the horſes from waſting the hay, as well as from blowing upon it: and beſides, the animals are prevented from looking round, a habit to which horſes are much accuſtomed when any perſon enters the ſtable; neither can they thruſt their heads over the troughs, as the ſlats compel them to feed directly over them, without turning to either ſide. This mode of fitting up the ſtalls of ſtables may be found of much utility, in different ſituations and circumſtances, in the management of both ſaddle, farm, and team-horſes.

Very great utility and ſaving in point of duration may not unfrequently be produced, by having the internal and ſome other parts of the mangers and boxes, or other contrivances from which the horſes eat their feeds of corn and other provender, lined and plated, or caſed with different metallic ſubſtances. At Holkham-Hall, in the county of Norfolk, Mr. Coke has his mangers themſelves, it is ſaid by the writer of the corrected agricultural account of that diſtrict, plated with ſheet-iron; and the front edges, which are rollers, covered with tin-plates. The bottoms of the ſtall diviſions are likewiſe made of ſlate. It has alſo been found that for ſtables, as well as all other offices, thoſe locks which have copper wards are the beſt, as being much more durable than any other kinds.

Stables, or the lofts over them, for ſaddle as well as for farm, team, and carriage-horſes, are alſo not unfrequently fitted up and provided with different ſorts of machinery and contrivances for preparing and reducing the different articles of food, which ſuch horſes are to have, into the moſt proper, convenient, and economical forms, for their being given to and conſumed by them. Theſe are, for the moſt part, ſtraw or chaff-cutters, bean, barley, or malt-crackers, and oat-cruſhing and bruiſing machines. Such contrivances are often of very great utility and convenience, when properly managed, and put up in ſuch ſtable buildings, or the rooms connected with them; and particularly where other more valuable uſes are to be made of ſtraw, pea and bean-haulm, and other ſimilar materials, than that of merely littering animals. They are likewiſe uſeful in ſaving much labour, by their being always ready and at hand for performing theſe different neceſſary operations, as well as in ſeveral other ways.

This ſort of machinery is arranged and placed in a variety of different ways, according to the circumſtances of the different caſes. In a two-ſtalled ſtable, paved in the manner which is directed above, or in that which has been recommended by a writer in the firſt volume of Communications to the Board of Agriculture, a very ſimple and convenient apparatus has been contrived for working a chaff-cutter and a bean and barley-cracker, ſituated in the upper part of it, by the Rev. Mr. Froud, of Dartington Parſonage, in the county of Devon, merely by the power of one horſe. It conſiſts, according to the writer of the corrected agricultural account of the huſbandry of the above diſtrict, of a block of oak ſunk in the ground below the ſtable, with a perpendicular ſhaft or ſtem paſſing through the hay-loft floor, upon the top of which is fixed a crown-wheel of two-inch elm-plank, with ſix caſt-iron ſegments, ſo as to compoſe a wheel of this ſort of one hundred and eight cogs. There is alſo a pinion-wheel with fourteen cogs, the ſhaft of which paſſes through a drum, which is eighteen inches in diameter. From this drum the motion is communicated by a belt to the barley-cracker, and by the ſame belt to the chaff-cutter, where it is drawn tight over a ſheave of eighteen inches in diameter. The barley-cracker has likewiſe a fly-wheel, and a wooden hopper for receiving the grain. The lever by which this machinery is worked, and which paſſes through a mortiſe made in the lower part of the ſhaft, makes, it is ſaid, the diviſion of the ſtalls of the ſtable, when tied or faſtened to the mangers and other parts.

Stables may, however, be accommodated with theſe ſorts of neceſſary machinery in other ways and manners, perhaps, with equal, if not greater, convenience and benefit than as above; as by having them put up in particular parts of ſuch buildings excluſively appropriated for them, and the materials which they are to work upon; or by placing them in diſtinct ſeparate erections conſtructed purpoſely for them, and ſuch matters in immediate connection with the ſtables. By either of theſe means every poſſible advantage may be gained, without the horſes being ſo much diſturbed as in the preceding method. Beſides, the materials which are to be operated upon may be a great deal more amply provided, and much better ſtored up and ſecured; and there will be far more extent for the fixing up and working of ſuch ſorts of machinery, as well as more room and convenience provided for putting by the different cut and prepared ſubſtances as food for the animals: and above all, a confidential ſervant can have the command and controul of ſuch ſituations, without interfering with the general management of the ſtables in ſuch inſtances, eſpecially where there is a proper corn and provender bin arranged ſomewhat in the manner that is ſuggeſted below; by which method a vaſt waſte and loſs of expenſive food may, in different caſes, be guarded againſt, and the machinery be wrought with a great deal more effect and ſecurity.

Stables for all ſorts of ſaddle-horſes, as well as for thoſe of the light carriage kinds, ſhould conſtantly be raiſed, conſtructed, and fitted up in a neat, warm, and ſometimes, in particular ſituations and circumſtances, in a rather elegant manner; as ſuch ſorts of horſes can never be made to look ſo ſleek and well in their coats as they ought to do, without the ſtables in which they are kept are in ſome degree warm and comfortable. And near the ſeats and reſidences of perſons of diſtinction, handſome ſtables have an ornamental effect, in conjunction with the other ſorts of offices and buildings, which is moſtly deſirable, and which ſhould ſeldom or ever be overlooked or neglected in the plans and diſtributions of the office-buildings, in ſuch caſes. The particular manner in which ſuch ſtables are to be built muſt be left to, and regulated by, the taſtes of the proprietors, and the peculiar nature and circumſtances of the ſituations; but in the external walls, effect ſhould almoſt always be well conſidered and attended to, while the neceſſary warmth and ſecurity are provided in an effectual and proper manner.

In the ſtalls, and the modes of fitting them up in theſe kinds of ſtables, the ſame ſort of neatneſs, elegance, and ornamental effect, ſhould, for the moſt part, be carefully preſerved and kept in view; though, in ſome caſes, this need not be ſo very much regarded. In the former, or ſtalls, there ſhould conſtantly be a ſufficiency of capacity or ſize, as already ſuggeſted, in order that the animals may not be too greatly confined, and that full room may be given for performing the various daily operations that are neceſſary about them. The latter, or the fitting up of the ſtalls, may be variouſly regulated and executed, according to the different methods and rules which have been laid down above, and the particular taſte of the owners; having a conſtant regard to neatneſs, ornament, convenience, and economy, in the diſtribution of the different kinds of food and labour which are neceſſary, and to be performed about them.

In the conſtruction of ſtables for farm and moſt ſorts of heavy team-horſes, a much leſs attention and regard to neatneſs will always be requiſite and proper; and any ſort of elegance or fineneſs in ſuch caſes muſt invariably be uſeleſs, abſurd, and improper. In the building and contriving of theſe ſorts of ſtables, convenience and the health of the animals are the principal circumſtances which deſerve to be materially conſidered and regarded. In the external incloſing materials for ſuch ſtables, any ſort which can afford the neceſſary warmth, ſhelter, and ſecurity, and which are at the ſame time cheap, will be proper for the purpoſe. The ſtables for theſe uſes need ſeldom, if ever, be raiſed to ſuch heights as thoſe for other ſorts of horſes; nor need they always have lofts over them, or, at leaſt, over the whole of them; though ſome extent of loft is moſtly deſirable, and often of conſiderable utility, for containing provender for the horſes in a convenient and readily applicable manner. A ſmall extent or proportion will, however, moſtly anſwer the purpoſe very effectually, when properly arranged and fitted up in ſuch intention; by which a very conſiderable ſaving of expence may not unfrequently be made.

The arrangement of all ſuch ſtables muſt be according to the nature and circumſtances of the farms, and purpoſes for which they are intended. The ſingle range or row mode, which has been already noticed, is very good, in many inſtances; but they may be quite differently arranged, placed, and ſituated, in other caſes, with equal or more advantage; and ſometimes, under particular circumſtances, ſtables with double rows of ſtalls may be found beneficial on farms, and for other uſes. In fitting up the internal parts of ſuch ſtables, the main objects are thoſe of convenience, the ſafety of the animals, the prevention of the waſte of food, and economy in the labour of thoſe who have the providing, preparing, and giving of it, as well as the management of the animals, in ſuch caſes.

Some have adviſed the having ſhort diſtinct ſtalls in ſtables, ſo that each horſe may conſume his feeds in a ſeparate manner, and be harneſſed and prepared for work with more facility and readineſs; and that the partitions, in ſuch caſes, ſhould not be carried quite up to the ceilings of the ſtables, in order that a more free and open circulation of air may be produced and preſerved. Others, again, contend for quite open ſhed-ſtables, where the racks and mangers are fixed low down near the ground; the horſes having ſmall yards for them to go into at pleaſure, furniſhed with pumps and ciſterns, as in theſe. With this ſort of management they are ſuppoſed to do better, even without dreſſing, than in regular ſtables, by the ordinary management which is beſtowed on them by farm-ſervants in ſuch caſes. Theſe ſorts of ſtables are ſaid to have anſwered well in practice, in ſome inſtances. They are found beneficial, when with yards, in the winter feeding of the horſes on dry fodder and carrots, or other ſimilar roots; alſo in ſummer, feeding them with different ſorts of green food and dry meat. It has been ſuggeſted, however, that as ſuch cold ſhed-ſtables ſeldom do well for horſes, thoſe of the regular ſtable kind may be the moſt proper in general, and eſpecially in all the more northern diſtricts of the kingdom; though the open ſhed ſort may ſometimes be uſeful and advantageous in the more ſouthern parts of the country, where the winter ſeaſons are more mild and favourable, as well as more ſhort in their duration. Low ſhed-ſtables, with large ſliding ſhutter openings behind the horſes, may often be cheap, proper, convenient, and uſeful, where ſoiling farm and team-horſes, during the ſummer ſeaſon, is practiſed to any great extent; as the animals, it is ſaid, not only do better in them, but are much more eaſily managed in ſupplying them with the different ſorts of green fodder in the moſt ſuitable and proper manner; and, at the ſame time, there are advantages produced in the way of raiſing manure. Theſe ſtables ſhould always be provided with ſuitable racks for the purpoſe; and there ſhould be proper drains for conveying away all the liquid matters that may be produced, in ſuch modes of feeding, into the littered yards, or other places deſtined for forming and containing the manure. They ſhould likewiſe have proper places provided in or near them, for the reception of the new-cut green food, from which it can be readily and with facility diſtributed to the different animals in ſmall ſuitable proportions, as it is wanted; there being large ſuitable openings into them, left for the purpoſe of receiving the carts, or other conveyances by which it may be brought to the ſtables. The horſes are probably the beſt and moſt advantageouſly managed, in all ſuch caſes, when kept conſtantly tied up in the ſtalls.

In all ſorts of ſtables, or very contiguous to them, as has been already ſuggeſted, there ſhould always be proper places provided for the reception and ſecuring of different ſorts of harneſs and other articles and things of that kind in; as well as ſuitable well-ſecured and convenient places for fixing up properly contrived corn-bins in. When theſe ſtables are ſmall, it is in general moſt convenient to have the corn-bins placed and put up in the rooms above them, and ſo contrived and conſtructed, as that the feeds may be regulated and drawn from a ſpout carried down into the ſtable part below, as by ſuch contrivances, much time, labour, trouble, and occaſionally food, may not unfrequently be ſaved, which would otherwiſe have been ſpent in going to the bins, meaſuring the grain or other ſorts of provender from them, and ſecuring them again. By having ſuch ſorts of contrivances duly provided in ſtables, many other ſorts of ſubſtances and materials, as food, can be kept ſafely and ready prepared, beſide thoſe of corn, either in a mixed or ſeparate ſtate, as may be moſt ſuitable and convenient; ſuch, for inſtance, as ſplit-beans, cut-ſtraw, bean and pea-haulm, and a great variety of other ſimilar matters, which are of much conſequence in the feeding and foddering of all ſorts of horſes.

On large farms, and in other ſituations where there is much room and convenience, it is always the beſt way to have ſuch cheſts, bins, or other contrivances, conſtructed and fitted up on the moſt improved principles, as thoſe of the aerated granary or ſome others, which have the means of preſerving the grain or other matters in a perfectly ſweet and ſound ſtate. Where the former of theſe plans is adopted and had recourſe to, the beſt form is probably that of ſomewhat the cubical, the bottom part being made, in ſome degree, in the manner of the common hopper, having the ſlider in the lower part of it ſo fixed and contrived, as that it may ſtand about eighteen or twenty inches from the floor of the place in which the bin or cheſt is put up; as by ſuch means, ſufficient room and convenience will be afforded for receiving and taking out the corn or other provender as it may be wanted. In all theſe kinds of bins or cheſts, the ſpouts for aerating the grain or other matters may with perfect eaſe, facility, and convenience, be formed and fixed from one ſide to the other of them; the external openings or air-holes being conſtantly well ſecured by gratings of iron-wire. In the ſpout parts of theſe bins, which moſtly project conſiderably below them, there are plate-iron ſliders at their bottoms, which are ſecured by a ſmall lock and key, where neceſſary. They have often alſo other ſmall ſliders put juſt above theſe, for the purpoſe of aſcertaining and regulating the feeds of the horſes, by which they can readily and without inconvenience be taken out as wanted for them.

The moſt uſeful and convenient machine for the uſe of ſtables, in cruſhing and bruiſing the grain and other ſubſtances which are neceſſary in them, is probably that conſtructed by Rawntree, as it takes up but little room, while it is very effective in reducing all ſuch materials. It is found to operate well on oats, beans, peas, barley, and other kinds of grain employed as horſe-food; and at the ſame time is capable of bruiſing malt for brewing.

Machines of the mill-kind are likewiſe ſometimes beneficial in ſtables for the purpoſe of preparing particular ſorts of horſe-food. The turning horizontal hand-mill, invented by Mr. Wright, may probably be found a good and uſeful contrivance for performing the neceſſary buſineſs in theſe ſituations, as it occupies but a very ſmall ſpace, is readily managed, and ſufficiently effective for the purpoſe.

It may alſo be of importance, that ſtables ſhould be better lighted than what is commonly the caſe, as the blindneſs which is ſo frequently met with among horſes, has lately been attributed, and not without conſiderable probability, to an exceſs of the ſtimulus of light on their coming out of dark or duſky ſtables, where the irritability of the organs of ſight has been for ſome length of time accumulating, into the full and broad glare of day-light.

As farm-ſtables are moſtly, during the ſummer months, very generally much expoſed to the full open air, the doors, wickets, or windows of them being very ſeldom ſhut, except at night, and then but very rarely; the conſequence of ſuch full expoſure is, that flies, which are attracted by the horſe-dung and other ſimilar matters, have very free acceſs into them; but as it may commonly be obſerved, that in ſuch expoſed ſtables, too, the ſpider is very prevalent, as is ſeen by the number of cobwebs which are preſent; it may, of courſe, be unwiſe and improper to diſturb or deſtroy them, as the inſect ſhould probably be cheriſhed in ſuch ſtables, as it may ſave the horſe from the irritation of a variety of little troubleſome enemies and diſturbers. The proviſion of ſuch an inſect is natural, and the uſeful conſequences of it ſhould not be diſregarded by the farmer in ſuch ſtables.

In concluding the account of ſtables, it may be juſt noticed, that the manner of treating and managing ſaddle and light carriage-horſes in them is often very negligent, uneconomical, and improper, as the different kinds of food which are made uſe of are not unfrequently given to them in very ineligible ſtates and modes, equally as to time, manner, preparation, and quantity; the natural habits or methods of feeding in the animals being ſcarcely at any time, or in any caſes or circumſtances, if they be ever at all attended to or regarded, ſo as to lead to better practices. The ſtuffing the racks of horſes in ſtables at all times and ſeaſons with large quantities of hay and other ſimilar ſorts of fodder, as is too commonly the caſe, is, in all circumſtances and caſes, a waſteful and highly improper manner of proceeding in ſtable-foddering. And the letting them have their feeds of corn or other ſorts of provender in irregular manners and quantities, is not leſs detrimental and inconvenient to the animals, than ſtuffing them ſo much with hay. They never ſucceed well when there is much irregularity in the practices of feeding them. All the other operations about them ſhould alſo be performed, as much as poſſible, in exact manners, and at proper periods.

But with the farm and heavy team-horſes, both in the ſtables and on the roads, as well as in other places, the manner of treatment is ſtill more exceptionable and improper in a variety of different diſtricts and ſituations of this country. It has been obſerved by Mr. Vancouver, that, except in Ireland, where the method of treating farm-horſes is extremely bad indeed, thoſe in the county of Devon have perhaps as hard a meaſure of neglect and ill-uſage dealt out to them, as is any where to be met with in the whole united kingdom. From the injudicious manner in which they receive the corn that is occaſionally given them, it is ſuppoſed, in ſome meaſure, a queſtionable point, whether it affords them a benefit, or, by diverting their appetites from the hay, pea-haulm, or other ſorts of ſtraw, abſolutely produces an injury and diſadvantage, in conſequence of the avidity with which they ſwallow the corn in an unmaſticated or unchewed ſtate. In order to rectify and remedy ſuch improper modes of management in the ſtable and other treatment of farm and heavy team-horſes, a better and more deſirable example, it is thought, can no where be found, than that which may be drawn from the management of farm and waggon-horſes in Pennſylvania and Maryland, in North America. Theſe horſes, it is ſaid, perform journies of two and three hundred miles over the ſtupendous mountains of that country, with prodigious loads of wheat and flour from the interior, and wet and dry goods from the ſea-ports to the different points of embarkation, at Fort Pitt, Red-ſtone, Charleſtown, Wheeling, and other places on the Ohio river. Notwithſtanding which, theſe waggon-horſes, through the whole extent of that country, are, it is aſſerted, ſeldom ſeen in a leſs high condition than the brewers' and other large cart-horſes in the metropolis of this country. The manner in which theſe American horſes are ſuſtained and ſupported, ſo as to perform theſe labours, is, it is ſaid, generally by feeding them, in the ſtables and on the roads, with hay and ſtraw chopped in ſhort pieces about half an inch in length, with which is mixed about half a peck of rye, oat, and Indian corn-meal, to about two and a half or three pecks of hay chopped in the ſame manner. A feeding-trough, ſufficiently large for four or five horſes to eat out of at the ſame time, is attached to each waggon, it is ſaid, while on the road. The chaff is put into this trough, and after being well mixed with the given quantity of meal, is moiſtened, and again well ſtirred together, until every ſhred or part of the hay or chopped ſtraw is found to be covered, or, as it were, froſted over by the meal. The avidity with which the horſes eat their meat or provender, when thus prepared, may, it is ſuppoſed, be readily conceived. Their feed or meal being finiſhed, they either purſue their journey or lie down to reſt; but in either caſe, it is obſerved, not without being well dreſſed, and perfectly freed and cleanſed from the muddy and other effects of their laſt labour. It is the pride and pleaſure, it is ſaid, of the carters, as well as of the waggon maſters in that country, to ſee their horſes in a condition rather above than under the labour which they have to perform; and in a hundred miles travelling, from Baltimore to Philadelphia, it is confidently aſſerted, that as many prime waggon-horſes, and in as high condition, may be ſeen, as is the caſe in any direction for the ſame diſtance from the chief city of this country. The adoption of a ſimilar manner of treatment in the management of farm and waggon-horſes in the ſtables and on the roads in this country, needs, it is thought, no further recommendation than the certainty of theſe facts and ſtatements, which are unqueſtionable.

The practice of baiting poſt, ſtage, and travelling horſes with rye, oat, or bean-bread, in the manner performed on the continent, is likewiſe, it is ſuppoſed, an infinitely more economical and facile mode of adminiſtering refreſhment to jaded, exhauſted, and labour worn-out animals, than that of giving them the crude corn in its unbroken ſtate, which is ſo commonly and indeed almoſt univerſally practiſed in this country.

That there are great waſte, want of economy, and loſs of nouriſhment, in the too general practice of giving unbroken corn to animals, eſpecially horſes, is extremely evident, from the ſtate it is in after it has paſſed through their bodies, as it is found, in many caſes of horſes thus fed, to have loſt but a little of its nutrient property, being ſtill capable of ſupporting other ſorts of animals, particularly thoſe of the granivorous kinds, in a perfect manner. In its unbroken condition, when not completely maſticated or broken by the teeth of the animals, as is frequently the caſe, the digeſtive proceſs of the ſtomach would ſeem to have but little effect upon it, as it paſſes in nearly its natural ſtate, while, when broken or cruſhed by art, it readily acts upon it, and the whole of its nouriſhing property is taken up there, and in its long courſe through the bowels, in conſequence of its being ſo much more fully and extenſively applied to their ſurfaces. All horſes are, therefore, far better fed and ſupported, where the grain is reduced in its preparation before it is given, than in the common uſual modes of giving it whole. The ſuppoſed defect from want of chewing and mixing the ſaliva of the mouth with it, where broken grain is given as the feeds of the animals, is probably complete ſuppoſition, being founded on an imperfect conſideration of the matter, and not upon the reſult of actual trials, as it has been a great deal talked about without any ſort of proof, which can be depended on, being given in its ſupport.

Stable *Bin* or *Hopper*, that ſort of box, or contrivance of that kind, which is fixed up in ſtables for the purpoſe and convenience of containing the corn or other ſort of provender, which is to be given to horſes in ſuch places.

Stable *Logger*, *Lumper*, or *Ball*, the oval, oblong, or round piece of ſolid wood, which has a hole through its middle, for the purpoſe of receiving and paſſing the rein of the horſe's head-ſtall or halter through, and faſtening it by a knot or otherwiſe, after it has been put through a ring fixed to the manger or other part of the ſtall, in order to poiſe and keep it tight, but not to be ſo heavy as to inconvenience the horſe in feeding or otherwiſe. There are often in good ſtables, two reins to each head-ſtall balanced in this manner. The forms and weights of theſe pieces of wood ſhould always be well ſuited and proportioned to the nature and powers of the horſes.

STABLE *Rings for Stalls*, the ſtrong iron rings which are fixed to the mangers or ſides of the ſtalls of ſtables for the purpoſe of the halter or head-ſtall reins of the horſes running in. There are not unfrequently two to each ſtall in well fitted up ſtables, but common ſtables have ſeldom more than one. Theſe rings are moſtly of the common kind, made ſo as to work in a ſhank, which ſcrews into the part of the ſtall to which the rings are to be fixed; but a great improvement has lately been made in them, by having them formed in ſomewhat the manner of and as a ſtrong ſpring, by which, in caſe of the horſe becoming entangled in the reins, accidents may be prevented by their giving way. At all other times they are as perfectly ſafe as the common ring. In theſe caſes, they have alſo a ſcrew-ſhank, in order to be fixed in their proper places, but are not moveable in it, as in the common ring.

STABLES's STRAIT, in *Geography*, a channel between Sugar-loaf iſland and Banker's iſland, in the Mergui Archipelago.

STABLESTAND, in the *Foreſt-law*, is when a perſon is found at his ſtand in the foreſt, with a croſs-bow or long-bow, ready to ſhoot at a deer, or elſe ſtanding cloſe by a tree with greyhounds ready to ſlip.

This is one of the four evidences, or preſumptions, by which a man is convicted of intending to ſteal the king's deer; the other three being back-berond, bloody-hand, and dog-draw. See FOREST.

STABLO, or STAVELO, in *Geography*, a town of France, in the department of the Ourte, and chief place of a canton, in the diſtrict of Malmedy, ſituated on the river Rechte, and deriving its name from that of an ancient abbey, founded in the year 657 by Sigebert, king of Auſtraſia, for the accommodation of St. Remacle, biſhop of Maeſtricht, who preferring ſolitude to the epiſcopal dignity, retired hither, and became the firſt abbot. The place contains 2604, and the canton 7903 inhabitants, on a territory of 292½ kiliometres, in 10 communes. The manufacture and trade, which are conſiderable, conſiſt of cloth and ſtuffs, and the tanning of leather; 20 miles S. of Aix-la-Chapelle.

STACCATO, Ital. is a term in *Muſic*, which implies a diſtinct ſeparation of one note from another, in a plain and articulate manner. The term is confined to inſtrumental muſic, and chiefly to that of the violin kind, where the ſtroke of the bow is to be given to every note, and none of the paſſages are to be ſlurred; that is, no two or more notes are to be played with the ſame bow.

STACHYS, in *Botany*, from ϛαχυς, *a ſpike*, becauſe the flowers, though whorled, are more crowded into a ſpiked form than moſt others of the ſame natural order; which may, in ſome meaſure, anſwer Ray's objection to this ancient name, as not peculiarly appoſite.—Linn. Gen. 293. Schreb. 390. Willd. Sp. Pl. v. 3. 97. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 632. Prodr. Fl. Græc. Sibth. v. 1. 407. Ait. Hort. Kew. v. 3. 397. Purſh v. 2. 407. Juſſ. 114. Tourn. t. 86. Lamarck Dict. v. 7. 364. Illuſtr. t. 509.—Claſs and order, *Didynamia Gymnoſpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, angular, permanent, cut about half way down into five awl-ſhaped, pointed, awned, rather unequal, teeth. *Cor.* of one petal, ringent; tube very ſhort; throat oblong, gibbous downwards at the baſe: upper lip erect, nearly ovate, vaulted, often emarginate: lower larger, reflexed at the ſides, three-cleft; its middle ſegment very large, emarginate, folded backward. *Stam.* Filaments four, two of them ſhorter than the reſt, all awl-ſhaped, curved towards each margin of the throat after flowering; anthers ſimple. *Piſt.* Germen ſuperior, four-lobed; ſtyle thread-ſhaped parallel to the ſtamens, and as long; ſtigma in two acute diviſions. *Peric.* none, except the ſcarcely altered calyx. *Seeds* four, ovate, angular.

Eſſ. Ch. Calyx five-cleft, awned. Upper lip of the corolla vaulted: lower reflexed at the ſides; its middle ſegment largeſt, emarginate. Fading ſtamens reflexed towards the ſides.

Stachys is chiefly an European genus, of herbaceous, or ſomewhat ſhrubby, moſtly perennial, plants. Loureiro indeed has a *S. Artemiſia*, found in China and Cochinchina; but we cannot, from his account, be certain as to its genus. Mr. Purſh enumerates four American ſpecies, three of which are new. The fourteenth edition of Linn. Syſt. Veg. contains ſeventeen, Willdenow has twenty-ſix. We ſhall particularize ſome of the moſt remarkable, eſpecially the five Britiſh ſpecies, and a new one from Crete.

S. *ſylvatica*. Hedge Woundwort. Linn. Sp. Pl. 811. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 416. Curt. Lond. faſc. 3. Riv. Monop. Irr. t. 26. f. 2. t. 34. (Galeopſis vera; Ger. Em. 704.)—Whorls of ſix flowers. Stem ſolid. Leaves heart-ſhaped, ſtalked.—Native of hedges and ſhady ſituations, throughout Europe, frequent with us, flowering in July and Auguſt. The *root* is ſomewhat creeping, perennial, not annual. *Herb* erect, two or three feet high, of a dark green, covered with fine, rather gliſtening hairs, and exhaling a pungent, diſagreeable, very peculiar ſcent. *Stem* ſolid. *Leaves* broad. *Spike* interrupted, leafy at the bottom, bracteated above. *Calyx* hiſpid. *Corolla* of a deep dull blood-red, elegantly variegated in front with purple and white.

S. *ambigua*. Ambiguous Woundwort. Engl. Bot. t. 2089. Ait. n. 5.—Whorls of ſix flowers. Stem hollow. Leaves oblong, heart-ſhaped at the baſe, ſtalked.—Found in the Orkneys, very abundantly, in potatoe-fields and other cultivated ground, as well as in the north of Scotland, and near the Pentland hills, flowering in Auguſt and September. It ſeems intermediate between *S. ſylvatica* and *paluſtris*, ſome ſpecimens more reſembling the former, others the latter. The *root* is white and creeping. *Stem* hollow, its hairs more or leſs deflexed. Lip of the *corolla* leſs ſtrikingly variegated. The ſtalked *leaves* diſtinguiſh this ſpecies from *S. paluſtris*; while their narrower oblong form, more ſilky ſurface, and the want of any very ſtrong fetor, render it unlike the *ſylvatica*.

S. *paluſtris*. Marſh Woundwort. Linn. Sp. Pl. 811. Willd. n. 4. Fl. Brit. n. 2. Engl. Bot. t. 1675. Curt. Lond. faſc. 3. t. 35. Riv. Monop. Irr. t. 26. f. 1. (Panax Coloni; Ger. Em. 1005.)—Whorls of ſix flowers. Leaves linear-lanceolate, half embracing the ſtem.—Found in marſhy watery places, about the banks of rivers, throughout Europe; common in England, flowering in Auguſt, and very troubleſome in low, wet cultivated fields. The *root* is fleſhy and tuberous, creeping extenſively, and very difficult of extirpation. *Stems* erect, two or three feet high, ſtrongly quadrangular, rough, with deflexed briſtles. *Leaves* ſeſſile, ſerrated; ſilky above; rather woolly beneath. *Spike* of many leafy whorls. *Corolla* light purple; its lower lip ſtreaked with white and violet. The herb is fetid. Gerarde calls it Clown's Woundwort, becauſe he was inſtructed by a clown to uſe it as a vulnerary, with ſo much ſucceſs, that, according to his account, it might ſuperſede all other ſurgical applications!

S. *germanica*. Downy Woundwort. Linn. Sp. Pl. 812. Willd. n. 6. Fl. Brit. n. 3. Engl. Bot. t. 829. Fl. Dan. t. 684. Jacq. Auſtr. t. 319. (S. Fuchſii; Ger. Em. 695.

S. montana; Riv. Monop. Irr. t. 27. f. 1.)—Whorls of many flowers. Leaves crenate. Stem woolly, erect.—Native of Germany, Siberia, France, England, and Greece. With us it is rare, occurring only on ſome chalky or limeſtone ſoils, flowering in July. The *ſtems* are denſely clothed with ſoft white wool. *Leaves* ſtalked, ovate, acute, covered with ſoft white pubeſcence, moſt woolly beneath. *Flowers* numerous, ſilky and ſilvery at the outſide; purple and white in front.

S. *lanata*. Woolly Woundwort. Murray in Linn. Syſt. Veg. ed. 14. 536. Jacq. Miſc. v. 2. 342. Ic. Rar. t. 107. Willd. n. 8. Ait. n. 9.—Whorls of many flowers. Leaves woolly. Stems procumbent and rooting at the baſe.—Native of Siberia. Frequent in gardens, where it proves a hardy perennial, flowering throughout the ſummer, and forming large tufts, conſpicuous for their very white woolly appearance. The *leaves* are more obtuſe, and far more denſely woolly, than in the laſt. Dr. Sibthorp's manuſcripts inform us that the preſent ſpecies is called ςαχυς by the modern Greeks in Laconia.

S. *coccinea*. Scarlet Chili Woundwort. Willd. n. 3. Ait. n. 3. Jacq. Hort. Schoenbr. v. 3. 18. t. 284. Curt. Mag. t. 666.—Whorls of ſix flowers. Leaves ovate, crenate, hairy; heart-ſhaped at the baſe, with dilated footſtalks.—Native of South America. Said to have been brought from Spain in 1798, by the late marchioneſs of Bute. This is a hardy greenhouſe plant, readily increaſed by cuttings, or by parting its roots, and producing abundance of large *flowers*, of that rich ſcarlet hue ſo prevalent in the vegetable productions of Chili and Peru.

S. *hyſſopifolia*. Hyſſop-leaved Woundwort. Michaux Boreal-Amer. v. 2. 4. Purſh n. 1. (S. paluſtris? Walt. Carol. 162.)—" Whorls of about four flowers. Stem erect. Leaves ſeſſile, linear-lanceolate, ſlightly toothed, nearly ſmooth."—Native of Carolina. A ſlender, upright, nearly ſmooth plant, with about four *flowers* in each *whorl*. *Michaux*.

S. *aſpera*. Harſh Woundwort. Michaux Boreal-Amer. v. 2. 5. Purſh n. 2. (S. tenuifolia; Willd. n. 11. S. arvenſis? Walt. Carol. 162.)—Whorls of about ſix flowers. Stem erect, very rough, with deflexed briſtles. Leaves lanceolate, acute, ſerrated, very ſmooth. Teeth of the calyx ſpinous, divaricated.—In low fields and on the banks of rivers, from New York to Virginia, flowering from June to Auguſt. It reſembles *S. paluſtris*. *Root* perennial. *Flowers* purple. *Purſh*.

S. *hiſpida*. Briſtly Woundwort. Purſh n. 3. (S. foliis lanceolatis, &c.; Gron. Virg. ed. 2. 89, but not the plant of Linnæus, nor of any other author cited, except Clayton, n. 271.)—" Whorls of about ſix flowers. Stem briſtly. Leaves ſtalked, ovate-oblong, bluntly ſerrated, briſtly. Calyx ſmoothiſh."—In old fields and low paſtures, from Virginia to Carolina, flowering in July. *Flowers* purple. Gronovius's ſynonym has been erroneouſly referred to *S. annua*, from which his original ſpecimen proves widely different. *Purſh*.

S. *Fœniculum*. Fennel-ſcented Woundwort. Purſh n. 4.—" Whorls of about ſix flowers. Stem erect, downy. Leaves ovate, ſomewhat heart-ſhaped, toothed; ſmooth above; whitiſh and downy beneath."—On the banks of the Miſſouri; annual, flowering in July. *Flowers* blue. The whole plant ſmells extremely like Fennel. *Purſh*.

S. *ſpinoſa*. Thorny Woundwort, Aſſes' Thyme. Linn. Sp. Pl. 813. Willd. n. 13. Ait. n. 12. Sm. Fl. Græc. Sibth. t. 559, unpubliſhed. (Gaidarothimo di Candia; Pon. Bald. 106.)—Hoary. Branches croſſing each other, tipped with ſpines. Flowers axillary, ternate.—Native of Crete, where moſt botanical travellers have gathered this ſpecies, and from whence it came into the gardens of Parkinſon and other curious cultivators of that time, though now ſcarcely to be met with. The *plant* is buſhy, of humble growth, ſpinous, pale green, with ſmall *leaves*. *Flowers* white, their lip prettily ſpotted with red.

S. *palæſtina*. Greek Woundwort. Linn. Sp. Pl. 1674. Willd. n. 15. Prodr. Fl. Græc. n. 1363. (S. alba, anguſto ſalviæ folio; Barrel. Ic. t. 279.)—Whorls of about ſix flowers, crowded, leafy. Leaves ſeſſile, lanceolate, entire, veiny, finely downy; as well as the nearly round ſtem.—Native of the Levant. Dr. Sibthorp found it plentiful throughout Greece, in rough and ſtony mountainous places, as Dioſcorides mentions of his ςαχυς, and therefore concludes it to be that identical ſpecies. It anſwers, indeed, well enough to the deſcription. The *ſtems* are erect, buſhy, ſomewhat ſhrubby, leafy, nearly round, clothed with peculiarly fine, cloſe, denſe, woolly hoarineſs. *Leaves* an inch and half or two inches long, ſcarcely one-third of an inch broad, very ſoft and downy on both ſides; the floral ones ſhort and ovate. *Calyx* unarmed, downy, like the outſide of the *corolla*, whoſe lips are purple, the throat variegated with white.

S. *rugoſa*. Rugged Yellow Woundwort. Ait. ed. 1. v. 2. 303. ed. 2. n. 17. Willd. n. 20. Jacq. Ic. Rar. t. 493.—Whorls of ſix flowers. Leaves lanceolate, ſerrated, rugoſe, downy; tapering at the baſe, and ſomewhat ſtalked. Stem round, finely downy.—Native of the Cape of Good Hope, from whence Mr. Maſſon is ſaid to have introduced it in 1774, yet Thunberg has it not in his Prodromus. The *ſtem* is ſhrubby, buſhy, quite round, very white, as in the laſt, to which the *leaves* alſo bear a great reſemblance, but are more ſtalked. Jacquin's plate ſhews no ſerratures. The *flowers* are axillary, with a white tube and yellow lips.

S. *annua*. Pale Annual Woundwort. Linn. Sp. Pl. 813. Willd. n. 23. Ait. n. 19. Jacq. Auſtr. t. 360. (Sideritis flore albo, barbâ luteolâ; Riv. Monop. Irr. t. 70. S. latifolia glabra; Ger. Em. 699.)—Whorls of ſix flowers. Leaves ovato-lanceolate, ſerrated, ſtalked, ſmooth, three-ribbed. Stem branched, erect.—Native of Germany and the ſouth of Europe. Kept ſometimes in curious gardens, rather for curioſity than any valuable property. The *root* is annual. *Stem* erect, ſquare, with oppoſite ſpreading branches. *Leaves* green; the larger ones ſtalked; uppermoſt narrower, and ſeſſile. *Calyx-teeth* ſpinous. *Corolla* white, with a yellowiſh lip.

S. *arvenſis*. Corn Woundwort. Linn. Sp. Pl. 814. Willd. n. 24. Fl. Brit. n. 4. Engl. Bot. t. 1154. Curt. Lond. faſc. 4. t. 41. Fl. Dan. t. 587. (S. arvenſis minima; Riv. Monop. Irr. t. 27. f. 2.)—Whorls of ſix flowers. Stem weak, ſpreading. Leaves heart-ſhaped, obtuſe, crenate, rather hairy.—Common in the fields of Britain, and other parts of Europe, eſpecially where the ſoil is light and ſandy, flowering in July and Auguſt. *Root* annual, ſmall. *Stems* ſpreading, often proſtrate, a ſpan long, ſquare, hairy or ſmooth. *Leaves* ſtalked, ovate, fetid, an inch long. *Flowers* ſmall, light purple, with a white and dotted palate; their *calyx* hairy, with violet teeth.

S. *ſpinuloſa*. Prickly-branched Woundwort. Prodr. Fl. Græc. n. 1368. (S. foliis hormini; Riv. Suppl. t. 15. Sideritis cretica maxima, ocymaſtri valentini facie; Tourn. Cor. 12.)—Whorls of ſix flowers. Leaves heart-ſhaped, crenate, hairy. Stem erect, branched, minutely prickly.—Native of Crete, where Dr. Sibthorp found it. Arduino ſent a ſpecimen to Linnæus, marked with Tournefort's ſynonym; and we have lately noticed a figure of this plant, in the rare unpubliſhed ſupplement to Rivinus, of which the only copy known to exiſt, apparently once belonging to the author, is in ſir Joſeph Banks's library. The *root* is fibrous, probably annual. *Stem* a foot or foot and half high, erect, branched, ſquare, with prickly angles. *Leaves* ſtalked, an inch and half long, bluntiſh, ribbed and veiny, green, more or leſs hairy. *Whorls* leafy, rather crowded. *Calyx* bell-ſhaped, hairy, with ſhort ſpinous teeth. *Corolla* yellowiſh, twice as long as the calyx; its upper lip entire.

STACHYTARPHETA, from *ϛαχυς, a ſpike,* and *ταρφυς, denſe,* a name of Vahl's, intended to expreſs the cloſe uninterrupted diſpoſition of the flowers.—Vahl Enum. v. 1. 205. Juſſ. Annal du Muſ. v. 7. 75. Ait. Hort. Kew. v. 1. 46.—Claſs and order, *Diandria Monogynia.* Nat. Ord. *Verbenaceæ,* Juſſ. Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, angular, with four acute teeth, permanent. *Cor.* of one petal, ſalver-ſhaped; tube cylindrical, longer than the calyx, ſomewhat recurved at the upper part; limb ſpreading, divided half way down into five roundiſh unequal ſegments, the loweſt being the ſmalleſt. *Stam.* Filaments four, inſerted into the upper part of the tube, not reaching to its top, two of them imperfect; anthers of two cells, one over the other. *Piſt.* Germen ſuperior, two-lobed; ſtyle the length of the tube, capillary; ſtigma peltate. *Seeds* two, linear, the length of the calyx.

Eſſ. Ch. Calyx tubular, with four teeth. Corolla ſalver-ſhaped, unequal, five-cleft, curved. Two abortive ſtamens. Seeds two.

A handſome and diſtinct genus, of tropical, chiefly Weſt Indian, annual or ſhrubby plants, previouſly confounded with *Verbena.* Their *branches* are obſcurely quadrangular, divided in a forked manner in the upper part. *Leaves* oppoſite, ſtalked, tapering down into the footſtalks. *Spikes* from the forks and ſummits of the branches, ſolitary, elongated, cylindrical, tapering, acute. *Flowers* alternate. *Bracteas* tapering into a briſtly point. *Calyx* as long as its correſponding channel in the common ſtalk.

Twelve ſpecies are defined by Vahl.

1. S. *anguſtifolia.* Narrow-leaved Baſtard Vervain. Vahl n. 1, excluding Jacquin's ſynonym. (Verbena anguſtifolia; Mill. Dict. ed. 8. n. 15.)—"Leaves lanceolate, tapering at each end, diſtantly ſerrated, ſmooth."—Gathered at Vera Cruz, by Houſtoun, who ſent ſeeds to Miller. The latter deſcribes it as an annual branching plant, a foot and half high. *Leaves* pale green, acute, three inches and a half long, half an inch broad. *Spikes* fleſhy. *Flowers* blue, appearing in Auguſt, and in warm ſeaſons ripening ſeed in our gardens.—We agree with Vahl that Miller's plant, though we have not ſeen it, is probably diſtinct; but Jacquin's *indica* ſurely is the following.

2. S. *indica.* Indian Baſtard Vervain. Vahl n. 2. Ait. n. 1. (Verbena indica; Linn. Sp. Pl. 27. Jacq. Obſ. faſc. 4. 7. t. 86.)—Leaves lanceolate-oblong, tapering at the baſe, coarſely toothed, ſmooth as well as the ſtem. Bracteas linear-lanceolate.—Native of Ceylon. Van Royen ſent ſeeds to Linnæus, who raiſed the plant in his ſtove. It is annual, flowering in Auguſt and September. The *leaves* are an inch or more in breadth; the lower ones obtuſe. *Spikes* long and ſlender. *Bracteas* finely ſtriated, membranous at the edges. *Corolla* blue. Jacquin repreſents the *leaves* more narrow and acute, with more regular ſerratures, than in the Linnæan ſpecimen, which came from the Upſal garden, and is accompanied by a branch with narrower leaves. This latter, evidently a mere variety, may be ſimilar to what Vahl had from the ſame garden, and took for Miller's *Verbena anguſtifolia.*

3. S. *ariſtata.* Awned Baſtard Vervain. Vahl n. 3. (Verbena ariſtata; Vahl Ecl. Amer. v. 2. 2. t. 11.)—"Leaves oblong, ſerrated, acute; villous and ſlightly hoary beneath. Bracteas ovate, pointed. Stem ſhrubby."—Gathered by Von Rohr in South America. *Branches* purpliſh-grey. *Leaves* an inch and a half long, tapering at each end, equally and deeply ſerrated, entire at the baſe, ribbed; the ribs moſt hoary underneath. *Spike* ſometimes near a foot long. Lower *bracteas* ſpreading; upper imbricated, ſomewhat fringed, longer than the *calyx. Vahl.*

4. S. *jamaicenſis.* Jamaica Baſtard Vervain. Vahl n. 4. Ait. n. 2. (Verbena jamaicenſis; Linn. Sp. Pl. 27. Jacq. Obſ. faſc. 4. 6. t. 85. V. folio ſubrotundo ſerrato, flore cæruleo; Sloane Jam. 171. t. 107. f. 1. Cymburus urticifolius; Saliſ. Parad. t. 53.)—Leaves ovate, obtuſe, ſerrated, nearly ſmooth. Branches hairy. Bracteas ovate, ſhorter than the calyx.—Native of the Weſt Indies. Introduced very early into our ſtoves. The *ſtem* is naturally ſhrubby and perennial, though it ſeldom ſurvives after flowering in a hot-houſe. *Leaves* two inches long, tapering down into a winged *footſtalk* half that length; their veins and margins roughiſh with ſhort hairs. *Spikes* a ſpan long, hardly thicker than a crow's quill. *Bracteas* cloſe-preſſed. *Corolla* blue, ſomewhat reſembling the elegant *Duranta Elliſia.*

5. S. *dichotoma.* Forked Baſtard Vervain. Vahl n. 5. ("Verbena dichotoma; Fl. Peruv. v. 1. 23. t. 34.")—"Leaves oblong-ovate, ſerrated. Branches hiſpid. Bracteas lanceolate, the length of the calyx."—Native of woods in Peru. *Stem* ſhrubby, erect, a yard high, ſlightly branched; the branches compreſſed in each joint at the upper part. *Leaves* acute, veiny, minutely hiſpid beneath; their ſerratures pointed. *Spikes* a foot long, curved. *Seeds* ſtriated externally. *Fl. Peruv.*

6. S. *marginata.* Bordered Baſtard Vervain. Vahl n. 6.—"Leaves roundiſh-ovate, ſmooth, with tooth-like ſerratures; the edges of the teeth cartilaginous. Stem ſhrubby."—Found by Von Rohr in the Weſt Indies. *Branches* round, ſmooth, like the reſt of the plant. *Leaves* an inch long, firm, very obtuſe, ribbed, without veins, with pointed coarſe teeth. *Spikes* ſix inches long, as thick as a pidgeon's quill. *Bracteas* linear-lanceolate, tapering, the length of the calyx, finely ſtriated. *Vahl.*

7. S. *ſtrigoſa.* Strigoſe Baſtard Vervain. Vahl n. 7.—"Leaves ovate-oblong, crenato-ſerrated, hairy like the branches."—Native of the Weſt Indies. *Ventenat.* Shrubby, with round *branches,* which are beſprinkled, like the *leaves* and *footſtalks,* with white hairs. *Leaves* very blunt, an inch long, ribbed, veinleſs. *Spikes* no thicker than packthread, about four inches long. *Vahl.*

8. S. *cajanenſis.* Cayenne Baſtard Vervain. Vahl n. 8. (Verbena cayennenſis; Richard Act. Soc. Hiſt. Nat. Pariſ. v. 1. 105.)—"Leaves ovate, crenato-ſerrated, ſmooth, very obtuſe. Stem ſhrubby."—Native of Cayenne. *Branches* round, their young extremities hairy, as well as the *flower-ſtalks* and the *leaf-ſtalks. Leaves* two inches long, coarſely crenate, ribbed. *Spikes* ſlender, four inches in length. *Bracteas* ſlender, hairy like the *calyx. Vahl.*

9. S. *orubica.* Orubian Baſtard Vervain. Vahl n. 9. Ait. n. 3. (Verbena orubica; Linn. Sp. Pl. 27. Pluk. Almag. 382. t. 228. f. 4, and t. 327. f. 7. Sherardia urticæ folio ſubtùs incano, floribus violaceis; Ehret. Pict. t. 5. f. 1.)—Leaves ovate, ſerrated, rough and rugoſe. Stem ſhrubby. Bracteas ovate, larger than the calyx.—Native of Panama. A greenhouſe or ſtove ſhrub, early introduced, but not often met with in our collections. The *ſtem* is a yard high, branched. *Leaves* deeply ſerrated, rounded. *Spike* twelve or eighteen inches long, with ſquarroſe *bracteas. Corolla* violet, with a dark divided ſpot.

10. S. *mutabilis.* Changeable-flowered Baſtard Vervain. Vahl n. 10. Ait. n. 4. Curt. Mag. t. 976. (Verbena mutabilis; Jacq. Coll. v. 2. 334. Ic. Rar. t. 207. Andr. Repoſ. t. 435. Venten. Malmaiſ. t. 36. Cymburus mutabilis; Saliſ. Parad. t. 49.)—Leaves ovate, ſerrated, rugoſe, ſomewhat hoary as well as the ſtem. Bracteas lanceolate, ſhorter than the calyx.—Native of South America. A ſtove-plant, flowering throughout the ſummer, and propagated by cuttings. This is larger and more ſplendid than any of the foregoing. *Leaves* often four inches, or more, in length. *Spikes* a foot long. *Flowers* large, crimſon, with a central ring of a blood-red, round the white throat. The *corolla* fades before it goes off, occaſioning a perpetual variety of hues in each ſpike.

11. S. *priſmatica.* Germander-leaved Baſtard Vervain. Vahl n. 11. Ait. n. 5. (Verbena priſmatica; Jacq. Coll. v. 2. 301. Ic. Rar. t. 208. V. ſpicata jamaicana, Teucrii pratenſis folio, diſpermos; Pluk. Alm. 382. t. 321. f. 1.) —Leaves ovate, obtuſe, ſerrated. Spikes lax. Bracteas awl-ſhaped, ſhorter than the calyx.—Native of the Weſt Indies. Biennial in our hot-houſes, flowering in May and June. The *ſtem* has many ſmooth, ſlender, forked branches. *Leaves* one or two inches long, green, roughiſh, ribbed. *Flowers* fewer and more diſperſed than in the reſt, of a violet blue, ſmall and rather inconſpicuous.

12. S? *ſquamoſa.* Scaly Baſtard Vervain. Vahl n. 12. (Verbena ſquamoſa; Jacq. Hort. Schoenbr. v. 1. 3. t. 5.) —Leaves elliptic-lanceolate, alternate, with ſhallow wavy ſerratures. Flower-ſtalks axillary, ſcaly, much longer than the leaves. Stem ſhrubby. Corolla ringent.—This flowered in the imperial ſtoves at Schoenbrun, but its native country is unknown. We ſhould preſume the plant to be of South America origin. The *branches* are villous. *Leaves* dark green, ſpreading, three inches long. *Flower-ſtalks* very peculiar, numerous, from five to ten inches long, hairy, thread-ſhaped, ſometimes branched, covered entirely with innumerable cloſe *bracteas.* *Flowers* very ſmall, pale blue; their upper lip erect, ſhort, cloven; lower larger, ſpreading, in three cloven ſegments. Vahl has doubts reſpecting the genus of this plant, its leaves being alternate. We ſuſpect it to be more allied to *Juſticia;* at leaſt to the Linnæan *J. acaulis,* which is Vahl's *Elytraria crenata.*

STACK, North, in *Geography,* a cape on the W. coaſt of the iſland of Angleſea; 2 miles N. of Holyhead.

Stack, in *Agriculture,* a quantity of corn, pulſe, hay, ſtraw, ſtubble, or other ſimilar material, regularly built or piled up, and generally thatched, as a defence from the weather. Stacks are of various forms and dimenſions, according to circumſtances; but for grain, thoſe of the long, narrow, ſquare ſhape are probably the moſt advantageous, where the quantity of corn is conſiderable; as they are found to ſtand more firmly, have a better appearance, are more conveniently and readily built, and preſerve the grain better than thoſe of other forms. And they have the great advantage of requiring leſs thatch, as well as labour in putting it upon them. But where the corn is only in a ſmall proportion, the round or oblong ſhape may be more proper and ſuitable, as being more readily drawn up in the roof; and the circular, with a conical top and cylindrical body diverging a little at the eaves, is eſteemed the beſt form of any in ſuch caſes by the author of the Agricultural Report of Perthſhire. For hay, the form of the ſtack is a matter of ſtill leſs conſequence: the long ſquare or oblong ſhapes are perhaps the moſt ſafe and convenient, eſpecially when not too broad, as they admit the air the moſt fully. Beſides, they are the moſt convenient to cut from in truſſing hay for ſale at the market. But the circular form for farm uſe, where ſtraw is ſcarce, may be more advantageous in ſaving ſtraw in thatching or covering them.

The octagonal form of corn-ſtack has ſometimes a pleaſing and very ornamental effect in particular circumſtances and ſituations, eſpecially in the ſtack-yards of the farms about country ſeats and reſidences, but it requires more time and trouble in building and finiſhing than thoſe of moſt other ſhapes, conſequently is improper, in general, except in ſuch places, circumſtances, and ſituations.

The oblong and long ſquare forms of corn-ſtacks, with circular ends in the latter caſe, are ſometimes very convenient, uſeful and advantageous, as they are built and finiſhed in a ready and eaſy manner, take up but little room in compariſon with ſome other forms, and keep the grain remarkably well and ſafe. In building them, the different courſes of the ſheaves, which are not many in the width, are laid ſo as to bind on each other and ſecure the whole, as will be ſeen in ſpeaking of ſtacking grain in a more full and clear manner.

In the ordinary circular form of corn-ſtack, the thatch, which ſhould always come down to the termination of the moſt bellying-out or ſpreading-out part of the ſtem, is uſually ſecured and kept on in the common way, without the uſe of any ſort of rope or other contrivance of that kind. Ropes are, however, ſometimes employed.

But there is another form of corn-ſtack, which is common in the northern parts of this country and that of Scotland, which is of the round kind, and which moſtly reſts on a wooden frame upon high ſtone ſupports with flat caps. The ſtem is made perfectly upright to the eaves, where the ſheaves of the upper part are made to project ſome way at firſt, and then gradually taken into a point at the top. The thatch or covering in this caſe, in conſequence of the windy and ſtormy ſituations in which the ſtacks are moſtly expoſed, are, for the moſt part, ſecured by means of ſtraw-ropes, or thoſe of other kinds, put on in a ſort of chequered manner, one rope being made to croſs or paſs over the other, ſo as to afford ſomething of this appearance. There are two ſtraight ropes, to which all the others, which are oblique, are faſtened, the ends being well ſecured by being paſſed round a ſtrong belt-rope which ſurrounds the top of the upright ſtem of the ſtack. The different oblique ropes are put on alternately from the different ſides of the ſtack. In ſome caſes, the ends of the oblique ropes are fixed to the butt-parts of the ſheaves, without any ſort of belt-rope being employed. See Thatching *of Grain-Stacks.*

There are a few other forms of corn-ſtacks, which are occaſionally made uſe of in particular circumſtances and caſes of farms; but more for the ſake of curioſity, than any utility they may have in practice.

In ſtacks with any ſort of pulſe crops, as peas, beans, feeding tares, and other ſimilar matters, the ſame forms may be moſtly had recourſe to, but their ſtem-parts need ſeldom be ſo much bellied out at the eaves as in corn-ſtacks, as there is moſtly leſs danger from wet; they ſhould always, however, have ſo much outward diverging at the tops of the ſtems, as fully to carry off the water from them. The ſtalk or butt-ends of all ſuch ſorts of produce, when put into ſtacks, ſhould conſtantly be carefully laid in an outward direction, ſo that as few of the pods as poſſible may be expoſed to the moiſture of the air. The top-parts in ſtacks of this kind have rarely any occaſion to be carried up to ſo much height, as is the caſe ſometimes in corn-ſtacks. Theſe ſorts of ſtacks, as well as thoſe of corn, ſhould always be put on ſtands or ſtaddles which are conſiderably raiſed from the ground.

In the forms of hay-ſtacks there is leſs variety than in thoſe of corn, but they have ſome degree of variety according to circumſtances, and the nature of the ſituations in which they are placed, as well as ſome other cauſes. The moſt uſeful forms are probably thoſe of the ſquare, long ſquare, oblong, and perfectly round kinds. There is a curious ſort of low very bellying form, which reſts on a very ſmall baſis or ſtaddle at bottom, and which has an equally low top, which is ſometimes in uſe. This is ſomewhat the form or ſhape of a ſort of hay-ſtack, which in Scotland, and ſome of the more northern Engliſh diſtricts, is often denominated a hay-ſow.

In ſtacks with hay of the artificial graſs kinds, as that of clover, ſaintfoin, tares, and other ſimilar ſorts, the ſtacks ſhould never be made ſo large as in the caſe of natural graſs-hay, as ſuch ſorts of hay, in order to ſecure them in the beſt manner, ſhould never be ſo much or ſo well made as that of the natural graſs kind; conſequently never be put together in ſtacks in ſuch large quantities, as there may often be danger, inconvenience, and loſs in ſuch practices.

In ſtacks of the ſtraw and ſtubble kinds, very little more is ſeldom neceſſary than merely the ſecuring of the materials; they need but rarely have ſo much labour and time beſtowed upon forming the top-parts of them, as is often the caſe in corn and hay-ſtacks, as the matters ſcarcely ever remain in them for any great length of time, being moſtly in a ſtate of gradual removal for different uſes.

It may be farther obſerved, in reſpect to the ſizes of ſtacks of the firſt ſort, that they of courſe vary greatly according to circumſtances; but they ſhould never be made too large, as there is a great deal more labour and riſk in ſecuring and getting in the grain for them, than in thoſe of a ſmaller ſize; and from their being built at different times, they do not ſettle altogether in ſo equal and perfect a manner, or reſiſt the effects of the weather, and keep the grain ſo well, as thoſe of leſs dimenſions, that can be completed at once: and, in addition, they are more convenient in the threſhing out, eſpecially where the flail manner is employed. The chief advantages they poſſeſs are thoſe of taking ſomething leſs in thatch and labour in covering them, as has been juſt noticed. But, in common, from about twenty to thirty-two horſe cart-loads may be ſufficient for one ſtack, on all the middling-ſized farms in moſt of the grain diſtricts of this kingdom.

And in regard to the proper ſize of the hay-ſtack, it ſhould probably be different in ſome degree, according to the ſtate and nature of the hay; but a middling ſize is perhaps the beſt, as from twenty to thirty loads of about one ton each; as there are inconveniencies in both ſmall and large ſtacks, the former having too much outſide, while the latter are liable to take on too much heat, and at the ſame time permit leſs moiſture to be preſerved in the hay. In ſmall ſtacks, the bellying forms, with very narrow bottoms, have often much advantage, and are in ſome diſtricts termed ſheep-ſtacks, probably from the ſlovenly practice of ſheep having been permitted to feed at them. It is obſerved by Mr. Middleton, in his Agricultural Survey of Middleſex, that there are no hay-ſtacks more neatly formed nor better ſecured than thoſe of that county. At every vacant time, while the ſtack is carrying up, the men are employed in pulling it with their hands into a proper ſhape; and about a week after it is finiſhed, the whole roof is properly thatched, and then ſecured from receiving any damage from the wind, by means of a ſtraw-rope extending along the eaves, up the ends, and near the ridge. The ends of the thatch are afterwards cut evenly below the eaves of the ſtack, juſt of ſufficient length for the rain-water to drip quite clear of the hay. When the ſtack happens to be placed in a ſituation which may be ſuſpected of being too damp in the winter, a trench of about ſix or eight inches deep is dug round, and nearly cloſe to it, which ſerves to convey all the water from the ſpot, and renders it perfectly dry and ſecure.

It may be noticed, that in ſtacks of all kinds, proper ſtands or ſtaddles ſhould conſtantly be provided, being well proportioned to the intended ſize of the ſtacks. Thoſe for grain ſhould have copings placed ſo as to prevent the entrance of vermin: but for hay there is no neceſſity for this, nor need they be raiſed ſo high, but be quite plumb and upright. It is evident, that by the common method of placing them upon the ground, on a little drift, or a few pieces of wood laid acroſs each other, there muſt conſtantly be great loſs in the bottom parts of the ſtacks, from the moiſture being abſorbed by the hay, and it becoming in a fuſty condition; while by the uſe of ſtands, this may be almoſt wholly avoided, and the expence be but trifling, as any old rough pieces of wood, or other materials, will anſwer the purpoſe in a pretty perfect manner, when other better ſorts of ſtaddles are not at hand, or to be procured. See STADDLE and STAND.

All ſorts of ſtacks ſhould be carefully attended to, while they are forming and getting up, and never be left for any length of time, as is too frequently the caſe, without being properly topped up; as injury and loſs are always to be apprehended wherever that is the caſe. Every kind of ſtack ſhould likewiſe conſtantly be ſuffered to have completely ſettled in all its different parts, before it be attempted to be covered in; as otherwiſe the covering may be deranged and rendered unſightly, by the ſhrinking that may afterwards take place, and the matters be not rendered ſo ſecure or ſo well preſerved.

Stacks of the corn kind are ſometimes conveniently placed upon low frames of wood, and on low caſt-iron wheels, moving in circular iron railways, contrived in ſuch a manner as that three or four horſes may, in moſt caſes, in moderate ſized ſtacks, draw them to the barn or threſhing machine. Placing them on theſe ſorts of contrivances is often of great utility and advantage, in ſaving the expence of labour and time in carting, or otherwiſe conveying them to ſuch places; and is, beſides, capable of being performed at any time, without waiting for the coming of fine and favourable weather for the purpoſe. The expence in this way of placing ſtacks is very trifling, and will in a great meaſure prevent the neceſſity of having capped ſtone ſtandings for them. It is likewiſe a neceſſary and uſeful plan, in many inſtances, as being that alone which allows of a choice of any particular ſtack for threſhing, without waiting for the whole or a great number of others being previouſly removed or taken out of the way. In ſome other caſes the placing the ſtacks in ſtraight lines, leading by and paſt theſe places, may anſwer the ſame intention, though in a much leſs perfect manner in different points.

STACK, *Hay-Sow*, a name given in ſome places to that low bowl-like bellying form of ſtack, which has an equally low top, ſecured by hay, or other ſimilar kinds of ropes, put on in ſomewhat the checquered form. It is chiefly in uſe in ſuch ſituations as are much expoſed to winds and ſtorms.

STACK, *Mow Ariſh* or *Erriſh*, that particular ſort of ſtack or mow which is made with grain in the field, in ſome diſtricts, as Cornwall, in wet and catching harveſt ſeaſons. The corn uſually remains in theſe ſtacks for a fortnight or three weeks. And it is ſaid by the writer of the corrected account of the agriculture of the above county, that theſe ariſh ſtacks or mows, of which he has given a repreſentation, are admirable contrivances in ſuch like ſeaſons; and that if proper care be taken in forming and making of them, to keep the middle parts well up, ſo as that the butt-ends of the ſheaves may have a conſiderable ſlope outwards, the corn will receive no damage, though it were to remain in the field a month or ſix weeks, or perhaps longer. See STACKING *Grain.*

STACK, *Sheep Hay*, a name ſometimes applied to that ſort of low, circular, diverging form of hay-ſtack, in ſome diſtricts, which was formerly had recourſe to about farms, for ſheep to feed at during the ſeverity of the winter ſeaſon. This littering, waſteful, and ſlovenly mode of foddering ſheep has now moſtly been done away by the great value of hay, and the introduction of proper ſheep-yards, with ſuitable contrivances for the purpoſe. See SHEEP-*Yard.*

STACKS, *Supporting of*, the practice of propping and ſhoring them up, where they may happen to lean or incline too much to either ſide, ſo as to be in danger of falling without ſuch aid and aſſiſtance. In thoſe of the grain kind, it is always a good practice to arm and eaſe the props, or poſts, which are made uſe of for the purpoſe, with a ſheet of tin, nailed round them, at more than half way up, in ſomewhat the form of an inverted funnel, as this ſerves to ſtop vermin in their progreſs and attempts to get up and into the ſtacks; and tin, on account of its cheapneſs and poliſhed ſurface, is found particularly well ſuited to the purpoſe.

The props or poſts for this uſe ſhould, in all caſes, have ſufficient ſtrength, and be firmly ſet up to or againſt the ſtacks; having a portion of ſtrong thick board laid to the ſtacks, where their upper ends come againſt them, to prevent their entrance into them.

This method is found to ſucceed well in the practice of ſome farmers in Glouceſterſhire, according to the corrected account of the agriculture of that diſtrict.

STACK-*Bars*, a term applied to the large bars or hurdles by which hay-ſtacks in fields are incloſed and ſecured.

The bars and hurdles for incloſing ſtacks ſhould always be of a proper thickneſs and ſtrength, ſo as not to readily give way, but reſiſt any ſtreſs that may be brought againſt them by animals, in getting at the hay, or in any other way. They ſhould alſo be put ſo near together in the fence, as to prevent any hurtful ſort of animal from getting at them.

STACK-*Guard*, a cloth or other covering ſuſpended over ſtacks, during the time of their being built, to protect them from rain, &c. It is applicable both to the ſecuring of corn and hay-ſtacks, as well as thoſe of other kinds. It is uſual for this purpoſe to employ a large ſheet of ſail or other cloth, which anſwers perfectly, and prevents much injury and loſs in wet bad ſeaſons. In the diſtricts of Kent and Surrey, the old or half-worn ſails of ſhips are, according to Mr. Marſhall, made uſe of as guards for ſtacks. But he thinks, that a ſail-cloth, thrown over and immediately upon the hay of a ſtack in full heat, is liable to do more injury, by increaſing the heat, and at the ſame time checking the aſcent of the vapour or ſteam, than ſervice in ſhooting off rain-water.

The improved method of ſpreading the cloth, which he obſerved in the diſtrict of Maidſtone, in the former of the above counties, is, he ſays, this: Two tall poles, uſers, fir-balks, are ſtepped firmly into two cart-wheels, which are laid flat upon the ground at each end of the ſtack, and loaded with ſtones to increaſe their firmneſs. Another pole of the ſame kind, and ſomewhat longer than the ſtack, is furniſhed at each end with an iron ring or hoop, large enough to admit the upright poles, and to paſs freely upon them. Near the head of each of the ſtandards is a pulley, over which a rope is paſſed from the ring, or end of the horizontal pole, by which it is eaſily raiſed or lowered, to ſuit the given height of the ſtack. In the inſtance obſerved, the rick was begun with two loads of hay; yet even theſe two loads were as ſecurely guarded from rain, until more could be got ready, as if they had been houſed: for a cloth being thrown over the horizontal pole, and its lower margins loaded with weights, a complete roof is formed, and exactly fitted to the ſtack, whether it be high or low, wide or narrow; the eaves being always adjuſted to the wall-plate, or upper part of the ſtem of the ſtack, thus effectually ſhooting off rain-water, while the internal moiſture, or ſteam ariſing from the fermentation of the hay, eſcapes freely at either end, as the wind may happen to blow. And what renders this ingenious contrivance the more valuable is, its being readily put up or taken away. The poles, being light, are eaſily moved from ſtack to ſtack, or laid up for another ſeaſon; and the wheels are as readily removed, or returned to their axles. On theſe hints ſir Joſeph Banks ſeems to have made a conſiderable improvement, which is equally ſimple, cheap, and eaſy in the execution; and, at the ſame time, perfectly calculated for the purpoſe.

This improved apparatus, as given by a writer in the tenth volume of the Annals of Agriculture, is thus deſcribed. There are two long upright poſts, poles, or balks of wood, which are firmly fixed and ſet into two wheels, ſomewhat in the ſame manner as the above; one of which is placed at each end of the ſtack, to which ropes and a block-tackle are ſo attached as to be capable of ſuſpending the cloth or ſheet over the ſtack in ſuch a way as to render it readily raiſed or depreſſed at pleaſure, without difficulty or much trouble; the middle part of the cloth being well prepared and ſecured, in order that the hooks of the tackle for regulating it may be attached to it in a ſuitable manner. There are three ropes on each ſide of each poſt or pole, which are faſtened to rings in the upper and top parts of them, and fixed by ſtrong large pegs down to the ground, by which means the upright poſts or poles are held ſteady and firmly in their places. The block-tackle, by which the cloth is rendered capable of being raiſed or let down, as there may be occaſion, conſiſts of an upper and larger, and of a lower and ſmaller block, which anſwer the purpoſe very effectually. There are alſo four pieces, or more, of ropes, which are attached by rings to the bottom parts or edges of the cloth, on each ſide, by which they fix it to the ground or ſtack, by means of pegs driven firmly into them. The whole of the apparatus is ſo contrived, as to be eaſily and readily taken down and removed, as there may be occaſion; and when not wanted, it takes up but little room in a dry ſecure place.

STACK *Hay-Rod*, the ſtrong or ſtout iron rod of the bolt kind, which is forced into hay-ſtacks, in order to make way and form a paſſage for an iron gun ram-rod, which has a ſtrong worm or ſcrew at the lower end of it. In this way a ſample of the hay is ſcrewed and forced or taken out, and the ſtate or condition of the ſtack diſcovered and determined. This neat and uſeful diſcovery and contrivance was made by the late Mr. Ducket, the ingenious farmer at Eſher, in the county of Surrey; and the method practiſed by him, not only for aſcertaining the ſtate of the heat in hay-ſtacks, and preventing its proceeding to too great a degree, but for ſhewing the colour of the hay in them. When the heat is too great, it ſerves alſo for making holes in different parts and places of the ſtacks, in order to let it paſs off, and to admit air more freely, ſo that the hay may be prevented from being injured in any way by it. This is an invention which, of courſe, may be beneficial to the hay-farmer in many different ways.

Stack-*Tackle*, any ſort of tackle or contrivance employed about a ſtack of any kind, either for the purpoſe of aſſiſting and expediting the work of forming, preparing, and building it, or for protecting and ſecuring the materials of which it is compoſed, while the ſtack is forming and finiſhing. Theſe different kinds of tackles and contrivances are often very neceſſary about ſtacks, while the work of forming and finiſhing them is in hand and going on with; as they may ſave much time, labour, and trouble, as well as be of great utility in preſerving the different ſorts of articles in a ſafe ſtate from the effects of the weather, or other cauſes. Every kind of tackle, or contrivance of this nature, ſhould always be made as readily applicable and convenient as poſſible, and ſo that it may perform its intended uſe in the eaſieſt and moſt ready and complete manner there is a capability of, without having any ſort of complexity or difficulty in making uſe of it.

Stack *Hay-Barn*, that ſort of open barn which is contrived for the purpoſe of receiving and having hay ſtacked up in it, in contradiſtinction to thoſe of the cloſe common kind in which it is ſometimes put. Theſe barns are conſtructed in ſeveral different manners, as the nature of the materials may allow, but moſtly on poſts of oak, or ſome other durable kinds, with open frames, ſo as to admit air in a very free manner. They have not unfrequently a capacity of holding from thirty to fifty loads of hay, and, in ſome inſtances, even ſo many as a hundred loads. See Hay-*Barn*.

The queſtion has not yet been fully decided, whether hay keeps better when ſtacked up in the open air, or in common barns, and thoſe formed expreſsly for the purpoſe. The opinion of moſt of the beſt hay-farmers in the ſouthern parts of the kingdom is directly in favour of the open ſtack manner, ſo far as the quality of the hay is in any way concerned; and there can be no doubt but that the ſtack-barn method, deſcribed above, may be equally or more beneficial in that way, and ſtill more advantageous in other reſpects. But how far the cloſe common barn is ſuited to the purpoſe of containing hay, has probably not yet been fully ſhewn. However, in many of the more northern parts of the country, hay is not unfrequently ſecured in barns of this kind, and, on examination, has been found to be equally ſweet and good as when preſerved in ſtacks in the open air. The experimental trials of others, in the more ſouthern diſtricts, have likewiſe ſhewn the ſame thing, ſo far as they have gone; it being found, on cutting and binding up, that it was not leſs good than that from the ſtack-yard, being equally free from duſt. It cannot, however, be diſputed, that hay put up in cloſe barns is, in general, more liable to become duſty, and of a mouldy fuſty quality about the ſides next the walls, and other ſuch parts, than ſuch as is contained in ſtacks in the open air, or in ſuch barns as the above.

Many other ſorts of buildings and roofed contrivances, beſides thoſe of the large ſtack hay-barn kind, may be had recourſe to for containing hay, in different ſituations and circumſtances, and be formed and raiſed in a much more ready and cheap manner.

Stack-*Roofed Corn-Barn*, that ſort of barn which has the roof formed for the fully ſecuring of the ſtacks of grain, or other ſuch matters as may be put into it, and the ſides and other parts ſo raiſed and made open, as to produce perfect ſecurity from vermin, and full ventilation of the contained materials. In the conſtruction of it, upon the low timber platform, which is put on poſts or pillars, as in ſtaddles for grain, the frame or ſkeleton of a perfect barn is raiſed, with ends, ſides, and roof. The ſides and ends are left open for the full admiſſion of air; but upon the roof is put a complete and ſubſtantial coat of thatch, or ſome other ſuitable, light, ſafe material, which being expoſed to no injuries or miſchief from mice, rats, or any thing elſe, excepting fire and the inclemency of the weather, will laſt, it is ſaid, for upwards of thirty years.

This is conſidered by Mr. Howlett, in the corrected account of the ſtate of agriculture in the county of Eſſex, as a very great improvement on the ſtaddle erections for corn-ſtacks or ricks; for though it is remarked, that the pillars and frame in that mode, together with the care and time employed in raiſing and providing them, and in thatching the ſtacks, muſt obviouſly be attended with conſiderable charge beyond what would have been neceſſary for the mere laying up the corn in the common barn; and, after all, it muſt be again taken down and removed, before it can be threſhed;—the height from the ground ſecures it from vermin; the thatch preſerves it from the weather; and the expoſure of its ends and ſides to the air, which are merely the butt-ends of the ſheaves, keeps it entirely ſweet and pure, far beyond the beſt common barn or granary in the world. And, indeed, the farmers' ricks and barns are, it is ſuppoſed, the only kind of granaries which a wiſe and patriotic government in this country will ever encourage: their contents will generally be brought forth at the propereſt time, not ſtinking and ſpoiled by conveyance in ſhips from abroad, or by lying and rotting in the warehouſe of the merchant, but pure, ſound, and good, as when carted from the field.

The ſuperior advantages of this ſtack-roofed mode over that of the common barn, and the common rick or ſtack manner, are, however, it is thought, great and numerous.

Theſe ſorts of barns are often made from fifty to ſixty feet in length, having a breadth or width of ſixteen or eighteen feet; but they may have ſmaller dimenſions, as may be neceſſary. They are ſometimes raiſed on large ſcales, and ſo contrived as to ſerve as cart-lodges for loaded corn, and other ways, upon the moveable rafters on the ſides being taken away. See Staddle, *Grain* Stand, and Wheat *Rick Stand*.

Stack-*Yard*, the incloſure or yard in which the ſtacks of hay and grain, as well as thoſe of other field produce, are placed. Theſe yards ſhould always be conveniently ſituated for the barns or threſhing-mills. They ſhould alſo always be ſufficiently ſpacious and airy, having a firm dry bottom. and ſome adviſe them to be ridged up, to prevent the accumulation of ſurface-water; as by theſe being pretty well raiſed in the middle, and covering the places where the ſtacks are to be built, either with rough ſtones, with a mixture of gravel, or paving them in the ſame manner as ſtreets, much advantage would be gained at little expence. But a much better method is to have the bottom parts for the ſtacks raiſed conſiderably above the ſurface, and placed upon pillars of wood or ſtone, with a covering of wood or ſtone round the circumference, and beams laid acroſs. The incloſing of ſtack-yards is alſo a matter that ſhould be attended to more particularly, and be well performed in ſome manner or other, either by means of low walls or palings.

On large arable farms the ſtack-yards are not unfrequently divided for different ſorts of produce; but this is ſeldom or ever neceſſary for thoſe of the middling or ſmaller ſizes, as it creates an additional expence and trouble, without any adequate advantage being derived from it, eſpecially where the yards, in theſe caſes, are ſufficiently extenſive for the quantity of corn-ſtacks which are to be put into them.

In theſe yards the ſtacks ſhould be arranged ſomewhat according to the nature of the matters or produce which are put into them: thoſe which require to be kept the moſt dry and ſweet, as the grain, pulſe, and hay kinds, in the higher and more open airy parts; and thoſe of the contrary kind in the lower and more confined parts.

Stack *of Wood*, among *Huſbandmen*, is a pile of wood three feet long, as many broad, and twelve feet high.

STACKHOUSIA, in *Botany*, received that appellation from the writer of the preſent article, in honour of John Stackhouſe, eſq. F.L.S. of Pendarvis, in Cornwall, author of a ſplendid work on ſubmarine plants, entitled *Nereis Britannica*, and of ſome botanical illuſtrations of Theophraſtus.—Sm. Tr. of Linn. Soc. v. 4. 218. Brown Bot. of Terra Auſtralis, 23.—Claſs and order, *Pentandria Trigynia*. Nat. Ord. *Terebintaceæ*, Juſſ.? Sm. *Stackhouſeæ*, Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-ſhaped, divided half way down into five equal, acute ſegments, permanent. *Cor.* Petals five, equal, inſerted into the calyx, linear-lanceolate, cohering by their claws in the form of a tube much longer than the calyx, their borders narrow, ſpreading horizontally, ſhorter than the tube. *Stam.* Filaments five, thread-ſhaped, unequal, inſerted into the calyx; anthers roundiſh, concealed within the corolla. *Piſt.* Germen ſuperior, three-lobed; ſtyles three, ſhort; ſtigmas obtuſe, ſimple. *Peric.* Capſule of three roundiſh, coriaceous, corrugated cells, each of one valve, not burſting. *Seeds* ſolitary, nearly globular, attached to the permanent central column.

Eſſ. Ch. Calyx in five ſegments. Petals five, connected by their claws. Capſule of three lobes and three cells, not burſting. Seeds ſolitary.

Obſ. The ſtyles, as well as the cells of the capſule, are ſometimes two only.

1. S. *viminea*. Slender Stackhouſia.—Gathered near Port Jackſon, New South Wales, by John White, M.D. to whom we are obliged for ſpecimens. The *root* is tapering, whether annual or perennial we know not. *Stems* ſeveral, erect, twelve or eighteen inches high, ſimple or branched, round, leafy, ſtriated, ſmooth. *Leaves* ſcattered, ſeſſile, ſlightly ſpreading, elliptic-lanceolate, or oblong, obtuſe, entire, ſmooth, rather fleſhy, and ſomewhat glaucous, ſingle-ribbed, an inch or more in length, tapering at the baſe. *Cluſters* terminal, elongated, erect, many-flowered. *Flowers* ſmall, yellowiſh, in little diſtant tufts, two or three together, on ſhort partial ſtalks, with minute bracteas at their baſe. *Capſule* of three rugged lobes, each the ſize of a muſtard-ſeed, ſubtended by the permanent expanded calyx. The flowers bear a reſemblance to ſome ſpecies of *Struthiola* or *Daphne*, but are very different when examined.

This is the only ſpecies that has fallen in our way. Mr. Brown probably may have ſeen more. This learned botaniſt conſiders *Stackhouſia*, "and an unpubliſhed genus, exactly agreeing with it in flower, but remarkably different in fruit," as forming a ſmall natural order, ſufficiently diſtinct from all hitherto eſtabliſhed. He places it between his *Celaſtrinæ* and *Euphorbiaceæ*, "to both of which, but eſpecially to the former, it ſeems to be related in a certain degree." Mr. Brown thus defines the order in queſtion.

Stackhouseæ. *Calyx* of one leaf, in five equal ſegments, with a ſwelling tube. *Petals* five, equal, inſerted into the top of the tube; their claws cohering in a tubular form, longer than the calyx. Their borders narrow, ſpreading like a ſtar. *Stamens* five, diſtinct, unequal (two alternate ones being the ſhorteſt) inſerted into the throat of the calyx. *Germen* diſtinct, of from three to five ſeparate ſingle-ſeeded lobes, the ſeeds erect. *Styles* three to five, ſometimes cohering at their baſe. *Stigmas* undivided. *Seed-veſſel* of three to five lobes, each without valves, ſometimes winged; the central column permanent. *Embryo* erect, central, almoſt as long as the fleſhy albumen.

The plants of this order are herbaceous, with ſimple, entire, ſcattered, ſometimes minute, *leaves*, and lateral, extremely minute, *ſtipulas*. *Spikes* terminal, with three *bracteas* to each *flower*. "The *Stackhouſeæ* are peculiar to Terra Auſtralis, and though found chiefly in its principal parallel, extend more ſparingly both to the ſouthern extremity of Van Diemen's iſland, and to the north coaſt of New Holland."

STACKING, in *Agriculture*, the art and manner of forming, building, and making all ſorts of ſtacks with any kind of farm produce.

In forming, building, or ſtacking any ſort of material of the farm kind, it is moſtly proper to begin in the middle of the ſtaddles or ſtands on which they are to be raiſed, ſo as to form and lay it out to the ſides, ends, or other parts, in a very ſlightly inclining manner, the ear-parts the higheſt in corn or other ſimilar matters, keeping ſuch middle part always well up, and the outſide parts on the ſides, or in other ways, in a conſtantly very gradual, but ſcarcely perceptible, outwardly ſwelling or overhanging manner, proceeding courſe after courſe, in the ſame way, until the top of the ſtem or ſhaft part of the ſtack be reached, from which, in forming the top part, it is to be taken or drawn in, in placing the different courſes of the ſubſtances in nearly the ſame eaſy, gradual, though in rather a quicker manner, until the ridge or top be arrived at; always carefully keeping up the middle, as in the ſtem or ſhaft part. The top or ridge part muſt conſtantly be well and ſafely ſecured; it is ſometimes ornamentally formed. In ſomewhat this way every ſort of ſtack about a farm may be raiſed without any very great difficulty or trouble, if the labourer or perſon who is to form and conſtruct them be but a little converſant with the nature and practice of ſtacking, though he may not be greatly experienced in this ſort of buſineſs. He cannot, however, raiſe or form ſtacks in the very neat, exact, and perfect manner, that complete and profeſſed ſtack-building labourers are capable of performing the work. Nor will he be capable of finiſhing them with the ſame exactneſs, or the ſame degree of neatneſs or elegance. See the next article.

Stacking *of Grain*, the art and practice of building or forming ſtacks of corn, and other ſimilar matters; which is performed in different methods, according to the particular nature and circumſtances of the different caſes. In the execution of this buſineſs, the ſtems of the ſtacks ſhould, however, in general, be ſo formed as to ſwell gradually outwards, quite up to the part termed the eaves, as by this method they are more perfectly ſecured againſt the entrance of moiſture, and at the ſame time require a leſs ſpace to ſtand or reſt upon. And when the building of them is well performed, they have equal ſolidity, and ſtand in as firm and ſafe a manner. But Mr. Marſhall, who has probably not fully conſidered the advantages of this practice, adviſes that the ſtem or body of the ſtack ſhould be carried up as plumb as poſſible, except the laſt courſe of ſheaves, which ſhould project five or ſix inches, to form the eaves: for the weight of the roof will, he thinks, preſs out the upper part of the ſtem ſufficiently. If it overhang in making, its own weight and the weight of the roof will, it is ſuppoſed, ſqueeze it too flat, will ſpoil the appearance of it, and waſte both thatch and time in thatching. The ſtem or body of a ſtack ſhould commonly contain about two-thirds, and the roof one-third of the whole ſtack. If it be built on a frame, the ſtem ſhould, however, contain leſs, and the roof more; if on a bottom, the reverſe. The corners of the ſtem ſhould not be built too ſharp; ſhould be carried up ſnug; by which the ſides will look fuller, and the ſwell given by the preſſure will be more perceptible. The ends of the roof ſhould have a gentle projecture, anſwerable to the ſtem; and the ſides ſhould be carried up rather convex, than flat or concave. Perhaps a roof greatly convex ſhoots off the rains preferably to any other. A corn-ſtack ſhould not, it is ſaid, contain above twenty-one loads, as the riſk of making and getting in is much leſs on a ſmall than on a large ſtack; beſides, a large ſtack does not ſettle ſo true as a ſmall one, and of courſe will not ſtand the weather ſo well. It is true, a large ſtack does not, in proportion, take ſo much thatch and thatching, which are its only advantages.

But in caſes where corn is ſtacked in a looſe manner, it is the uſual practice to have a number of perſons upon the ſtack, the corn being forked up and depoſited on the different ſides all round in a ſimilar method; after this, other parcels are laid all round on the inſide of theſe, ſo as to bind them in a ſecure manner from ſlipping outward; the operator proceeding in the ſame manner till the whole of the middle ſpace is perfectly filled up; when he begins another courſe in the ſame method, and goes on in this mode, with courſe after courſe, till he has raiſed the whole of the ſtem or body part; then he begins to take in for the roof in a very gradual manner, in every ſucceeding courſe, until the whole is brought to a ridge or point, according to the manner the ſtack is formed in. But in order that the roofs may throw off the water in a more perfect and effectual manner, they ſhould be made ſo as to have a ſlight degree of fulneſs or ſwell about the middle of them, and not be made flat, as is too frequently the practice with indifferent builders of ſtacks of this ſort.

The method of proceeding where the corn is bound into ſheaves, is, however, quite different, as there is ſeldom more than one perſon employed in managing the work of building the ſtack, except in caſes where the dimenſions are very conſiderable; in which caſes it is found neceſſary to have a boy to receive the ſheaves from the pitcher, and hand them to the man that builds the ſtack. And in executing the work, it is of the utmoſt importance that the centre of the ſtack be conſtantly kept in a ſomewhat raiſed ſtate above that of the ſides, as by this means the ſheaves have a ſloping direction outwards, by which the entrance of moiſture is more effectually guarded againſt and prevented. And in order to accompliſh this in the moſt perfect method, it is ſaid to be the beſt practice for the workman to begin in the middle of the ſtand or ſtaddle, ſetting the ſheaves together, ſo as that they may incline a little againſt each other, placing the reſt in ſucceſſive rows againſt them, till he comes to the outſide, when he carries a courſe of ſheaves quite round, and in a more ſloping manner than in the preceding courſes. The bottom of the ſtack being formed in this way, it is afterwards uſual to begin at the outſide, and advance with different courſes round the whole, placing each courſe a little within the other, ſo as to bind them in an exact and careful manner, till the ſtacker comes to the middle. And all the different courſes are to be laid on in a ſimilar manner, until the whole of the ſtem is raiſed and completed; when the laſt outſide row of ſheaves is, in moſt caſes, placed a very little more out than the others, in order to form a ſort of projection for the eaves, that the water may be thrown off more effectually. But in caſes where the ſtems of the ſtacks are formed ſo as to project outwards, in the manner already noticed, this may be omitted without any bad conſequences, as the water will be thrown off eaſily without touching the waſte of the ſtack. And the roof is to be formed by placing the ſheaves gradually a little more in and in, in every courſe, until it comes to a ridge or point, according to the form of the ſtack, as has been already obſerved. But in forming and conſtructing this part of the ſtack, great care ſhould conſtantly be taken to give the ear-ends of the ſheaves a ſufficiently ſloping direction upwards, in order that they may be the better ſecured from wetneſs. And to the outſide ſhould be given a rounded form, in the manner that has been already noticed.

In reſpect to the ſtacking of grain, it is obſerved in the Farmer's Magazine, that the corn and its ſtraw muſt neceſſarily be a great deal more dried in the field, to render it proper for being ſecured in barns, than when it is built in ricks, as theſe latter, being expoſed to the free air all round, are by no means ſo apt to heat or mould the grain and ſtraw, as if it were ſtored in common barns. And that, in conſequence of that ſuperior degree of dryneſs neceſſary for barn-harveſting, the grain is certainly a great deal more apt to ſhake out from the ear, in handling and forking into the carts or waggons for being led home. And further, that when built in ricks properly contrived, the grain is likewiſe placed altogether out of the reach of rats and mice, which commit very great waſte in common barns, however well conſtructed; that it is of courſe better that all grain ſhould be built in round ricks in the yard, upon wooden frames open below, raiſed on ſtone ſupports, ſimilar to thoſe on which granaries are fixed. By this plan, it would, it is ſuppoſed, be more effectually ſecured againſt the depredations of vermin; and beſides, the air having free acceſs all round, and even underneath, through the interſtices of the frame, it will be completely prevented from all danger of ſpoiling any way in the rick. And further, that in this way of ſecuring grain, the ricks do not by any means require to be thatched ſo very ſubſtantially, and, of conſequence, expenſively, as is practiſed in general.

Further, it is alſo adviſed, that in building a corn-rick, effectual care be taken to keep the centre or heart of the rick always conſiderably higher than the outer range of ſheaves, as noticed above; ſo that every ſheaf in the rick has a conſiderable ſlope outwards and downwards. When this is properly attended to, and all the ſheaves carefully locked together, and the crown properly put on, the rick will, it is obſerved, turn a very heavy ſhower of rain, even before the thatch is applied. The whole rick, after the thatch is laid on, is finally covered with a net-work of ſtraw-rope, leaving the meſhes about nine or twelve inches wide, all the ends of the ropes being ſecured to a belt-rope, which goes round the rick below the eaves, juſt within reach of a man, and the middle parts of all the ropes are tied to one that goes ſtraight over the top of the rick by ſmall handfuls of ſtraw. See Stack.

And it has been ſtated by the author of "Practical Agriculture," that it is the practice in ſome diſtricts, eſpecially where the ſtacks are made of a circular form, and the weather is wet and unfavourable, to have a funnel or chimney left in them, in order to prevent their taking on too much heat. This is effected by tying a ſheaf up in a very tight manner, and placing it in the middle, on the foundation of the ſtack, pulling it up occaſionally as the building of the ſtack proceeds all round it. And in ſetting up ricks in bad harveſts, it is a practice in ſome places, particularly with barley-crops, to have three or four pretty large poles tied together, by winding ſtraw-ropes round them, ſet up in the middle, round which the ſtacks are then built. But that except the ſtacks are large, or the grain when put into them in an imperfect condition, ſuch openings are quite unneceſſary. Theſe openings in the northern parts of the kingdom are denominated *fawſes*, or *fauſes*: And it is probable that in ſome inſtances they may be prejudicial to the ſtacks, by the admiſſion of too much moiſt air. See HARVESTING *of Grain.*

A curious practice in this mode of ſtacking grain prevails in ſome parts of the northern diſtricts of the kingdom, where the operation is performed round about a high conical frame of wood, which has, in ſome caſes, a ſmall door, provincially termed a *logie*, formed in it on the ſide or quarter from which the wind commonly blows, in order that a more free admiſſion of air may be ſecured, a lateral vent, or ſmall opening, being ſometimes, perhaps, made in the body, a little below the point of the wooden frame, which has in different parts of theſe diſtricts of country the names of *fauſe* houſe and *windy* houſe. The writer of the Corrected Account of the Agriculture of the County of Inverneſs ſuggeſts, that where wood is ſcarce, the ſame effect and advantage may nearly be produced, without an upright timber-frame, by filling a ſack with ſtraw or hay, and fixing a rope to the mouth of it. This ſack is ſet down adjoining to the logie, and in the centre of the ſpace on which the ſtack is to be built; and as the ſtacking advances, the ſack is gradually pulled up, ſo far as is thought neceſſary and uſeful, by which means a future draught of air is freely admitted. Theſe precautions are, however, it is ſaid, moſtly uſed when the material is damp, and the ſtack to be formed on the ground. See STADDLE.

In ſome damp ſituations and moiſt wet ſeaſons, grain is occaſionally ſtacked up in the field in different forms and methods. The writer of the Account of the Huſbandry of Middleſex has remarked, that to the weſtward of the city of Bath, the exceſſive moiſture of the climate has neceſſarily induced and obliged the occupiers of arable land to ſecure their corn or grain crops in the field, immediately after they are bound into ſheaves, by ſtacking them in round ricks or ſtacks, which contain about a cart-load each; the ſheaves being placed in ſuch a manner as to ſecure the ears equally againſt the rain and damp ariſing from the ground. They are ſet on their butt-ends in the bottom parts, but every ſheaf, from the eaves upwards, is placed ſloping in a thatch-like manner, and in the form of a cone. One ſheaf is inverted at the top, and ſpread over this cone-like point; which method ſecures the whole, until it may ſuit the convenience of the farmer to carry the matters to be re-ſtacked, or built up in the barns or ſtack-yards. When theſe ricks or ſtacks are well made or put up, they are ſecure, it is ſaid, againſt every poſſible quantity of rain, and for any reaſonable length of time; even for a whole winter, if it were neceſſary to keep them out ſo long. This is a practice of ſtacking in the field, which, it is thought, deſerves imitation in all wet climates, and indeed in all others, in caſes of wet harveſt ſeaſons.

The method of ſtacking or making the ariſh mow or ſtack, which is another mode of ſtacking grain in the field in ſome of the ſouth-weſtern diſtricts of the kingdom, is thus deſcribed by the writer of the "Weſtern Tour." A ſort of cone or pyramid is firſt formed with ſheaves ſet upon their butt-ends, and in a leaning manner towards their centre; the workman then gets upon them with his knees, an aſſiſtant putting the ſheaves in their proper places before him, while he creeps or crawls round the mow or ſtack, forcing and beating them down in a perfect manner with his knees applied about the binding-place; and continuing in this manner to lay courſe after courſe, until the mow or ſtack be deemed high enough; obſerving to contract the dimenſions of it as it riſes in height, and to ſet the ſheaves more and more upright, until they form at the top a ſharp point, which is capped with an inverted ſheaf, either of corn or reed. In caſes where corn or grain is put up or built in theſe ſtacks, it is moſtly thought to be quite ſafe.

The ſtacking of corn, when carried to the yards, is frequently performed on oblong and other forms of raiſed wood, on frames covered with looſe poles or other matters, ſo as to admit air freely to all parts of the bottoms of the mows or ſtacks, and at the ſame time to prevent rats and other ſuch animals getting into them.

The ſtacking of grain is moſtly performed in a neat and exact manner in many diſtricts towards the middle and more northern parts of the kingdom; but in many of the more ſouthern and eaſtern counties, it is often done in an extremely bad and ſlovenly manner. In Oxfordſhire and Berkſhire ſtacks are formed with peculiar neatneſs, and have much merit in their different forms and ſhapes, being not unfrequently duly arranged, and placed in neat clean ſtack-yards. In the latter of the above counties, it has been remarked, that a farmer who was negligent in theſe reſpects, would be the object of obſervation and deriſion in his neighbourhood. And that the labourer who can make a handſome rick or ſtack, prides himſelf on his ſkill; and as good as well as bad examples are catching, others, in imitation, endeavour to gain credit by the ſame means.

In finiſhing the ſtacking of grain in many places, the ſtem or body parts of the ſtacks or mows are neatly pared round, in order to prevent the vermin, which might leap againſt them, from finding any thing to hold by; and the whole is completed in a neat and exact manner.

STACKING *of Hay*, the work or buſineſs of putting hay up into ricks or ſtacks. This is an art which requires much care and attention in the perſon employed for the purpoſe, though much leſs than that of building corn-ſtacks. There ſhould conſtantly, though it is often too much neglected, be a proper ſtand or foundation, ſomewhat raiſed by wood or other materials, prepared for placing the ſtacks upon; but nothing of the ſhelving outward direction or of the coping kind is here neceſſary. See STACK, STADDLE, and STAND.

It may be noticed, that in performing the buſineſs of ſtacking hay, the work ſhould conſtantly be performed as much as poſſible while the ſun is upon the hay, as much advantage is thus gained in the quality of the hay: and it is neceſſary to have a ſtacker that has been accuſtomed to the buſineſs, and a proper number of perſons to help upon the ſtack, in order that it may be well ſpread out and trodden down. The building of theſe ſorts of ſtacks ſhould be conducted much in the ſame way as thoſe of the grain kind; the middle of the ſtack being always well kept up, a little higher than the ſides, and the ſides and ends be well bound in by the proper application of the ſucceſſive portions of hay as the work advances; and during which it is a good way, where there are plenty of hands, to have the ſides and ends properly pulled into form, as by this means much after-labour is prevented. It is likewiſe of advantage, that the hay ſhould be well ſhaken and broken from the lumps during the operation of ſtacking. The form in which the ſtacks are built is not, as has been already ſeen in ſpeaking of ſtacks, of much conſequence. See STACK.

With the intention of preventing too much heat, ſometimes in building theſe ſtacks, as well as thoſe of the grain kind, holes, pipes, and chimnies are left in the middle, that the exceſſive heat may be diſcharged. But there is often injury ſuſtained by them, from their attracting too much moiſture. See HAY, and HAY-*making*.

For this purpoſe, ſquare ſpouts or troughs, bored full of large holes, and two oppoſite boards, ſecured about nine inches apart, by nailing ſhort laths on them, are ſometimes employed; as well as the drawing up the middle of the ſtacks, while they are building, a baſket or a ſack full of hay, ſtraw, or other ſimilar materials. And in ſome caſes, on the ſtacks heating too much, ſquare openings are cut from the tops to the bottoms of them.

In ſtacking of hay, the uſe of ſalt has likewiſe been found to have the valuable property of keeping it from heating too much in ſuch ſituations, and, by that means, preſerving it of a finer green colour than would otherwiſe be the caſe. Its diſpoſition to counteract or prevent heat is ſo great, it is ſaid, in ſuch caſes, as to render it particularly ſuitable, proper, and valuable in every inſtance where it may be ſuſpected that the hay has been put together without being ſufficiently made.

The hard benty hay of poor uplands may moſtly be ſtacked up without any riſk or danger of heating too much; but that which is of a more open ſucculent nature and quality, on rich or highly manured lands, is for the moſt part very liable to take on too great a degree of heat, and ſhould conſequently be longer delayed in ſtacking, as well as put up in ſmaller quantities together, in order to avoid being injured by being burnt in the mow or ſtack.

The hay of clover, tare, ſaintfoin, and ſome other ſimilar kinds of graſſes, are commonly more diſpoſed to heat in too great a degree than almoſt any other ſorts when put up in ſtacks, not only on account of their being more ſucculent and ſappy, but in conſequence of their nature requiring that they ſhould be a good deal leſs made, in order to preſerve their foliage as perfectly as poſſible. In ſtacking them, therefore, theſe circumſtances ſhould be carefully attended to and kept in mind, and ſmaller, as well as more looſely formed ſtacks of them raiſed. In the county of Middleſex alſo, many farmers are ſaid to make uſe of ſalt, in ſuch caſes, with very good effect, in keeping down the heat.

Where there are great quantities of hay ready on hand at the ſame time, it is of much conſequence that it ſhould all be ſtacked up as ſoon as ever it is fully made, which, though difficult to be accompliſhed in many caſes, ſhould ſeldom be neglected, as its weight and good quality greatly depend upon it, there being every moment from that time a loſs in the weight, as well as the nutritious properties of it, by what is forced off by heat into the atmoſphere. The difference of even a few hours in very hot ſeaſons, may, it is ſuppoſed, be the cauſe of a loſs of fifteen or twenty *per centum* on the hay, by its having been carried beyond the point of perfection in making; and not unfrequently a much greater loſs is ſuſtained. The ſtacking, therefore, in ſuch circumſtances, ſhould always be done as expeditiouſly as poſſible.

In regard to the loſs of the materials before and after they have been ſtacked up, it has been ſuppoſed by the writer of the Middleſex Agricultural Report, that four hundred weight of graſs waſtes in forming into hay, three hundred before it is ready for ſtacking; it is then further reduced by heat and evaporation, in about the ſpace of a month, to perhaps ninety-five pounds; that at between that and ninety, it is apprehended it continues throughout the winter. That from about the beginning of ſpring until the commencement of the following autumn, the different operations of truſſing and conveying it away, render it conſiderably lighter, probably to eighty, by expoſing it ſo much to the ſun and wind: that is, ſuch hay as would weigh ninety pounds on being taken from the ſtack, would be reduced to eighty by the time it is diſpoſed of, as in the courſe of twenty-four hours. On ſuch ſtacked hay being kept longer, little or nothing is loſt in the ſucceeding winter: it is nearly obvious, it is thought, that the ſame ſtacked hay will weigh on being diſpoſed of eighty pounds in the ſummer, and ninety in the winter. From this circumſtance, and ſome others which relate to price, the farmer may, it is conceived, determine what ſeaſon of the year is the moſt advantageous and proper for him to diſpoſe of his ſtacked hay: on large hay-farms ſtacked hay is ſometimes kept for four or five years, and there are not unfrequently very large quantities of hay on them in this ſtate.

The ſtacking or mowing of hay is ſometimes performed in large hay-barns conſtructed for the purpoſe, which are found to be extremely uſeful and convenient on many occaſions, as well as to produce conſiderable ſavings in different ways, beſides the ſafety which they afford. See STACK *Hay-Barn*.

After the work of ſtacking the hay has been finiſhed, and the ſtack been properly pulled and topped up, it may be left until it has ſweated, and is become perfectly ſettled, which moſtly takes place in the courſe of a week or two. It is then ready for thatching. See THATCHING *of Stacks*.

It may likewiſe be noticed, that in building the upper parts of theſe, as well as grain and other ſtacks, the uſe of a ſtage often becomes neceſſary, in order that the materials may be pitched more conveniently to the ſtacker, as has been ſeen under the head STACK. See STACKING-*Stage*.

STACKING *of Pulſe Crops*, the art and practice of putting all the ſorts of farm produce, which have pods in the place of ears, up into ſtacks. It is always neceſſary, in building them, to keep the pod parts, as much as poſſible, from being expoſed to the action and effects of the atmoſphere, as they are very liable to be much injured or quite ſpoiled by the influence of much moiſture or wetneſs, whether communicated by the air or in any other manner. It is conſequently proper in ſtacking up theſe different materials, to always let the ſtem or root-ends of the crops have an outward direction and appearance, they being bound inwardly by ſuch wads, ſheaves, or bundles as have but little ſtem or root parts in them, which is moſtly ſufficiently the caſe in all ſuch ſorts of produce. The middle parts of ſuch ſtacks ſhould always be kept well filled up with ſuch materials while building. The ſtem or ſhaft parts may moſtly be carried up in a pretty plumb or upright manner, but if the outward ſide parts are made and carried up ſo as gradually to diverge or project a very little at the top or eave parts, it will be ſo much the better, and the ſtack will be ſo much the ſafer from the danger of the droppings of the rain-water or any other wetneſs that may fall upon it.

It is hardly ever neceſſary to carry up the top parts in conſtructing ſuch ſtacks to any great height, the lower they are indeed the better, provided they are formed in a regular manner, and ſo as to effectually carry off the water that may fall upon them.

The topping-up of ſuch ſorts of ſtacks ſhould never, however, be much delayed, as the ſeed of ſuch kinds of produce readily ſwell, and are apt to become injured by a very little moiſture in ſuch ſituations.

Theſe ſorts of ſtacks, as well as thoſe of other kinds, ſhould always be built upon proper ſtaddles in ſafe yards or other ſituations.

STACKING *and preſerving of Hop-Poles*, the practice and method of piling them up in ſtacks, for the purpoſe of rendering them ſafe and ſecure againſt wind and bad weather; and the means of preparing their bottom parts againſt the injuries they may receive from the earth or ſoil in which they may be placed. See HOP-*Pole*.

In the ſquare manner of ſtacking up hop-poles, the number of from thirty to forty or more are uſually ſet up to each corner ſo as to form it, which ſhould moſtly ſtand eight, ten, or twelve feet apart in each or every direction at the baſe or bottom parts of them, the top parts uniting, or coming as cloſely as poſſible into contact with each other. By this mode of proceeding, a ſort of ſquare inclining pile is formed, while ſufficient openings or ſpaces are produced below and between them, for contributing to render the poles dry, as well as afterwards for preſerving them, as much as poſſible, in that condition, and at the ſame time for letting the wind paſs among them more freely, by which the danger of their being thrown down or overturned is conſiderably leſſened, as in the caſe of ſtacks of the conical or circular form. In conſtructing this, as well as the other form of theſe ſtacks, a few poles are firſt well fixed up, faſtened and ſecured at the top parts, and then ſet out in a firm ſpreading-out manner at the bottoms, ſo as that the proper quantity of poles may afterwards be regularly and gradually laid to them and conſtitute the ſtack.

The means of rendering the parts of hop-poles which are ſet into and come in immediate contact with the mould or ſoil leſs liable to decay and deſtruction than they are in the ordinary mode, is a matter of much conſequence to thoſe engaged in the cultivation of hops. The following proceſs has been recommended by Mr. Vancouver, in the Corrected Account of the Agriculture of the County of Eſſex. Taking into full and due conſideration, it is ſaid, the very important benefits which are derived from coal-tar, in preventing the depredations of marine inſects on plank and timber, it very naturally occurs, that a preparation of the ſame ſubſtance, judiciouſly applied, might not only produce a ſimilar effect on and againſt inſects in the ground, but, by its gradual and regular ſolution there, become matter of food for the nouriſhment of plants; and that this leads to a very important conſideration, as that of how far the application of the ſame material may become ſerviceable, by prolonging the durability of poſts ſet into the ground, and in the like manner for the preſervation of the parts of hop-poles which are put into the earth, to which particular point, it is ſtated as the ſubſtance of a converſation on the ſubject with the earl of Dundonald, who has taken a great lead and intereſt in the invention, manufacture, and introduction of coal-tar into more general uſe, that he recommends the method of preparing the hop-poles with it, which is given below, to all hop planters.

The parts of the ends of the hop-poles which are intended to be ſet or inſerted into the ground or ſoil, ſhould firſt be ſtripped of their bark for the length of about thirty inches. The poles ſhould then be pointed, and ſcorched or burnt, until the ſurface of them, from which the bark has been removed, becomes black, and in ſome ſort charred. The uſual or cuſtomary depth to which poles are ſet and fixed in the ground, will moſtly regulate with exactneſs how much of the pointed ends of the poles ſhould be treated in the above manner. The burnt end of the pole, while hot, ſhould be dipped into thin coal-tar, which ſhould previouſly be made a little warm, in order that the wood may abſorb and take up as much of it as poſſible. There may perhaps, it is ſuppoſed, be an advantage in dipping or putting the pole the whole ſpace of the thirty inches which is ſtripped of the bark, as by that means twelve inches of what is covered and laid over with coal-tar may be above the ſurface of the ground.

After the paying or coating of the poles with the tar has been completed, they are to be put up or ſtacked with their pointed and tarred ends upwards, until they become perfectly and quite ſufficiently dry; after which they are to be dipped in coal-pitch made boiling hot, and then ſet up again in the ſame manner, to remain in that ſtate until the time when they are wanted for uſe. In caſes where the poles are liable to injury at the upper or ſmaller ends, dipping them in the coal-tar might alſo, it is ſuppoſed, probably be of uſe in preventing the ſeparation of the bark, or the harbouring of inſects.

It is of very material conſequence that the coating or tarring of the poles be performed at ſuch a diſtance of time before they are wanted for uſe, as to allow of the whole covering becoming perfectly firm, hard, and dry. And likewiſe that the poles, before they are begun to be coated over with the tar, be in a quite dry condition, as they take up a much greater quantity of tar when in this ſituation, than when much loaded with moiſture, as is too often the caſe.

The practice of burning or charring the bottom ends of hop-poles has alſo been found highly beneficial in preſerving them from decay without the application of either the coal-tar or pitch, in many caſes and ſituations, as well as ſome other methods. See Hop.

It is always proper to have the poles piled up in proper parcels together, or ſet upright againſt ſome ſort of ſupport in the hop-grounds, while they have the binds about them, until they can be diſengaged from them, as well as afterwards, until they can be ſtaked or pointed, prepared in the above manner, and ſet up into ſtacks, inſtead of having them diſperſed all over the ground in a flat manner, as is the too uſual cuſtom, as by ſuch means they will become readily more dry, be a great deal more free from injury, and at the ſame time be rendered more fit for receiving the preparation.

And in extenſive plantations, it might probably be the ſafeſt, cheapeſt, and moſt convenient way, to have open coarſe ſheds with ſecure cheap roofs built for receiving and preſerving them in, they being piled up in them upon low frames or ſtools with long arms or branches for keeping them up. In this manner they would in all probability be more readily, more perfectly, more conveniently, and more advantageouſly ſecured than in any other way; and thereby a great ſaving of poles moſt likely be produced.

Stacking *of Straw and Stubble.* Straw is often ſtacked up when bound in truſſes, as well as when in the looſe ſtate. In the former mode, the different bundles ſhould be ſtacked in as ſtraight a manner as poſſible, in order to be kept for ſale or other particular uſes. In the latter ſtate the ſtacks ſhould be well pulled while they are forming, in order that they may be cloſe and compact. In building the top parts of ſtacks of this nature, they need not be carried to any great height, but be ſo formed as to ſhoot off the water in a perfect manner.

Stacking-*Bands*, or *Belts*, the ropes or bands uſed in thatching ſtacks of different kinds, whether of the ſtraw, hay, or other ſorts.

Stacking-*Stage*, the ſcaffold or platform employed in building ſtacks of corn, hay, and many other ſorts of farm produce.

Stages of theſe kinds are conſtructed in different ways, ſome being fixed together in a ſort of frame, ſo as to be ſet up againſt the ſtack, and ſuited to the height of pitching by a moveable ſtage. Lately this ſort of ſtage has been conſiderably improved, by being ſo contrived as to be capable of being readily taken in pieces and laid by. It is the contrivance of a gentleman in the county of Suffolk, and deſcribed in the Agricultural Survey of that diſtrict. It conſiſts of two parts, one of which is a frame eight feet wide, made of two fir-balks twenty-two feet long, braced together in a parallel poſition, and having ſeveral holes bored in them, about fourteen feet from the ground, for the reception of the hinges of the ſtage; and a hook in each of them, to hang the chains on which are to ſupport the outward edge of the ſtage, and ſerve to raiſe or lower it at pleaſure. The other part is a moveable ſtage eight feet long, and three feet eight inches broad, having a hinge under each end, at the hinder, or edge neareſt the ſtack; one end of the hinges is made like a bolt, to enter the holes in the balks; the ſtage likewiſe has an iron-plate under each end, with a hole in it to receive a hook on the chain. It is added, that in uſing the ſtage it is ſet againſt the ſtack, when it grows ſo high that it is inconvenient to pitch on to it from the buck of an empty waggon. The holes in the balks moſt commonly uſed are fourteen feet from the ground, about the height of a waggon-load of hay. Should the ſtage be fixed lower, it would be of no uſe, not being wanted whilſt a man can conveniently pitch from the buck of a waggon on to a ſtack; and ſhould it be fixed much higher, it would be found too high for a man to pitch on to, when the waggon is nearly empty.

It has been ſuggeſted, that a ſtage like this is not expenſive in the conſtruction, and might be uſed for nailing up weather-boarding, painting, plaſtering of walls, and ſeveral other purpoſes.

STACKPOLE Head, in *Geography*, a cape on the S. coaſt of Wales. N. lat. 51° 42′. W. long. 4° 57′.

STACKS *of Burgh*, rocks near the E. part of Scotland, one mile W. of Duncanſby Head. N. lat. 58° 23′. W. long. 2° 57′.

Stacks *of Duncanſby*, rocks in the North ſea, near the E. coaſt of Scotland; 1½ mile S. from the mouth of Wick river. N. lat. 58° 36′. W. long. 2° 57′.

Stacks *of Hempriggs*, rocks in the North ſea, two miles S. from the mouth of Wick river. N. lat. 58° 21′. W. long. 2° 57′.

STACTE, ϛακτη, in *Pharmacy*, a fatty reſinous liquid matter, of the nature of a liquid myrrh.

This liquor is very odoriferous, and is held very precious; making alone the perfume called by Dioſcorides *ſtacte*, which, he ſays, ſmells finely, though very bitter to the taſte. We have none of it now but what is ſophiſticated; and what the apothecaries call ſtacte, is uſually no more than liquid ſtorax.

STADARSTAD, in *Geography*, a group of buildings, compriſing a church, the habitation of the miniſter, and a few cottages, in Iceland, ſituated in the peninſula terminated by Snæfell's *Syſſel* (which ſee.) This church was the beſt which the travellers to whoſe account we refer had ſeen, except that of Beſſeſtad. It is conſtructed entirely of wood, and has a pretty large gallery. The mountains that riſe behind Stadarſtad are very lofty, and preſent a bold and precipitous front towards the ſea. About ſix miles from Stadarſtad, in the mountains that approach towards the ſea, is a hot ſpring, in a place called Lyſiehouls. The water iſſues from the top of a mount about ten feet high, and fifty yards in diameter, entirely calcareous. The temperature of the ſpring was 96°, and the water had an acidulous taſte. Not far from the mount were great quantities of incruſtations not calcareous, which had evidently been formed by ſome ancient ſprings. About half a mile from the ſpring is a ſtream of lava, that had flown down from the precipices above, and ſpread over the flat plain intervening between the mountains and the ſea. Near Buderſtad, which is one of the trading ſtations of Iceland, and conſiſts of a merchant's houſe, a large wooden ſtorehouſe, a church, and a conſiderable number of cottages, is another mineral water, the taſte of which was ſimilar to that of Lyſiehouls; the temperature was 46°. Mackenzie's Travels in Iceland.

STADDLE, in *Agriculture*, a term applied to the bottom part, or that on which the ſtack or mow of corn, pulſe, ſtraw, hay, or any other ſort of field produce, reſts, and is formed or built. Theſe ſorts of ſtaddles are contrived in many different ways, according to different occaſions and circumſtances; as, in a walled manner, in the wooden frame method, in the ſimple log mode, and ſome others. The two firſt are, however, by far the moſt proper, where grain or pulſe is to be ſtacked upon them; but the laſt may do for ſtraw and hay occaſionally, where better and more perfect methods cannot be adopted or put in practice. The firſt method is expenſive, and therefore not common. See *Corn*-Stand.

A method more commonly adopted by farmers, is that of the wooden frame, reſting upon low ſupporters of the ſtone or other kinds. In many different diſtricts, the ſtaddles, eſpecially for corn, are conſtructed by means of upright ſtones with caps, placed about ſeven feet diſtance from each other, in a circular, ſquare, or ſome other ſuitable form. The upright ſtone, in ſome caſes, is a truncated pyramid, about four feet in length, a foot being allowed to be let into the ground. On the top, which is about four inches in the ſquare, is placed the cap, which is a round ſtone, flat and ſmooth on the under ſide, and a little convex on the upper, two feet in diameter, and projecting ten inches from every ſide of the upright ſtone. Upon theſe ſtones ſtrong timbers are framed, firſt extending in a croſswiſe direction, and then all around the ſides; a ſtone and cap being, for the moſt part, put in the centre, to take off the bearing of the croſs-timbers. This is a plan of ſtaddle, which, it is thought by many, effectually ſecures the grain againſt rats and other ſimilar ſorts of vermin.

In other ſituations, ſtone or wooden pillars are put down, at proper diſtances from each other, into the ground, upon which is laid a firm and ſtrong ſubſtantial timber-frame, well compacted and put together, of joiſts, beams, and other parts, as may be found neceſſary and expedient. If the ſupporting pillars be of ſtone, they are uſually of a conical form, with ſtone caps faced upon their tops, as above; but if of wood, they are caſed with tin, ten, twelve, or more inches near their upper ends. In the former caſe, the ſtone caps, and, in the latter, the tin coverings, effectually prevent, it is ſuppoſed, the rats and mice from climbing up into the ſtacks.

In ſome of the more northern diſtricts of the country, the corn-ſtacks are occaſionally ſet ſomewhat in the form and manner of little houſes, upon pillars, or arches turned in maſonry, round or on one or more of the moſt expoſed ſides of the ſtraw-yards, where the outlying or other cattle are to be foddered and kept. Where the pillar mode is adopted, a ſtrong ſolid wall, built in maſon work, moſtly forms the outſide, and the pillars are ſet round or on the inſides of the ſtraw-yards. Beams of a proper ſize and length are firſt laid from one pillar to another, and then rafters are laid acroſs from the outſide wall to the pillars and beams, ſo as to form a ſort of flooring; upon which the ſtacks are built of any length and height that may be neceſſary; their roofs being always well ſecured. In the turned arch manner, no pillars or frames of wood are at all neceſſary, the top parts of the arches forming the baſes or ſtaddles for raiſing the ſtacks upon, while the openings of them, or arches below, form the ſtalls for the cattle. In both theſe ways the cattle are well protected below or underneath the ſtacks; the grain is perfectly preſerved from the effects of dampneſs and vermin, by being ſo much elevated; and to the farmer there is a conſiderable ſaving of manure in different ways.

In other caſes, corn-ſtacks are built round and againſt a frame of wood, ſet up firmly in ſomewhat a conical ſhape or manner; the tops of the rafters or boards, of which this ſort of ſtaddle is compoſed, reſting or inclining againſt each other, and reaching ſomewhat above the eaves of the ſtack. This is a kind of ſtaddle which is ſuppoſed to afford much air and ventilation in moiſt damp ſituations, for drying the grain in the ſtacks. See STACKING *of Grain.*

Where the ſimple log manner of forming ſtaddles is in uſe, any ſort of rough large pieces of wood, of the tree or other kind, are laid round the outſides, in the form in which the ſtacks are to be made; in the inſide and middle of which, bottoms or foundations are formed with common wood faggots, buſhes, or any other ſimilar matters; the whole being then well covered with rough ſtraw or haulm of any ſort. See STACKING *of Hay*, and STAND, *Grain.*

The term *ſtaddle*, likewiſe, ſometimes ſignifies a tree, which is ſuffered to grow for coarſe or common purpoſes; as the forming and making of poſts, rails, and other ſimilar uſes.

STADDLE *of Hay*, a term applied to a plot or portion of hay thrown abroad in making. See HAY-*Making.*

STADDLE-*Roof*, any ſort of roof or covering which is placed over ſtaddles, and employed for the purpoſe of protecting or ſecuring the ſtacks of either corn or hay, or of any other ſorts of materials which are built upon them. Staddle-roofs are of many different kinds, and their heights and ſizes are various, according to thoſe of the ſtaddles over which they are laid.

In the county of Devon, a mode of this kind of roof prevails for the ſecuring of corn, in ſome parts of the South-hams in that diſtrict, which appears to be entitled to the conſideration of the farmer.

It is ſaid to have been borrowed from the Dutch, as it is much uſed in Holland, and all the low countries upon the borders of the Rhine and Scheldt rivers. It is likewiſe ſtated to be almoſt univerſally had recourſe to throughout the eaſtern and middle ſtates of North America. And it probably exiſts in different other countries and diſtricts.

It conſiſts of a light moveable roof, formed of ſome ſort of ſuitable and convenient materials for the purpoſe, which is capable of being raiſed or let down at pleaſure over the ſtaddle upon which the ſtack is built. The methods of forming and managing the arrangement of it are theſe. At the diſtance of about four feet from the corners of the ſtaddle or ſtack-frame, are ſunk four ſtrong boxes, well rammed and ſecured in the ground, and of ſufficient capacity to receive about three feet in length of a large pole or ſpar, rounded from a ſquare of ſix inches, being made a little tapering towards the top, and thirty feet in length: on the upper end of this ſpar or pole is fixed a ſtout ring or ferrule, from which is projected a ſtrong iron hook: the four poſts or poles thus formed and fitted up are placed in the boxes at the different corners of the ſtaddle. A two-ſheave tackle is then hitched to the hooks at the tops of the poles or poſts, and a one-ſheave tackle to each corner of the roof, reſting upon the ſtaddle, and preſenting at each corner a portable hoop, or collar, to encloſe the different poles or poſts on which it traverſes up and down, keeping all firm, ſteady, tight, and compact together. Theſe four tackles are manned with as many perſons as may be found neceſſary to raiſe or lower the roof, and thus every ſheaf of grain, or any other ſubſtance, which is brought home to be ſtacked under theſe ſtaddle-roofs, is ſaid to be more immediately and better ſecured from future damage, than if they were any otherwiſe placed under cover, or even ſtowed away in a barn or other ſimilar building. This ſtaddle-roof contrivance is ſaid to be denominated a hay-barrack in the ſtate of Pennſylvania, in North America, in which diſtrict they are equally uſed for the purpoſe of protecting hay as well as corn.

It is noticed, that in climates or tracts of country which are frequently liable to ſudden and violent ſtorms, or thunder-ſhowers, during the periods of hay-time and harveſt, theſe ſtaddle-roofs are moſtly found particularly uſeful, proper, and neceſſary for the farmer, in preſerving his crops of theſe kinds in the beſt and readieſt manner.

The looſe ſtaddle-roofs, uſed in ſome ſituations, are moſtly formed of ſome ſort of very light thin boards of different extents, as ten, twelve, or more feet in length, and which are ſometimes bent or curved on one ſide, and hollowed in the middle, in ſomewhat the manner of the pantiles which are uſed in covering buildings, ſo as to hook on to each other and carry off the wet. Roof-boards of this ſort are in uſe on the farms at Winwick, one of the ſeats of the earl of Derby, in Lancaſhire, and found to anſwer the purpoſe very well, and to be particularly ſerviceable in ſhowery or rainy ſeaſons.

Staddle-roofs of the cloth kind are ſometimes employed; the old ſails of ſhips and other ſimilar ſorts of cloth being provided for the purpoſe.

STADDLE-*Stones*, thoſe which are made uſe of in the conſtruction of ſtaddles, eſpecially when they are intended for the purpoſe of corn, in order to keep rats and other ſorts of vermin out of the ſtacks; and alſo for granaries, to keep them from climbing up into them. Various kinds of ſtones are employed in this way, as thoſe of the free-ſtone, the ſlate-ſtone, the lime-ſtone, and different other kinds. See STADDLE.

Staddle-ſtones are moſtly employed alſo for granaries, wherever the primary conſideration of the farmer is the ſecurity of his corn. In theſe caſes, the old method was to have them only put at the corners, while the buildings ſtood upon a frame of wood, but the improved mode is to have them coped all round, in ſomewhat the ſame manner as corn-ſtands, in order that they may be perfectly ſecure againſt the inroads of deſtructive vermin.

For granaries placed on ſtaddle-ſtones, it has been lately ſuggeſted, in order to prevent vermin from getting up the outward ſteps, that ſuch ſteps ſhould be fixed on the inſide of the lower parts of the door, which are to be balanced with weights, ſo that a ſlight effort may be capable of bringing them down on blocks of ſtone, which are to form the firſt ſteps for the purpoſe, ſuch blocks of ſtone being twenty-four feet by fourteen in the clear. The doors, in ſuch caſes, muſt, of courſe, project in ſome degree in being brought forward, ſo as to reach the ground, or come near to it, for the purpoſe of affording a ready and eaſy entrance into the repoſitories.

STADE, in *Geography*, a town of the duchy of Bremen, with a ſtrong fort, on a ſmall river, about a mile from the Elbe; formerly the capital of a county and reſidence of the counts. It is now the ſeat of the regency of the duchies of Bremen and Verden, and alſo of the chancery, chief court of juſtice, and conſiſtory, and contains three churches. Its two burgo-maſters are counſellors of ſtate. It was formerly a place of conſiderable trade, and from the year 1586 to 1612, an Engliſh ſtaple, which was removed to Hamburg. After having undergone ſeveral revolutions and changes of maſters, it was occupied in 1715 by the troops of Brunſwick. In 1757 the fortifications of it were completed; 24 miles W. of Hamburg. N. lat. 53° 42′. E. long. 9° 21′.

STADECKEN, a town of Germany, in the palatinate of the Rhine; 11 miles W. of Oppenheim.

STADELHOFEN, a town of Bavaria, in the biſhopric of Bamberg; 6 miles S.S.W. of Weiſmain.—Alſo, a town of the duchy of Wurzburg; 7 miles S.S.E. of Gemunden.

STADEN, a town of France, in the department of the Lys; 7 miles S.E. of Dixmude.—Alſo, a river of Germany, which runs into the Nidda, 10 miles N. of Francfort on the Maine.—Alſo, a town of Germany; 20 miles N.E. of Francfort on the Maine.

STADIUM, ϛαδιον, an ancient Greek long meaſure, containing one hundred and twenty-five geometrical paces, or ſix hundred and twenty-five Roman feet; correſponding to our furlong.

The word is formed from the Greek ϛασις, *ſtation;* and it is ſaid, on this occaſion, that Hercules, after running ſo far at one breath, ſtood ſtill. The Greeks meaſured all their diſtances by ſtadia, which they call ϛαδιαζειν.

Eight ſtadia make a geometrical or Roman mile; and twenty, according to M. Dacier, a French league; but according to others, eight hundred ſtadia make forty-one and two-thirds of a league.

Guilletiere obſerves, that the ſtadium was only ſix hundred Athenian feet, which amount to ſix hundred and twenty-five Roman, five hundred and ſixty-ſix French royal feet, or ſix hundred and four Engliſh feet; ſo that the ſtadium ſhould only have been one hundred and thirteen geometrical paces. It muſt be obſerved, however, that the ſtadium was different in different times and places. See MEASURES.

STADIUM was alſo the courſe, or career, in which the Greeks ran their races.

It is ſaid to have derived its name from the meaſure of length mentioned in the preceding article; which being equal to the ſpace of ground allotted for the foot-race, the courſe was from thence called the ſtadium, and the racers were named ſtadieis, or ſtadiodromi. The Eleans, indeed, pretended, that the ſtadium at Olympia was meaſured by the foot of Hercules, which being longer than that of an ordinary man, made their ſtadium longer than any other in the ſame proportion.

Vitruvius deſcribes it as an open ſpace one hundred and twenty-five paces long, terminated at the two extremes with two poſts, called *carcer* and *meta*.

Along it was built a kind of amphitheatre, where the ſpectators were placed to ſee the athletæ exerciſe running, wreſtling, &c.

Pauſanias (lib. vi.) informs us, that the Olympic ſtadium was a terrace compoſed of earth; on one ſide of which was the ſeat of the Hellenodicks, or Hellenodics (ſee HELLENODICÆ), and over-againſt them on the other, was an altar of white marble, upon which the prieſteſs of Ceres Chamyne, and ſome virgins, had the privilege to ſit and view the games. At the farther end of the ſtadium was the barrier, whence thoſe who ran the ſimple foot-race began their courſe; and there, according to the tradition of the Eleans, was the tomb of Endymion.

According to the deſcription given by Wheeler, in his travels, of the remains of the ſtadium at Athens, which was built by Herodes Atticus, it appears to have been a long place, with two parallel ſides, cloſed up circularly at the eaſt end, and open towards the other end, and about one hundred and twenty-five geometrical paces long, and twenty-ſix or twenty-ſeven broad, which gave it the name of a ſtadium.

Though the Olympic ſtadium does not ſeem to have been ſo ſplendid as this at Athens, or another at Delphi, built likewiſe of marble by the ſame magnificent citizen of Athens, yet we may ſuppoſe they were all formed upon the ſame model, as they were deſtined to the ſame uſe. In the ſtadium were exhibited thoſe games which are properly called gymnaſtic. At either end of the courſe ſtood a pillar, the one conſtituting the barrier where the race began, and the other the goal, where the ſimple foot-race, inſtituted or revived by Iphitus, ended.

In the fourteenth Olympiad was added the *diaulos*, or double ſtadium; and the *diaulodromoi*, who ran this race, turned round the pillar erected for that purpoſe at the end of the ſtadium, and returned to the barrier, where their race terminated. But the *dolichodromoi*, or runners in the race called *dolichos*, or the long courſe, which was introduced in the fifteenth Olympiad, and which conſiſted of ſeven, or twelve, or even of twenty-four ſtadia, when they came to the barrier, turned again round the pillar erected at that end, in order to continue their courſe, which required many doublings of the ſtadium.

The ſtadium, or race-ground, called the Olympian *hippodrome*, conſiſted of two parts; the firſt reſembled in ſhape the prow of a ſhip, and was called the *barrier*. In this place were the ſtands for the horſes and chariots, and here they were matched and prepared for the courſe. The next partition was the *liſts*, or the ſpot on which the races were to be run. At the end of the courſe ſtood a pillar, which was the goal, round which the candidates were to turn; and that rider or driver who could make the narroweſt turn and approach neareſt to it, had the faireſt chance, *cæteris paribus*, of ſurpaſſing his rivals. To this Horace alludes in the expreſſion, *Meta fervidis evitata rotis*. Beyond this goal, there was a figure placed on purpoſe to frighten the horſes, called *Taraxippus*, or the *terrifier of horſes*. It is probable, that ſome tricks were practiſed under the diſguiſe of this figure, to render the victory more difficult, and of courſe more honourable, or to try and prove the reſolution and temper of the horſes. On each ſide of the courſe, from one end to the other, the ſpectators were placed; the moſt advantageous ſtations being aſſigned to the judges of the games, and other diſtinguiſhed perſons. In that place where the horſes ſtood which were to run, a long cable was drawn from one ſide to the other, which ſerved the purpoſe of a barrier; about the middle of the prow already mentioned, an altar was erected, upon which ſtood a brazen eagle with outſtretched wings, and the figure of a brazen dolphin was likewiſe placed at the entrance of it. This laſt was ſo contrived, that when the preſident of the races thought proper to put it in motion, it would aſcend at once to ſuch a height, as to be viſible to all the ſpectators. This eagle was dedicated to Jupiter, the patron god of the Olympic games, as the dolphin was ſacred to Neptune, the ſuppoſed creator of the horſe. In the moment when the eagle ſprang into the air, the dolphin ſunk under ground; and upon this ſignal, the cable was removed, and the horſes advanced from the ſtands into the courſe, where they ſtood ready to ſtart. The ſignal for ſtarting was probably the ſame as in the chariot races, and was given by the ſounding of a trumpet. The ſpace of ground round which the horſes were to run, and the number of times which they were required to run round it, will make their courſe or heat to amount to about four miles, or ſomewhat more. See on this ſubject Weſt's Odes of Pindar, and Preliminary Diſſertation on the Olympic Games, p. 43, &c. p. 84, &c. For other particulars, ſee HIPPODROME.

There were ſtadia likewiſe covered over, and encompaſſed with colonnades and porticoes, ſerving for the ſame exerciſes in bad weather. Captive children uſed to run the ſtadium.

A more natural derivation of the word ſtadium, from

στασις,

ϛασις, *ſtation*, than that popular one mentioned in the laſt article, may be drawn from the athletæ ſtopping and reſting when at the end of this courſe: whence the name might be applied to the ſame diſtance meaſured in any other place.

STADIUS, John, in *Biography*, a German aſtronomer, was born in 1527, and ſtudied at the univerſity of Louvain, where he applied himſelf with ſo much diligence to mathematical purſuits, that he was very ſoon qualified to become a profeſſor; he reſided ſome time at Liege, and was allowed a ſalary by the biſhop, for whom he annually calculated an ephemeris, adapted to the meridian of Antwerp, beginning from the year 1554. The ephemerides of Stadius were much uſed by the celebrated Dutch mathematician Stevin, though they were afterwards proved to be in many reſpects inaccurate. From Louvain, Stadius went to Savoy, with a commiſſion as mathematician to the king of Spain, and he removed thence to Bruges, in Flanders, where he compoſed his "Faſti Romanorum," which were publiſhed by Hubert Goltzius, whoſe daughter was married to his ſon; after this he was invited to France as profeſſor royal of mathematics, and lived there in high reſpect and honour till he became enthuſiaſtically attached to judicial aſtrology, and on the faith of that pretended art he began to predict future events. He died in the year 1579, in the fifty-ſecond year of his age. He is author of ſome aſtrological treatiſes, and tranſlated a work of Hermes Triſmegiſtus, entitled "Jatro-mathematicæ, ad Amonem Ægyptium conſcripta."

STADL, in *Geography*, a town of the duchy of Stiria; 8 miles N.E. of Gratz.

STADLIN, or Stadlau, a town of Sileſia, in the principality of Breſlau, on the Stober; 27 miles E. of Breſlau.

STADLKIRK, a town of Auſtria; 4 miles N. of Steyr.

STADMANIA, in *Botany*, ſo named by Lamarck, in commemoration of a botanical traveller, M. Stadman, to whom he was obliged for the knowledge of the plant.—Lamarck Illuſtr. t. 312. Poiret in Lam. Dict. v. 7. 376.—Claſs and order, *Octandria Monogynia*. Nat. Ord. *Sapindi*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, minute, of one leaf, with five ſhort, oval, rather pointed, teeth. *Cor.* none. *Stam.* Filaments eight, thread-ſhaped, erect, rather longer than the calyx; anthers terminal, roundiſh. *Piſt.* Germen ſuperior, oblong; ſtyle very ſhort; ſtigma triangular. *Peric.* Berry dry, globoſe, generally attended by the rudiments of another abortive one. *Seed* ſolitary, globoſe, large.

Eſſ. Ch. Calyx with five teeth. Corolla none. Stigma nearly ſeſſile. Berry dry, with one ſeed.

1. S. *oppoſitifolia.*—Native of the iſland of Mauritius, where the French call it *Bois de fer*, or Iron-wood, from the hardneſs of the wood, which is employed for many uſeful purpoſes. The half-ripe berries, preſerved in a moiſt form with ſugar, are ſaid to be tolerably good.—The tree is large and handſome, with a tall erect *trunk*, and ſpreading, oppoſite, round *branches*, of a greyiſh hue, downy when young. Poiret deſcribes the *leaves* as ſimple, oppoſite, ſtalked, elliptic-lanceolate, coriaceous, perfectly entire, obtuſe, ſlightly contracted at their baſe, ſmooth; ſhining above; paler and browniſh beneath; their length three or four inches, breadth an inch, or inch and half. *Footſtalks* three lines long. *Flowers* about the ends of the branches, in long, ſtalked *cluſters*, with ſhort, thick, often aggregate, partial ſtalks, having a ſmall tuberculated permanent *bractea* at the baſe of each.—Such is Poiret's account; but Lamarck's plate evidently repreſents the *leaves* as alternate, pinnate, of from three to ſix pair of oppoſite leaflets; the cluſters of *flowers* being axillary. Such we believe to be the true nature of the plant. We have ſpecimens brought by Commerſon from the iſles of Mauritius and Bourbon, and marked *Bois des Gaulettes*, a name which does not occur in Juſſieu, which, if not the ſame ſpecies, have every appearance of belonging to this genus. In theſe the *leaves* are alternate, abruptly pinnate, their common *footſtalks* ſlightly winged. The flowers are in ſhort, denſe, compound, axillary, ſilky cluſters. *Calyx* and *germen* very ſilky. *Fruit* nearly ſmooth, crowned with the permanent *ſtyle* and *ſtigma*. We dare hardly ſuſpect ſo much inaccuracy of deſcription in the authors cited as to take this for their very identical *Stadmania*, but that it belongs to the ſame genus there can ſcarcely be any doubt. We find here and there even the appearance of a bud, or abortive leaflet, at the end of the common *footſtalk*, as repreſented more ſtrongly by Lamarck, which perhaps led Poiret to take the compound leaf for a branch.

STADT-AM-HOF, in *Geography*, a town of Lower Bavaria, on the Danube, oppoſite to Ratiſbon, and connected with it by a bridge. It has two convents and an alms-houſe, to the latter of which Lutherans and Roman Catholics are equally admiſſible; the objects of relief, as well as the governors, being half Lutherans and half Catholics; its yearly revenue is ſaid to amount to 80,000 florins.

STADTBERG, or Marsberg, a town of the duchy of Weſtphalia, on the Dimel; 20 miles S. of Paderborn.

STADTHAGEN, a town of Weſtphalia, in the county of Schauenburg, endowed in the 13th century with conſiderable privileges, and ſurrounded with ditches, ramparts, walls, and towers. From its ſufferings during the 30 years' war, it has not yet recovered. The palace of the prince of Schauenburg-Lippe is in this town, and the gardens have a mineral ſpring; 8 miles E. of Minden. N. lat. 52° 18′. E. long. 9° 20′.

STADTHOLDER, Stadthoulder, or *Stadholder*, a governor or lieutenant of a province, in the United Netherlands, particularly that of Holland, where the word (now indeed almoſt obſolete) has been moſt uſed, by reaſon of the ſuperior importance of the government of that province.

Menage derives the word from *ſtadt*, *ſtate*; and *houlder*, *holding*, *q. d.* lieutenant of the ſtates. Others will have it compounded of *ſtad*, or *ſtede*, *ſtead*, or *place*; and *houlder*, *holding*; in regard this officer held the place of the counts, and repreſented them in their abſence.

The ſtadtholder, *i. e.* the ſtadtholder of Holland, was the firſt member of the republic: he was chief of all the courts of juſtice, and might preſide therein when he pleaſed. All ſentences, judgments, &c. were diſpatched in his name. When an office became vacant in any of the courts, the ſtates propoſed three perſons to the ſtadtholder, who choſe one of them. He even pardoned criminals, which is a ſovereign prerogative: and he had the choice of ſcabines, or chief magiſtrates, in each city; to which end the council of the city always preſented him two perſons, one of whom he appointed.

In ſeveral cities he had the ſame right of nominating the burgo-maſters and counſellors; as at Rotterdam, Dort, &c. He had alſo a power to caſhier the magiſtrates, and put others in their room, when he found it neceſſary for the public good, upon giving a reaſon for the ſame.

By article VI. of the union of Utrecht, the States conſtituted him arbiter of all the differences that might ariſe between the ſtates of the ſeveral provinces, or between the cities and the members of the ſtates of the province.

To the dignity of ſtadtholder was inſeparably annexed that of captain and admiral-general of the province; in which quality he named all the officers, and diſpoſed of all military poſts. He took care of the execution of the ordinances of the ſtates; and his authority gave him a right to receive, and give audience to ambaſſadors from foreign princes, and even to ſend ambaſſadors on his own private affairs.

The office of ſtadtholder was very ancient: the counts, not being able to reſide in Holland, appointed ſtadtholders to command in their abſence in the ſeveral provinces; beſides a governor-general of all the ſeventeen provinces of the Netherlands.

William I., prince of Orange, was made ſtadtholder of Holland and Zealand in 1576, and ſoon after of the provinces of Guelders, Utrecht, and Overyſſel, at the time when the Dutch ſhook off the Spaniſh yoke; which enabled him to contribute greatly to that happy event.

In 1584, when William I. was aſſaſſinated, the ſame dignity was conferred, by the ſame provinces, on his ſon prince Maurice, who was ſucceeded by his brother Frederic-Henry in 1625. Upon his death, in 1647, his ſon, William II., became ſtadtholder, and he poſſeſſed this dignity till his death in 1650. The ambitious views of this prince having given offence to the provinces of the republic, they took meaſures to reduce the authority of the ſtadtholder; and the province of Holland formed a deſign of excluding his ſon, William III. prince of Orange, afterwards king of England, from the dignity poſſeſſed by his anceſtors. However, in 1672, Holland, alarmed at the progreſs of Lewis XIV., declared William ſtadtholder, and captain-general of the forces of the republic, with the ſame power which his predeceſſors had enjoyed. Their example was followed by four other provinces; and, in 1674, on account of his ſignal ſervices to the ſtates of Holland, they declared him hereditary ſtadtholder, and determined that his dignity ſhould deſcend to his male heirs. He was ſucceeded by his appointed heir, the prince of Naſſau-Dietz, hereditary ſtadtholder of the provinces of Frieſland and Groningen, from whom the dignity deſcended to his ſon, William-Charles-Henry-Friſon. In 1722 he was named ſtadtholder by the province of Guelderland.

In 1747, the ſtadtholderſhip was extended to all the ſeven united provinces, and made hereditary in the male and female repreſentatives of the family of Orange. For other particulars reſpecting the change of government, &c. ſee Holland and United Provinces.

STADTKYLL, or Statkyl, in *Geography*, a town of France, in the department of the Roer, on the Kyll; 8 miles N.N.W. of Gerolſtein.

STADTLAND, a ſmall iſland in the North Atlantic ſea, near the coaſt of Norway. N. lat. 62° 10′. E. long. 5° 50′.

STADT-LOEN, a town of Germany, in the biſhopric of Munſter; 23 miles W. of Munſter. N. lat. 52° 6′. E. long. 6° 54′.

STADT-OLDENDORF, a town of the principality of Wolfenbuttel, containing about 200 houſes; 15 miles W.N.W. of Eimbeck.

STADTSBUGDEN, a town of Norway, in the province of Drontheim; 10 miles N.N.W. of Drontheim.

STADT-STEINACH, a town of Bavaria, in the biſhopric of Bamberg; 7 miles N.E. of Culmbach.

STÆBIS, in *Botany*, a name given by the modern Greeks to a plant growing very plentifully in the iſland of Crete, and ſeeming to be the ſame with the *ſtabe* of the ancient Greeks, when uſed as the name of the pheos or hippopheos; for the ancients uſed it alſo as the name of a low plant of the gnaphalium kind, growing in marſhy places, with which they uſed to ſtuff beds, &c.

STÆBIUM, a name given by the modern Greeks to the plant called *hippopheos* by Dioſcorides: that author alſo ſometimes called it *ſtabe*.

STÆBROECK, in *Geography*, a town of Guiana, on the eaſt coaſt of the river Demarari.

STÆCHAS, in *Botany*. See Cassidony.

STÆHELINA, appears to have been a name of Haller's, which Linnæus removed to the preſent genus. There have been ſeveral Swiſs botaniſts, authors of inaugural diſſertations, or other ſmall treatiſes not generally current, of the name of Stæhelin, or Stehelin. Haller ſeems to have intended principally to commemorate his beloved and regretted friend and companion, Benedict Stæhelin, to whom he addreſſes two epiſtles among his poems. (See his *Biblioth. Botanica*, v. 2. 175, and *Hiſt. Stirp. Helvet.* v. 1. 136.) In the latter place he contends that he had given this name to the *Bartſia alpina*, before Linnæus dedicated that genus to his own, no leſs tenderly lamented, friend Bartſch. (See *Fl. Suec.* ed. 2. 211.) However the right of priority may be circumſtanced, the *Bartſia* of Linnæus, like his *Stæhelina*, has prevailed; nor can the warmeſt admirer of Haller or of Stæhelin now regret, that the latter has obtained a moſt elegant and remarkable genus, of the compound tribe; he having particularly written upon that order, in a diſſertation publiſhed at Baſil in 1721, after the diſtinguiſhed example of Vaillant, of whom he had been a favourite diſciple.—Linn. Gen. 415. Schreb. 546. Willd. Sp. Pl. v. 3. 1783. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 512. Sm. Pl. Ic. 71. Prodr. Fl. Græc. Sibth. v. 2. 162. Juſſ. 175. Gærtn. v. 2. 412. (Serratula; Lamarck Illuſtr. t. 666. f. 3, 4.)—Claſs and order, *Syngeneſia Polygamia-æqualis*. Nat. Ord. *Compoſitæ diſcoideæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common Calyx* oblong, cylindrical, ſlightly ſwelling, imbricated with lanceolate erect ſcales, each terminated by a ſmall, ſhort, coloured ſcale. *Cor.* compound, uniform, tubular: all the florets equal, perfect, of one funnel-ſhaped petal, whoſe limb is bell-ſhaped, in five equal, acute ſegments. *Stam.* Filaments in each floret five, capillary; anthers united into a cylindrical tube, each of them having two elongated teeth at the baſe. *Piſt.* Germen very ſhort; ſtyle thread-ſhaped; ſtigmas two, oblong, obtuſe, erect. *Peric.* none but the unchanged calyx. *Seeds* ſolitary, oblong, very ſhort, quadrangular: down branched or cloven, longer than the calyx. *Recept.* flat, covered with very ſhort, permanent, chaffy, branched ſcales.

Eſſ. Ch. Receptacle with branched ſcales. Seed-down branched. Anthers with a pair of threads at the baſe. Calyx imbricated, rather ſwelling.

1. S. *dubia*. Roſemary-leaved Stæhelina. Linn. Sp. Pl. 1176. Willd. n. 1. Ait. n. 1. Dickſ. Dr. Pl. n. 13. Gerard Gallopr. 190. t. 6. (Serratula; Lamarck f. 4. Chamæchryſocome prælongis purpuraſcentibuſque Jaceæ capitulis; Barrel. Ic. t. 406. Stœchas citrina altera inodora; Lob. Ic. 486.)—Leaves ſeſſile, linear, ſomewhat toothed; downy and white beneath. Seed-down ſmooth, about twice as long as the nearly cylindrical calyx.—Native of dry open hills and fields, in Spain, Italy, and the ſouth of France. Parkinſon appears to have cultivated it, but we have never met with the plant in any garden, nor does it make a figure even in catalogues. The *ſtem* is ſhrubby, of humble growth, buſhy, with round leafy branches, clothed with cloſe white cottony down; as are alſo the backs of the very narrow, toothed, ſlightly revolute *leaves*, each above an inch long. *Flowers* terminal, erect, either ſolitary or

ſomewhat corymboſe, making a ſingularly elegant appearance, even in dried ſpecimens, on account of their partly downy *calyx*, variegated with roſe-colour and brown, ſurmounted by the tuft of ſilvery *ſeed-down*, intermixed with the long, tubular, crimſon *florets*, which are eight or ten in each calyx. The genus of this ſpecies was conſidered doubtful by Linnæus, becauſe the *ſeed-down* is deſcribed by Gerard as ſimple. It is, however, curiouſly branched from the baſe, which, added to the bearded *anthers*, ſufficiently eſtabliſhes the character, though we have not examined the ſcales of the *receptacle*. The habit, moreover, is well marked, and proves this genus, which ſome French botaniſts have ſcrupled to admit, to be one of the moſt natural, as it unqueſtionably is the moſt elegant, of the ſyngeneſious family in Europe. Willdenow has ſurely altered the ſpecific character for the worſe.

2. S. *arboreſcens*. Storax-leaved Stæhelina. Linn. Mant. 111. Willd. n. 2. Ait. n. 2. Schreb. Dec. t. 1. Sm. Fl. Græc. Sibth. t. 845, unpubliſhed. (Cyanus arboreſcens altera, ſtyracis folio; Alpin. Exot. 33. t. 32. Ciano fruticoſo di Candia; Pon. Bald. 165.) — Leaves ſtalked, elliptical, entire; ſilky beneath.—Native of rocks on the white mountains of Crete, and in the iſles of Hyeres. Miller is ſaid to have cultivated this fine plant, before the hard winter of 1740, which was fatal to ſo many oriental varieties in the Engliſh gardens. The *ſtem* is woody, two feet high, ſometimes an inch in diameter, with round, leafy, ſilky, aſcending branches. *Leaves* remarkably handſome, elliptical or ſomewhat heart-ſhaped, obtuſe, two or three inches long and half as broad; ſmooth and dark-green above; white and beautifully ſilky beneath; with one rib, and many branching veins. *Footſtalks* ſilky, about an inch long. *Flowers* terminal, corymboſe, light purple. *Calyx* ſlightly ſwelling, its ſcales roundiſh-ovate, partly ſilky. *Anthers* with a double feathery beard. *Seed-down* roughiſh, cloven in a finger-like manner, like the ſcales of the *receptacle*.

3. S. *fruticoſa*. Smooth Plantain-leaved Stæhelina. Linn. Syſt. Nat. ed. 12. v. 2. 538. Willd. n. 3. (Centaurea fruticoſa; Linn. Sp. Pl. 1286. Serratula; Lamarck f. 3. Cyanus repens; Lob. Ic. 548.)—Leaves obovato-lanceolate, entire, tapering at the baſe, ſmooth on both ſides.—Native of Crete and the Levant. Dr. Sibthorp mentions having gathered it on rocks in the iſland of Chéro, but no ſpecimens are found in his herbarium. The *ſtem* is ſhrubby, with round, minutely roughiſh, branches. *Leaves* near two inches long, dotted, tapering down into a winged footſtalk. *Flowers* ſaid to be white. *Calyx* nearly cylindrical, with oblong, acute, partly downy ſcales. *Seed-down* rough. Its peculiar ſtructure, or that of the ſcales of the *receptacle*, our ſpecimens will not allow us to aſcertain.

4. S. *haſtata*. Halberd-leaved Stæhelina. Vahl. Symb. v. 1. 70. Willd. n. 4. (Chryſocoma ſpatulata; Forſk. Ægypt.-Arab. 147.) — "Stem ſhrubby. Leaves haſtate, hoary, ſeſſile."—Gathered by Forſkall near Taæs, in Arabia Felix. A low rigid *ſhrub*, with numerous, round, hoary *branches*. *Leaves* not half an inch long, very obtuſe, dilated into an horizontal lobe at each ſide; moſt hoary beneath; tapering at the baſe. *Flowers* ſolitary, ſeſſile, towards the extremities of the branches. *Calyx* at firſt cylindrical, then turbinate, with linear keeled ſcales. *Seeds* villous; *down* ruſty, rather rigid, very finely toothed where it projects beyond the calyx. *Receptacle* ſcarcely chaffy.—Vahl, from whom we borrow this deſcription, as we have ſeen no ſpecimen, might poſſibly not be aware of the true characters of a *Stæhelina*, and therefore might, like Linnæus, Gerard, and others, not obſerve whether the *ſeed-down* were branched in this ſpecies. Its genus therefore remains doubtful.

5. S. *unifloſculoſa*. Simple-flowered Stæhelina. Sm. Prodr. Fl. Græc. Sibth. n. 2016. Fl. Græc. t. 846, unpubliſhed. — Leaves ovate, acute, toothed; downy and ſnow-white beneath. Stem ſomewhat ſhrubby. Calyx ſingle-flowered. — Found on mount Parnaſſus, by Dr. Sibthorp. The *root* of this very pretty ſpecies is ſtrong and woody, bearing numerous, partly decumbent, branched, leafy, hoary, ſhrubby *ſtems*, about a ſpan high. *Leaves* ſtalked, an inch or an inch and half long; ſmooth and dark-green above; very white beneath; their points ſomewhat reflexed. *Flowers* five or ſix at the top of each ſtem, corymboſe, erect, ſmall. *Calyx* cylindrical, brown, ſhining, nearly ſmooth, half an inch long, containing a ſolitary, purple, ſtarry *floret*, with tawny *anthers*, whoſe baſe is furniſhed with a double feathery beard. *Seed-down* cloven in a digitate manner. Nothing can be more certain than the genus of this plant, though its ſingle *floret* forms one of thoſe exceptions in its natural order, which render abſolute definitions, in botany, ſcarcely ever poſſible.

6. S. *ilicifolia*. Holly-leaved Stæhelina. Linn. Suppl. 358. Willd. n. 5. Sm. Plant. Ic. t. 71.—Leaves oppoſite, on ſhort ſtalks, heart-ſhaped, bluntly toothed; ſmooth and ſhining above; woolly beneath. Points of the calyx-ſcales naked. — Native of New Granada, from whence Mutis ſent ſpecimens to Linnæus. The *ſtem* is ſhrubby, or arboreſcent, with round leafy *branches*, downy when young. *Leaves* rather above an inch long, rigid, obtuſe, revolute, coarſely toothed, reticulated with veins; of a ſhining green, as if varniſhed, on the upper ſide; denſely woolly and white beneath; on ſhort, thick, hoary *ſtalks*, remarkable for being oppoſite, thoſe of all the foregoing being alternate. *Stipulas* none. *Panicles* terminal, corymboſe, denſely woolly, with lanceolate woolly *bracteas*. *Calyx* almoſt hemiſpherical, very woolly; its inner ſcales with ſmooth, membranous, fringed, finally inflexed, points. *Florets* numerous, yellow; their limb erect. *Anthers* with two points at the baſe. *Seed-down* rough, or feathery, ſcarcely branched or digitate. Scales of the *receptacle* ſhort, rigid, with two or three teeth.

7. S. *aquifolia*. Kermes-leaved Stæhelina. (Elichryſum arboreſcens, ilicis cocciglandiferæ folio; Plum. Cat. Amer. 9. Ic. 114. t. 123. f. 2.) — Leaves ſcattered, on ſhort ſtalks, roundiſh, abrupt, with ſpinous teeth; ſmooth and ſhining above; woolly beneath. Calyx-ſcales downy throughout. — Gathered in South America by Plumier. This is in many reſpects nearly akin to the laſt, though eſſentially diſtinct. The *leaves* are but half the ſize, with finer veins, and ſharp ſpinous teeth. *Flowers* yellow, ſeſſile, either ſolitary, or ſeveral together, at the leafy ſummit of each branch. *Calyx* longer, and more regularly imbricated, its ſcales lanceolate, finely and uniformly woolly, without any membranous inflexed points. The *anthers* have two briſtly naked points at their baſe, like the preceding, and the *ſeed-down* is rough; we cannot perceive it to be branched. We have not been able to examine the *receptacle*. There cannot be the leaſt doubt of this plant belonging to the ſame genus as the laſt, and the points in which it differs ſpecifically, ſerve to bring it nearer to other *Stæhelinæ*.

8. S. *gnaphalodes*. Soft-linear-leaved Stæhelina. Linn. Sp. Pl. 1176. (Leyſera ſquarroſa; Thunb. Prodr. 160. Willd. Sp. Pl. v. 3. 2133. Jacea æthiopica, ſtœchadis citrinæ majoribus tomentoſis foliis, capitulorum ſpinis et ſquamulis ex aureo colore nitentibus; Pluk. Almageſt. 193. t. 302. f. 3.) — Leaves thread-ſhaped, woolly. Flowers ſolitary, on long ſtalks. Points of the calyx-ſcales reflexed, membranous, naked, acute.—Native of the Cape of Good

Hope, but rare, and as yet a ſtranger in our greenhouſes. The *plant* is ſhrubby, branched, clothed throughout with white cottony down. *Leaves* an inch and a half to three inches long, very narrow, obtuſe, alternate. *Flower-ſtalks* terminal, ſolitary, erect, ſimple, ſingle-flowered, twice as long as the leaves, woolly like them. *Calyx* ovate, of numerous imbricated ſcales, the inner ones gradually longeſt, as in the laſt, all woolly, with ſhining, tawny or brown, membranous edges, and a ſtrongly reflexed, tapering, almoſt pungent, ſmooth point, of the colour and texture of the edges. *Florets* apparently yellow. *Anthers* with two ſlightly feathery points at the baſe. *Seed-down* feathery, divided at the baſe into ſeveral palmate portions, like the ſtamens of a polyadelphous flower. *Scales* of the receptacle crenate, or many-cleft, at the ſummit.—We know not on what grounds this has been referred to *Leyſera*, there being in our ſpecimens no appearance of a radius, nor any thing of the peculiar habit or characters of that genus. But if it were ſo, this, being the original *Stæhelina*, ought not to be changed. The more particular explanation, than heretofore, which we have given of the reſt of the ſpecies, anſwering alſo to this in ſo many peculiar and eſſential characters, will we truſt eſtabliſh the genus before us beyond any poſſibility of doubt. Plukenet's figure of *S. gnaphalodes*, the only one we can find, though rude, is characteriſtic, eſpecially in the points of the calyx.

9. S. *ſpinoſa*. Thorny-leaved Stæhelina. Vahl Symb. v. 1. 69. Willd. n. 6. (Chryſocoma mucronata; Forſk. Ægypt-Arab. 147.)—Leaves nearly cylindrical, ſimple or pinnatifid, with awl-ſhaped ſpinous points. Calyx-ſcales elliptic-lanceolate, erect.—Found by Forſkall in Egypt. The *ſtem* is ſhrubby, buſhy, rigid, with angular branches. *Leaves* alſo rigid, ſlender, like branched thorns, an inch or inch and half long, roughiſh, alternate. *Flowers* terminal, few, ſomewhat corymboſe, yellow, according to Vaillant, who is cited by Vahl. *Calyx* at firſt cylindrical, then ſpreading and turbinate, of many, nearly ſmooth, imbricated, ſtraight ſcales, each tipped with a ſcarcely diſcernible, erect, prickle. *Seeds* hairy, their down very minutely toothed according to Vahl, and the *receptacle* clothed with ſhort briſtly ſcales. We have not ſeen theſe parts, nor the *anthers*, ſo that we cannot be certain of the genus. One of Forſkall's ſpecimens, now before us, has decidedly pinnatifid *leaves*.

10. S. *Chamæpeuce*. Pine-leaved Stæhelina. Linn. Syſt. Nat. ed. 12. v. 2. 538. Willd. n. 7. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 847, unpubliſhed. (Serratula Chamæpeuce; Linn. Sp. Pl. 1147. Chamæpeuce; Alpin. Exot. 77. t. 76. Stebe capitata, overo Chamepino frutticoſo di Candia; Pon. Bald. 75. Jacea fruticans, pini folio; Pluk. Phyt. t. 94. f. 3.)—Leaves linear, crowded, elongated, revolute; downy beneath. Calyx ovate. Scales lanceolate, erect.—Native of rocks in Crete and Cyprus, where, as well as in Greece, and on mount Athos, it was gathered by Dr. Sibthorp. Parkinſon mentions this ſpecies as cultivated here in 1640. It is ſtill preſerved in curious greenhouſes, and may be ſeen at Chelſea, flowering all ſummer long. The *ſtem* is ſhrubby, buſhy, ſtout, two or three feet high, its round cottony *branches* clothed with abundance of long, narrow, drooping, revolute, acute *leaves*; ſmooth and green above; covered with white cottony down beneath; their baſe ſomewhat dilated. *Flowers* forming a ſort of ſpare leafy panicle at the top of each branch, erect. *Calyx* ovate, or nearly globoſe, bigger than a hazel-nut, of numerous, cloſely imbricated, lanceolate, acute, downy, crimſon-pointed ſcales. *Flowers* crimſon. *Anthers* with a pair of ſimple, not feathery, briſtles. *Seeds* poliſhed, obovate, variegated with brown; their *down* the length of the calyx, feathery, but not branched or palmate. Scales of the *receptacle* in many briſtly ſegments.

11. S.? *imbricata*. Imbricated Stæhelina. Berg. Cap. 233. Linn. Mant. 2. 281. Willd. n. 8. Thunb. Prodr. 143.—"Leaves ovate, pointed, imbricated; downy beneath. Calyx turbinate; its inner ſcales with reflexed coloured points.—Native of the Cape of Good Hope. The *ſtem* is ſhrubby, a ſpan high, with cluſtered downy branches. *Leaves* ſeſſile, above a line in length; of a glaucous green, nearly ſmooth, and ſlightly rugoſe, above; white and downy underneath; cloſely imbricated. *Flowers* uſually two at the end of each branch, one ſeſſile, the other ſtalked. *Calyx* downy, of numerous, linear-lanceolate, acute, fringed ſcales; the inner ones rather the longeſt, and each tipped with a blueiſh, chaffy, ſpreading point, reſembling a radiant floret. *Seed-down* ſimple, minutely feathery, violet-coloured. *Receptacle* naked, rough, with elevated points. Such is the deſcription of Bergius, who mentions no appendages to the *anthers*, nor does the *receptacle*, or the *ſeed-down*, indicate a *Stæhelina*. Having ſeen neither ſpecimen nor figure, we muſt leave the matter undecided.

12. S. *corymboſa*. Corymboſe Cape Stæhelina. Linn. Suppl. 359. Willd. n. 9. Thunb. Prodr. 143.—Leaves wedge-ſhaped, toothed; downy beneath. Panicles corymboſe. Calyx-ſcales rounded, obtuſe.—Native of the Cape of Good Hope. The *ſtem* is ſhrubby, with hoary, furrowed, leafy *branches*. *Leaves* ſcattered, an inch long, on ſhort ſtalks, abrupt, toothed at the extremity; green and ſmooth above; white, finely downy, ſomewhat ſilky, beneath. *Flowers* numerous, on angular, downy, corymboſe, terminal ſtalks. *Calyx* not half an inch long, of many broad, brown, downy, erect, cloſely imbricated ſcales. *Florets* white or yellowiſh. *Anthers* with a double ſpur at the baſe. *Seed-down* rough, ſimple, ſcarcely faſciculated. *Receptacle* ſmall, cellular, not perceptibly ſcaly. The habit, and the ſpurred *anthers*, ſeem to juſtify us in keeping this ſpecies among the *Stæhelinæ*, notwithſtanding the *receptacle*.

STAFARDA, in *Geography*, a town and abbey of France, in the department of the Stura; 3 miles N. of Saluzzo.

STAFF, BACULUS, an inſtrument ordinarily uſed to reſt on, in walking. Card. Bona obſerves, in his treatiſe of liturgies, that, anciently, thoſe who uſed a ſtaff in the church to lean on, were obliged to lay it by, and to ſtand alone, firm and upright, while the Goſpel was reading, to teſtify their reſpect by their poſture; and to ſhew they were ready to obey Jeſus Chriſt, and to go whereſoever he ſhould command them.

The ſtaff is alſo frequently uſed as a kind of natural weapon, both of offence and defence. The Lacedæmonians never wore any ſwords in the time of peace; but contented themſelves with a thick, crooked ſtaff, which was peculiar to them.

Among the Romans, M. St. Evremond obſerves, blows with a ſtaff were the gentleſt correction they gave their ſlaves; inaſmuch as they received them over their clothes. Among the maſters of honour and arms, it is held a greater affront to be beaten with a ſtaff than with a ſword; becauſe the ſword is the inſtrument of war, the ſtaff the inſtrument of outrage.

Blows with a ſtaff were very ſeverely puniſhed by the French laws: by a regulation of the marſhals of France, in 1653, for reparations and ſatisfactions of honour, it is adjudged, that a perſon, who ſhall ſtrike another with a ſtaff, ſhall be impriſoned a whole year; unleſs ſix months be moderated, upon paying three thouſand livres, applicable to the neareſt hoſpital; beſide which, the offender is to aſk pardon of the offended on his knees, &c. ready to receive from him a like number of blows with a ſtaff; which, on ſome occaſions, the latter may be obliged to give, if he have too much generoſity to do it of himſelf.

By another regulation of the marſhals in 1679, he who ſtrikes with a ſtaff after receiving blows with the fiſt in the heat of a fray, is condemned to two years' impriſonment; and to four, if he ſtruck firſt with the fiſt.

Staff, *A*, is uſed as an inſtrument for taking acceſſible or inacceſſible heights. For the manner of operation, in taking the height of an acceſſible object, ſee Altitude.

Inacceſſible heights may likewiſe be taken by means of two ſtaves. This muſt be done at two ſtations in a right line from the object, at each of which the ſtaves are to be placed in ſuch a manner, that the ſummit, or top of the height, may be ſeen along their tops in the ſame right line. Thus, ſuppoſe A (*Plate* XIII. *Geometry*, *fig.* 17.) the ſummit of the object whoſe height is to be meaſured, D E, F G, the two ſtaves at the firſt ſtation; and R N, K O, the ſame ſtaves at the ſecond, ſo placed, that the points F D A, K N A, are in the ſame right line. Through the point N let there be drawn the right line N P, parallel to F A: wherefore in the triangles K N P, K A F, the angles K N P, K A F, are equal; alſo the angle A K F is common to both; conſequently the remaining angles K P N, K F A, are equal. And P N : F A :: K P : K F. But the triangles P N L, F A S, are ſimilar; therefore P N : F A :: N L : S A. Thence alternately K P : N L :: K F : S A; *i. e.* as the exceſs of the diſtance of the ſtaves at the ſecond ſtation above their diſtance at the firſt, is to the difference of their lengths; ſo is the diſtance of the two ſtations of the ſhorter ſtaves, to the exceſs of the height ſought above the height of the ſhorter ſtaff. Wherefore S A may be found by the rule of three; to which add the height of the ſhorter ſtaff, and the ſum will give the whole inacceſſible height, A B.

Staves may be uſed for meaſuring any diſtance: ſuppoſe A B (*fig.* 18.), to one of whoſe extremities we have acceſs. Let there be a ſtaff fixed at the point A; then going back to ſome ſenſible diſtance, in the ſame right line, let another be fixed in C, ſo that both the points A and B may be covered or hid by the ſtaff C. Likewiſe going off in a perpendicular, from the right line C B, at the point A, let there be placed another ſtaff at H: and in the right line C G K, perpendicular to the ſame C B at the point C, and at ſuch a point of it K, that the points K, H, and B, may be in the ſame right line, let there be fixed a fourth ſtaff. Let there be drawn, or ſuppoſed to be drawn, a right line, H G, parallel to C A. The triangles K H G, H A B, will be equiangular: wherefore K G : G H (= C A) :: A H : A B; *i. e.* as the exceſs of C K above A H is to the diſtance betwixt the firſt and ſecond ſtaff, ſo is the diſtance betwixt the firſt and third ſtaff to the diſtance ſought. Tr. Pract. Geom. p. 22—25.

Staff, *Almucantar's*, *Augural*, *Back*, *Croſs*, *Fore*, *Paſtoral*, *Whip*. See the articles.

Staff, *Jacob's*. See Radius *Aſtronomicus*.

Staff, *Quarter*. See Quarter.

Staff, *Ward*, See Ward-*Staff*.

Staff-*Officers*, in *Military Language*, &c. See Officers.

Staff, *Field*. See Field.

Staff, *Regimental*, conſiſts of the adjutant, quarter-maſter, chaplain, ſurgeon, &c.

Staff, in *Heraldry*. See Baston.

Staff, in *Muſic*, *Riga*, Ital., *Portée*, Fr., the five parallel lines upon which, and between which, muſical characters or notes are written.

Guido Aretin, the great improver of the modern muſic, is ſaid to be the firſt who introduced the ſtaff, marking his notes by ſetting points (.) up and down them, to denote the riſe and fall of the voice; and each line and ſpace he marked at the beginning of the ſtaff, with Gregory's ſeven letters, a, b, c, d, e, f, g.

But others will have the artifice of an older date; and Kircher particularly affirms, that in the Jeſuits' library at Meſſina, he found an old Greek MS. book of hymns, above ſeven hundred years old; in which ſome hymns were written on a ſtaff of eight lines, marked at the beginning with eight Greek letters. The notes or points were on the lines, but no uſe was made of the ſpaces.

The ingenious and learned Dr. Burney has proved that parallel lines were of higher antiquity than the time of Guido. It appears from an ancient MS. treatiſe on muſic by Odo the monk, written about the year 920, that lines began to be uſed in the tenth century. They were eight or nine in number; and at firſt, the ſyllables of the pſalm or hymn that was to be ſung, were placed in the ſpaces between theſe lines: after this an alphabetic character was placed at the beginning of each line, capitals for the grave ſounds, and minuſcules for the acute: to this kind of notation ſucceeded points, a ſcale formed of which Dr. Burney has given from a tract written by the great muſical monk Hubaldus, who flouriſhed about the year 880. He has alſo produced three examples from ancient miſſals, one of which was written about the year 900, cited by P. Martini, in which only one line is uſed to aſcertain the predominant ſound of the chant; a red line for the clef of F, and a yellow one for that of C: and this, he ſays, ſeems to have been the firſt time that a line was drawn through notes of the ſame elevation, and the origin of clefs, which are only Gothic letters corrupted or disfigured.

Vincenzo Gallilei ſays, that a little before the time of Guido, the points were placed on ſeven lines only, without uſing the ſpaces; perhaps in imitation of the ſeven ſtrings of the lyre. The regular ſtaff of four lines was not generally uſed till the thirteenth century. Kircher, indeed, ſpeaks of Guido's uſing five lines and five ſpaces, but, as Dr. Burney ſays, without authority. However, though lines without ſpaces, and ſpaces without lines, had been uſed before the time of Guido, he ſeems to have firſt ſuggeſted the uſe of lines and ſpaces together; and thus the lines, which by ſome had been made as numerous as the notes, were reduced to four: a number which, in miſſals and rituals, of the Romiſh church, has never ſince been exceeded. Indeed the uſe of a line for each note above mentioned, may never have arrived at the knowledge of Guido, who ſpeaks the language of an inventor, with reſpect to lines and ſpaces, more than on any other occaſion: and, if he be allowed the invention of lines and ſpaces, clefs will of courſe accompany them. Burney's Hiſt. of Muſic, vol. ii. p. 34, &c. p. 87, &c.

Staff, in a *Ship*, a light pole erected in different parts of a ſhip, on which to hoiſt and diſplay the colours. The principal of theſe is reared immediately over the ſtern, to diſplay the enſign; another is fixed on the bowſprit, to extend the jack; three more are erected at the three maſt-heads, or formed by their upper ends, to ſhew the flag or pendant of the reſpective ſquadron or diviſion to which the ſhip belongs.

Staff, *Futtock*, or *Puttock-ſtaff Rigging*, are ſhort pieces of rope, ſerved over with ſpun-yarn, to which the ſhrouds are confined at the cat-harpins. Thoſe for the lower and top-maſt rigging are to be made of iron in future in the navy.

STAFF, in *Rope-Making*, is an implement belonging to the nipper, being an oak bar ſeven feet long, and four inches ſquare, one end of which is fixed in an iron ſtrap on the upper plate of the nipper, whilſt on the other end a weight is ſuſpended, ſufficient to preſs the tar out of the yarn. The "nipper" is formed of two ſteel plates, eight inches ſquare, and half an inch thick, with a ſemi-oval hole in each, four inches wide, which, by the upper plate moving, enlarges or contracts, as the tarring of the yarn requires. It is thus fixed: a poſt, twelve inches ſquare, is placed between the kettle and capſtern, with a mortiſe cut eighteen inches long from the kettle's ſurface, and five inches wide. The under plate is turned up on each ſide, to form two grooves, and is let into the front ſide of the poſt from the lower part of the mortiſe: the upper plate has a dove-tail on the back, that ſlides up and down in a groove into the grooves of the lower plate, and by the ſtaff, made faſt to its front, it is elevated or depreſſed, and regulated by a weight ſuſpended at the other end, ſo that the yarn receives no more tar than is required, and what is ſqueezed out drops in a trough, and returns into the kettle.

STAFFS for tops are round, from ſix to eight feet long, and from two and a half to five inches in diameter, which go through a hole in the top, or are confined under it by a bolt and tails: they run on a truck-wheel, as the rope cloſes. See SPINNING-*Wheel.*

STAFF, in *Surgery*. See CATHETER and LITHOTOMY.

STAFF, in *Surveying*, a kind of ſtand, on which to mount a theodolite, circumferentor, plain table, or the like, for uſe. It conſiſts of three legs of wood joined together at one end, whereon the inſtrument is placed; and made peeked at the other, to enter the ground. Its upper end is uſually fitted with a ball and ſocket.

STAFF, *Station*, an inſtrument conſiſting of two rulers that ſlide to ten feet, divided into feet and inches, with a moveable vane or ſight, two of which are uſed with a level; and on the edges there are the links of Gunter's chain divided. Its chief uſe is for the eaſy taking off-ſets. See OFFSET *Staff.*

STAFF, *Shepherd's*, in *Botany*. See TEAZEL.

STAFF-*Tree*. See CELASTRUS.

STAFF, in *Rural Economy*, a meaſure of nine feet, or half a cuſtomary rod. It alſo ſignifies the rod ſet up as a mark in levelling, ſurveying, &c. See LEVELLING.

STAFF *and Band Hedge*, a term applied to that kind of dead fence of this ſort, which is formed and conſtructed by means of ſtakes and bands, or edders and eathers.

STAFF, *Churn*, a term applied to the round upright ſtem, or piece of wood of the ſtaff kind, which, in churning in the old common upright churn, forms the butter from the cream or milk.

A very great and uſeful improvement has lately been made on the ſtaffs of churns of this kind, by Mr. T. Fiſher, an ingenious gunſmith at Ormſkirk, in the county of Lancaſter; which conſiſts in the head or working part of the ſtaff being formed with a ſort of bevil, and its turning upon a ſwivel made of iron.

The two pieces of wood which form the head of the ſtaff have commonly the following dimenſions. Thickneſs one inch and a half, breadth two inches and a half, length thirteen inches, and from that to any other length, according to the ſize of the churn. They are joined together in a croſs-like manner, by halving one into the other in the middle parts. All the edges on the under ſide are rounded, or bevilled off to ſome diſtance, ſo as to elevate or raiſe the middle part a little above the reſt of the head. This croſs-formed head is connected with the ſtaff by means of a ſwivel, which is one inch and three quarters in diameter, being turned perfectly ſmooth and round. There is a ſort of tongue, which is four inches in length from the ſhoulder, and of an oblong form, which is paſſed up the ſtaff, and held in its place by an iron peg; the lower round end of which, to the length of about half an inch, ſerves to ſteady the head of the ſtaff. And there is a button fixed upon the upper ſide of the head, which notches into the ſtaff, and keeps it ſteady in the time of collecting the butter, but when churning, the whole is left perfectly looſe. The lower end of the ſtaff, in this caſe, ſhould be left rather thicker than in the common ſtaff, in order that it may receive the button more perfectly.

STAFF, *Hand*, in *Agriculture*, the name of that part of the common flail which is held in the workman's hand while he is working with it, and to which the ſouple or other part of the flail is attached. The hand-ſtaffs of flails were formerly moſtly connected to the other parts of the tools by means of leather caps and thongs; but the improved method is now by iron caps, made in the manner of round half-circular ſtaples in the middle parts, which connect with and work in the ſame ſort of caps on the ſouples.

STAFF, *Plough Paddle*, a term ſometimes applied to the ſmall ſtaff carried in the body of the plough, which is ſhod with iron, and employed for clearing away the adheſive earthy matter that hangs about the mould-board, and other parts of common ploughs.

STAFF, *Rack*, that ſort of ſtaff which is employed in forming racks for horſes or neat cattle.

STAFF, *Tuck*, the name of that ſort of ſtaff which is made uſe of in emptying dung and ſome other kinds of carts.

STAFFA, in *Geography*, one of the iſlands of the Hebrides, Scotland, is noted in natural hiſtory for its vaſt baſaltic columns and caves. (See BASALT.) This ſmall iſland emerges from the Atlantic ocean, in the midſt of a ſpacious bay, formed by ſeveral iſlands, of which thoſe of Mull, Icolm-Kill, Col, and Tiree, are the chief. In civil government and juriſdiction it is included in the diſtrict of Mull, and ſhire of Argyle, and conſtitutes part of the pariſh of Kill-Ninian. It is about five leagues W. from the iſle of Mull, and three leagues N.N.E. from Icolm-Kill. The form is oblong and irregular, and the whole extends about one mile in length, and half a mile in breadth, with ſteep and craggy coaſts; its ſides are entirely bare, and in many places it exhibits ſuperb baſaltic columns, with various caverns. It is acceſſible only by a ſmall entrance on the weſt ſide, where the ſurface ſlopes towards the ſea; but which will only admit a ſmall boat, and that in calm weather. The moſt elevated part of the iſland is over the cave of Fingall, where it is 214 feet above the ſea, at ordinary tides. The greateſt length of Staffa is about one Engliſh mile, and its breadth half a mile. During the ſummer a few cattle are fed on this iſland, and are attended by a herdſman and his family, who have a ſmall hut. More than half the circumference of the iſland is occupied by grand and regular colonnades of baſaltes, which are completely expoſed to the operations of the ſea: the reſt of the iſland exhibits the ſame baſaltic appearances; but the pillars are bent and twiſted in various directions; ſome lying nearly horizontal, and others forming ſegments of circles. The pillars are chiefly of five or ſix ſides; but ſome of three, four, or ſeven. The diameters vary from one foot to four feet and a half: the ſurface of the large pillars is, in general, uneven; ſome are jointed, having the upper ſurface concave, with a correſpondent convexity in the inferior; but in many the ſurface is plain. The ſpaces between the perpendicular priſms are filled with a yellow ſparry matter, of which the oxyd of iron, ſeparated from the baſaltes, with ſome argillaceous earth, and ſpecimens of zeolitic cryſtals, are the component parts. Near the landing-place the pillars are ſmall, but their magnitude increaſes in the vicinity of the cave of Fingall. This natural curioſity of the iſland is 53 feet wide at the entrance, 117 feet in height, and 250 feet in length. The arch is compoſed of two unequal ſegments of a circle, which form a natural pediment. The maſs by which the roof is crowned, or rather formed, is 20 feet in thickneſs at its loweſt part. It conſiſts of ſmall priſms, inclining in all directions, cloſely cemented with a calcareous matter, and zeolitic cryſtallizations, which afford a ſtriking contraſt with the dark purple hexagons formed by the ends of the pillars, and exhibit the appearance of moſaic work. The bottom of the cave is filled with the ſea. In very calm weather, a boat may ſail into it; but if ſuch an attempt ſhould be made when the waves are in the ſlighteſt degree agitated, the veſſel would be daſhed to pieces. The only way of entering at ſuch times is by a cauſeway on the eaſtern ſide, not more than two feet broad, formed by the baſes of broken pillars, which being conſtantly waſhed by the ſpray, is very ſlippery and unſafe. At the further extremity is another ſmall cave, which, from certain paſſages, emits an agreeable noiſe every time the water ruſhes into it, whence it has acquired the name of the "melodious cave." Beſides the cave of Fingall, there is another, exhibiting the ſame appearances, though on a ſmaller ſcale. It is ſituated on the north ſide of the iſland, and is called the "Corvorant's cave."

Staffa, though one of the greateſt natural curioſities in Europe, or perhaps in the world, has been till lately little noticed, and indeed ſcarcely known. The firſt perſon who particularly called the attention of the learned to this ſingular iſle was Mr. Leach, a native of Ireland; who, in the year 1772, having been on a viſit to Morven, in Argyleſhire, in a fiſhing excurſion, was charmed with the peculiar appearance of its rocks, and landed upon it. Soon afterwards, ſir Joſeph Banks, Dr. Von Troil, the learned biſhop of Linckoeping, and others, in their voyage from Iceland, anchored in the Sound of Mull; and having been informed by Mr. Leach of the wonders which Staffa afforded, they viſited the iſland, and an account of it was communicated by ſir Joſeph to Mr. Pennant, who publiſhed it in his "Tour to the Hebrides." Since that time it has excited the attention of various naturaliſts, who have given accounts of it in their reſpective works: among whom, M. de St. Fond and Dr. Garnett may be principally mentioned. The former, who viſited the Britiſh dominions on a voyage of reſearch, thus expreſſes himſelf reſpecting Fingall's cave. "This ſuperb monument of a grand ſubterraneous combuſtion, the date of which has been loſt in the lapſe of ages, preſents an appearance of order and regularity ſo wonderful, that it is difficult for the coldeſt obſerver not to be ſingularly aſtoniſhed by this prodigy, which may be conſidered as a ſort of natural palace. I have ſeen many ancient volcanoes, and I have given deſcriptions of ſeveral baſaltic cauſeways and delightful caverns in the midſt of lavas, but I have never found any thing which comes near to this, or can bear any compariſon with it, for the admirable regularity of its columns, the height of the arch, the ſituation, the form, the elegance of this production of nature, or its reſemblance to the maſter-pieces of art, though art has had no ſhare in its conſtruction." Similar to this are the animated obſervations of the learned prelate before-mentioned. "How ſplendid," ſays he, "do the porticoes of the ancients appear in our eyes, from the oſtentatious magnificence of the deſcriptions we have received of them: and with what admiration are we ſeized on ſeeing the colonnades of our modern edifices! But when we behold the cave of Fingall, formed by nature in the iſle of Staffa, it is no longer poſſible to make a compariſon, and we are forced to acknowledge that this piece of nature's architecture far ſurpaſſes that of the Louvre, that of St. Peter at Rome, all that remains of Palmyra and Pœſtum, and all that the genius, taſte, and luxury of the Greeks, were ever capable of inventing." In Pennant's Tour in Scotland, 4to. 1790, and St. Fond's Travels, are accounts of this iſland, with plates.

STAFFELSTEIN, a town of Bavaria, in the biſhopric of Bamberg, on the Lauter; 16 miles N.N.E. of Bamberg. N. lat. 50° 8′. E. long. 11° 3′.

STAFFORA, a river of Italy, which paſſes by Voghera, and runs into the Po, 8 miles W.S.W. of Pavia.

STAFFORD, a borough, market, and county-town, in the ſouth diviſion of the hundred of Pirehill, Staffordſhire, England, is ſituated on the north bank of the river Sow, at the diſtance of three miles from its junction with the Trent: and is 16 miles N.W. from Lichfield, and 140 miles in the ſame direction from London. The earlieſt authentic mention of the town is in the Saxon chronicle, A.D. 913, when Ethelfleda, counteſs of Mercia, ſiſter of king Edward the Elder, built a caſtle here, of which no veſtige now remains: and Camden ſtates, that in the following year king Edward built a tower on the north bank of the river. This tower Mr. Pennant ſuppoſes to have ſtood on the mount called Caſtle-hill, and now diſtinguiſhed by the appellation of Bully-hill. Near it is an ancient ſtructure, called Caſtle-church, built in various ſtyles of architecture. Nothing worthy notice is mentioned reſpecting this town, from the erection of theſe caſtles till the Norman conqueſt, when it appears from the Domeſday ſurvey, that the king had here "eighteen burgeſſes in demeſne, and twenty manſions of the honour of the earls." The ſame record ſtates that the king built a caſtle here, the cuſtody of which was given to Robert de Tonei, who in conſequence took the name of Stafford. This caſtle does not appear to have ſtood long; but by whom, or on what account deſtroyed, is unknown. It was, however, reſtored in the reign of Edward III., and continued till the ſeventeenth century; when being garriſoned in ſupport of the royal cauſe, it was taken by the parliament's forces, and demoliſhed. Stafford appears to have been a town of conſiderable importance prior to the Norman conqueſt: early in the tenth century it was conſidered the chief town of the diſtrict: in the Domeſday-book it is termed a city, and was at that time governed by two bailiffs: but the earlieſt charter of incorporation now extant was granted by king John, in the ſeventh year of his reign. This deed, however, evinces that it was incorporated at a much earlier period; as it merely confirms privileges enjoyed from "remote antiquity," and does not confer any new. The word uſed in this charter to point out the previous exiſtence of theſe privileges is *antiquitus*, which certainly would not have been uſed to denote a period then ſo recent as that of the Conqueſt. King John's charter was confirmed by Edward VI., and many new privileges added to the town. Queen Elizabeth eſtabliſhed the aſſizes and ſeſſions here by act of parliament, in the firſt year of her reign. Mr. Gough ſtates, that in her progreſs in 1575, ſhe perceived the town to be on the decline; and being informed that it was partly owing to the removal of the aſſizes, ſhe ſaid ſhe would reſtore that privilege for ever.

The form of Stafford is that of an irregular ellipſis, the greateſt diameter whereof extends from ſouth-eaſt to north-weſt. The ſituation, though low, is very pleaſant: the ſtreets are well paved, and the houſes in general built of ſtone, in a compact and regular manner. It anciently had four gates, and was defended, except on the ſide next the Sow, by a wall, and a ditch ſupplied with water from the river. When taken by the republican army in 1643, the wall was razed, and the ditch filled up, ſo that no remains of either can now be diſcovered. Under the charter of Edward VI. the civil government of Stafford was veſted in a mayor, a recorder, ten aldermen, twenty common-councilmen, a town-clerk, and two ſergeants at mace. Two repreſentatives are ſent to parliament, and have been ſo ever ſince the 23d year of Edward I. The right of election is in the mayor and burgeſſes; the number of voters being about four hundred. The chief manufactures in the town are thoſe of boots, ſhoes, and cutlery. Tanning is likewiſe carried on to a conſiderable extent, as well for the exportation as home conſumption of leather. A weekly market is held on Saturdays, and ſeven fairs, annually. In the year 1811, the population of Stafford was returned to parliament at 4868; the number of houſes 885. The immemorial cuſtom of *Borough Engliſh* is ſtill retained in this town, whereby the youngeſt ſon ſucceeds to property, as heir at law, in preference to the elder children. Though Stafford may with propriety be conſidered as only one pariſh, there are two churches, St. Mary's and St. Chad's. The former is a ſpacious cruciform ſtructure, conſiſting of a nave, two ſide aiſles, a tranſept, and a chancel of three aiſles, with an octagonal tower in the centre. This church appears to be of very remote origin: it has, however, been almoſt entirely rebuilt, but ſome remains of the ancient ſtructure are ſtill viſible. The general ſtyle of architecture is the early pointed. The font is a ſingular remnant of antiquity, very large, and aukwardly conſtructed. Its height is three feet three inches: the lower part is two feet ſquare; and is ornamented on three ſides with human figures lying flat on their faces: on the fourth ſide is the figure of a ram. Among a variety of monuments, ancient and modern, in this church, thoſe moſt worthy of notice are, an altar-tomb, in honour of lord Edward Aſton, of Tixal, and his wife lady Ann; a monument to the memory of ſir Edward Aſton, who erected the ancient manſion of Tixal, tem. Hen. VIII. and his lady Joan; and one to lady Barbara Crompton, who, as the inſcription informs us, "lyeth interred in the pariſh-church of St. Gregory, by St. Paules, London." Near the church, to the weſtward, formerly ſtood an ancient building, which Mr. Pennant conjectures to have been the dean's houſe. The church of St. Mary, anterior to the reformation, was collegiate: king Stephen, at the commencement of his reign, beſtowed it on the biſhop and chapter of Lichfield and Coventry. At the diſſolution, a dean and thirteen prebendaries were attached to it. The other church of Stafford, St. Chad, is a very ancient edifice. Early in the laſt century it was caſed with brick; but ſome portions of the buttreſſes of the original building are ſtill viſible. St. Chad's pariſh is of very ſmall extent, not containing more than 20 houſes, the rents of which are chiefly paid to the dean and chapter of Lichfield cathedral. Beſides the churches, there are places of worſhip for the Quakers, Independents, Preſbyterians, and Methodiſts, of which ſects the two latter are numerous. Of the other public buildings, the moſt conſpicuous are; the county hall, a ſpacious modern edifice, ſituated near the centre of the town: it extends a hundred feet in front, and contains many handſome apartments. Behind the hall is a convenient market-place. The county infirmary, a plain building, in the Foregate; erected about the year 1772, according to Mr. Pennant; and ſupported by voluntary contributions, to the annual amount of nearly 900*l.* The county gaol, ſituated oppoſite to the infirmary; an extenſive modern ſtructure, containing about 150 cells or apartments. The free-ſchool, an ancient building, founded and endowed (as appears by an inſcription in St. Mary's church) by king Edward VI., in the year 1550. Leland ſays, "there is a fre ſchool for grammar in Stafford, made by ſir Thomas Countre, parſon of Ingeſtre, by Heywodde and Syr Randol, a chantre prieſt of Stafford." Various alms-houſes, at different periods, have been built and appropriated for the comfortable accommodation of the aged poor: each tenement has a garden annexed to it. Previous to the diſſolution of religious houſes, Stafford contained ſeveral monaſtic eſtabliſhments. At the north end of the walls ſtood a houſe of Franciſcans, or grey friars, founded, Erdeſwick ſays, by ſir James Stafford, of Sandon. King Henry VIII. granted it to James Leveſon. A priory of black canons was founded here about the year 1180, and dedicated to St. Thomas á Becket, ten years after his death. Richard Peche, biſhop of Lichfield and Coventry, had ſuch a partiality for this houſe (of which he is by ſome authors conſidered the founder), that, reſigning his ſee, he entered himſelf as one of the members, and ſo continued the remainder of his life. At the diſſolution it was granted to Rowland, biſhop of Lichfield. This houſe, which was ſituated on the banks of the river Sow, about two miles to the E. of Stafford, was incloſed by a ſtrong ſtone wall; ſome remains of the building are ſtill extant. About the middle of the fourteenth century, the Auſtin friars founded a religious eſtabliſhment at the ſouthern extremity of the town; a portion of ground having been granted to them by Ralph, lord Stafford, for that purpoſe. This houſe was given by queen Mary to Thomas Neve and Giles Iſam.

About a mile and a half ſouth-weſt from the town, on the ſummit of a hill, are the remains of the caſtle of the barons of Stafford: the chief portion now ſtanding is the keep, of which each angle is ſurmounted by a ſmall octangular tower. At a ſmall diſtance to the ſouth of the caſtle ſtood the manor-houſe, the uſual reſidence of the ancient and powerful family to which this town has given the title of baron, viſcount, and earl, from the time of William the Conqueror till the beginning of the laſt century, when it became extinct; but was again revived in the year 1786, by the elevation of earl Gower to the dignity of marquis of Stafford, which title is now enjoyed by his ſon, the ſecond marquis. Among the more diſtinguiſhed natives of this town we find John Stafford, a Franciſcan friar, a philoſopher and divine of conſiderable celebrity, born towards the cloſe of the fourteenth century; Thomas Aſheburn, an eminent divine of the ſame century, who diſtinguiſhed himſelf as a ſtrenuous opponent of Wickliffe and his new doctrines; Edmund Stafford, biſhop of Exeter, and chancellor in the reigns of Richard II. and Henry IV.; Thomas Fitzherbert, a learned and able writer of the ſixteenth and ſeventeenth centuries, who was born in 1552, and died in 1640, in the 88th year of his age.

About three miles weſt from Stafford, on a lofty mount, is an intrenchment, called Billington Bury. Its area is circular, including ſeveral acres, and is ſurrounded in ſome parts by one, and in others by two deep ditches. Mr. Pennant conſiders this fortification as having been originally a Britiſh poſt, ſubſequently occupied by the Saxons, whoſe ſtations have generally the addition of borough or bury.

At the diſtance of four miles ſouth from Stafford, in the angle formed by the junction of the rivers Sow and Trent, is Tixal Hall, the ſeat of Thomas Clifford, eſq. The preſent edifice is a plain modern brick building; but in front of it is an old gateway, ornamented with three ſeries of columns, built by ſir Walter Aſton. Behind this gateway ſtood the ancient manſion, of which ſome remains are ſtill viſible, erected by ſir Edward Aſton, in the beginning of Henry VIII.'s reign. Adjoining to the park which ſurrounds the manſion is Tixal Heath, diſtinguiſhed by two remarkable tumuli, one called the King's, the other the Queen's Low. But why ſo named, or on what occaſion conſtructed, no account is extant. Two urns, ſuppoſed to be of Roman workmanſhip, were found near them early in the laſt century.

Adjoining Tixal is Ingeſtre Hall, an old manſion, built in the reign of queen Elizabeth, the ſeat of earl Talbot. Near the houſe is the village-church, which was built in 1673, by Walter Chetwynd, eſq. the then poſſeſſor of this eſtate.

On Hopton Heath, adjoining Ingeſtre, a ſevere action was fought between the parliamentary and king's forces, in the time of the civil wars of Charles I.—Hiſtory and Antiquities of Staffordſhire, &c. by the Rev. Stebbing Shaw, folio, 1798. Beauties of England and Wales, Staffordſhire, by J. Nightingale, 8vo.

Stafford, a county of Virginia, bounded N. by Prince William county and E. by the Patowmac; containing 9830 inhabitants, of whom 4195 are ſlaves.—Alſo, a townſhip of Connecticut, in Tolland county, on the S. line of Maſſachuſetts, 12 or 15 miles N.E. of Tolland. In this townſhip is a furnace for caſting hollow ware, and a medicinal ſpring, which is the reſort of valetudinarians. It contains 2235 inhabitants.

Stafford, *New*, a townſhip of New Jerſey, in Monmouth county, adjoining Dover on the S.W. and containing 1239 inhabitants.

STAFFORDSHIRE is an inland county, ſituated nearly in the centre of England, between 52 and 54 degrees N. latitude, and between one and three degrees W. longitude from London. It is in ſhape an irregular parallelogram; and is bounded on the N. by Cheſhire and Derbyſhire, on the E. by Leiceſterſhire, on the S. by the counties of Warwick and Worceſter, and on the W. by Shropſhire. Its greateſt length from N.N.E. to S.S.W. is about 60 miles, and its greateſt breadth from E. to W. 38 miles. The ſuperficial contents are about 780,800 acres, of which 100,000 are paſture, 500,000 arable, and the remaining 180,800, woods, waters, waſtes, &c.

Ancient State: Hiſtorical Events.—This county appertained to the Cornavii of the Britons, to the diviſion of Flavia Cæſarienſis of the Romans, and was a part of the kingdom of Mercia during the Saxon heptarchy. Bede calls the inhabitants Angli-Mediterranei, the midland Engliſh. The two Roman military ways, Watling-ſtreet and Icknield-ſtreet, paſs through this county. The former enters it out of Warwickſhire, near Tamworth, and running weſtward paſſes into Shropſhire. Icknield-ſtreet alſo enters from Warwickſhire at the village of Hanſworth, near Birmingham, croſſes Watling-ſtreet, and enters Derbyſhire at Monk's bridge. The Roman ſtations in this county that are known, are Pennocrucium, near Stretton; and Etocetum, at Wall near Lichfield. But Salmon gives to Staffordſhire four Roman ſtations, which, he ſays, are Mediolanum, at Knightley; Uriconium, at Wrotteſley; Uxacona, at Wall-Lichfield; and Etocetum, at Barbeacon. The firſt of theſe ſtations Camden poſitively fixes in Montgomeryſhire; and biſhop Horſley places it on a ſlip of land incloſed by the Tern and another river. Salmon aſſigns Pennocrucium to Oldbury, in Warwickſhire, and refers to Antoninus's ſecond Iter for his authority; but Plot, Gale, Horſley, and Stukeley, coincide in opinion that Penkridge is the ſcite of that ſtation. The ancient inhabitants of Staffordſhire, in the opinion of Dr. Plot, were the Iceni; but in this he ſtands unſupported: Shaw ſays that tribe was undoubtedly of Derbyſhire. Camden and Gough will not allow that they extended beyond Huntingdonſhire, weſtward; while Salmon confines them to Norfolk and Suffolk. Shaw ſuppoſes that the Ordovices were the original inhabitants of this diſtrict, and it is generally agreed that they poſſeſſed it many centuries before the Chriſtian era. Theſe were an intrepid warlike people, whoſe territories compriſed a great portion of Wales and ſeveral counties of England. But they were diſturbed in their poſſeſſions by the Cornabii, who, breaking through the limits of their original ſettlements on the banks of the Dee, conquered a large tract of country to the weſt and north-weſt, and eſtabliſhed a monarchy, of which Condate was the capital. The Brigantes, in their turn ſubdued a portion of the territories of this tribe a ſhort time previous to the arrival of the Romans. On this event the metropolis was transferred from Condate to Uriconium, now Wroxeter, where it continued a conſiderable time, till the Romans extended their conqueſt into the interior of the country. During the ſanguinary conteſts which enſued, little is recorded reſpecting this diſtrict and its inhabitants, but that they heroically reſiſted the invaders, and though at length compelled to ſubmit, their courage and ardour for freedom excited the admiration of their conquerors. The Cornabii, after the ſubjection of their country, appear to have been the friends and allies of the Romans. It is remarkable that after the decline of the Roman power, the appellation Cornabii never occurs in the annals of Engliſh hiſtory. When the Britons experienced a ſecond ſubjugation by the Saxons, and the heptarchy was eſtabliſhed, Staffordſhire formed a part of the kingdom of Mercia, which extended over all the midland counties, and was founded by Crida in the year 585. During the repeated invaſions of the Danes, this county ſuſtained a conſiderable part of the calamities conſequent on their cruelty and rapacity. Several ſanguinary battles took place within the kingdom of Mercia; in Staffordſhire particularly, two victories were obtained over the Danes in the reign of Edward the Elder. On the partition of England between Edmund Ironſide and Canute, this county, as part of Mercia, was awarded to the latter. After the Norman conqueſt, William divided the eſtates of the Mercian earls among four of his principal followers, Hugh de Montgomery, earl of Arundel; Robert de Stafford, Henry de Ferrars, and William Fitz-Anſculph; the laſt of whom held twenty-five manors in this county. The other principal landholders beſides the king, were the biſhop of Cheſter, the abbots of Weſtminſter and Burton, the church of Rheims, and the canons of Stafford and Wolverhampton. During the contention between the royal houſes of York and Lancaſter, a deciſive battle was fought at Bloreheath, in this county, between the Yorkiſts under the earl of Saliſbury, and the Lancaſtrians under lord Audley, when the latter, with double the force and ſuperior poſition, was completely defeated, himſelf ſlain, and 2400 Cheſhire gentlemen, whoſe attachment to king Henry led them into the van, alſo fell in the action.

In the civil war of the ſeventeenth century, Staffordſhire was conſiderably engaged: Stafford ſurrendered to the parliament's forces, and Lichfield was ſeveral times taken and retaken by the contending parties. In this county Charles II. lay concealed after the fatal battle of Worceſter, till he had an opportunity of eſcaping. The circumſtances attending his concealment, the difficulties he ſuſtained, and the unſhaken loyalty of his friends, are amply detailed by Mr. Shaw in his General Hiſtory of Staffordſhire.

Eccleſiaſtical Hiſtory.—Staffordſhire did not receive the light of the goſpel till the reign of Penda, king of Mercia, whoſe ſon, Peadda, was converted to Chriſtianity by the venerable Bede. This was ſoon declared the eſtabliſhed religion of Mercia, and the cathedral of Lichfield was founded, where the epiſcopal ſee of Mercia was fixed in 669; but it was ſoon afterwards divided into five ſeveral dioceſes, and Lichfield, Worceſter, Hereford, Leiceſter, and Sidnaceſter, choſen for the reſpective ſees. In the year 786, at the requeſt of king Offa, pope Adrian advanced Lichfield to the dignity of an archbiſhopric; but this diſtinction was continued only till the death of Offa, when pope Leo reduced it to its former rank. About the year 1067 the epiſcopal ſeat was removed to Cheſter, and thence ſoon afterwards to Coventry, where it continued till the end of the thirteenth century, when Walter de Langton was appointed biſhop of Lichfield and Coventry. From this period nothing remarkable occurred in Staffordſhire, connected with church hiſtory, previous to the reformation, when Lichfield cathedral was deſpoiled of the rich ſhrine of St. Chad, and the ſee of Coventry ſeparated from it. The two biſhoprics remained diſtinct till the reſtoration, when they were again united in the perſon of Dr. John Hacket. Since that time the dioceſe has undergone no particular alteration. Staffordſhire, which is compriſed in this ſee, contains 181 pariſhes.

Civil Diviſion.—Staffordſhire is divided into five hundreds; Totmanſlow, Pyrehill, Cuddleſtone, Offlow, and Seiſdon: and contains one city, Lichfield, and twenty-three other market-towns, *viz.* Stafford, Wolverhampton, Walſall, Burton-on-Trent, Uttoxeter, Newcaſtle, Leek, Stone, Cheadle, Eccleſhall, Rudgeley, Tamworth, Tutbury, Abbot's-Bromley, Breewood, Penkridge, Cannock, Wedneſbury, Burſlem, Handley-Green, Lane-End, and Longnor. Ten members are returned to the imperial parliament from this county, *viz.* two for the ſhire, and two each for Lichfield, Stafford, Newcaſtle, and Tamworth. According to the population ſurvey of the year 1811, this county contained 57,040 houſes, occupied by 295,153 perſons; of whom 34,011 families were chiefly employed in trade and manufactures, and 18,361 in agriculture.

General Aſpect, Soil, and Climate.—The appearance of the county varies in different diſtricts. The middle and ſouth portions are generally level: among the few exceptions are the hills of Dudley and Sedgeley, the quartoſe and ragſtone hills of Rowley, and thoſe of Clent and Barbeacon. The grounds of Byſhbury and Eſſington, and ſome ſituations near Tettenhall and Enville, as well as on Cannock-heath, are alſo conſiderably elevated. The latter portion of the county was in ancient times covered with oak, but moſt of theſe have been deſtroyed: indeed ſcarcely a tree now remains to enliven the proſpect, through an extent of 2500 acres. The northern portion of the county is of an oppoſite character to that on the ſouth. Here the ſurface is moſtly bleak and hilly: only a few of the eminences, however, riſe to any remarkable elevation. The ſummit of Bunſter, near Ilam, was found by Mr. Pitt, in the courſe of his "Agricultural Survey," to be 1200 feet above the level of the Thames. The Weever hills, and ſome other points, he reports as aſcending even 1500 feet. The general elevation of this diſtrict above the ſouthern is eſtimated at from one to two hundred yards. That portion of it called the moorlands, is the commencement of that range of mountains which extend through the centre of England, till they enter Scotland, acquiring different appellations in their progreſs, and increaſing in altitude as they approach the north. The *ſoil* is extremely varied. The arable ſoils may be divided generally into the argillaceous, or ſtiff and ſtrong clayey; the arenaceous, or looſe, light, and ſandy; the calcareous, or lime earth; and a mixed or compound ſoil, or loam compoſed of the foregoing, with the addition of ſtones and other matters. The *climate* of this county inclines to wet: the annual rains are calculated at upwards of 36 inches, and thus exceed by nearly 16 inches the average computation of rain in London. A great quantity of ſnow falls in the moorlands, which doubtleſs is a principal cauſe of the piercing cold which prevails in that diſtrict.

Rivers.—Staffordſhire abounds with rivers, but none of them are navigable, at leaſt within the county. The principal are the Trent, the Dove, the Tame, and the Blythe. The Trent, which may be conſidered as the third river of England, waters, in its courſe to the ſea, ſome of the moſt fertile and beſt cultivated diſtricts of the kingdom. During its paſſage through Staffordſhire, its banks are covered with luxuriant meadows. In the vicinity of Trentham, the ſeat of the noble family of Gower, the efforts of art have greatly added to the natural beauty of the river, by ſwelling it into an expanſive lake. Paſſing the town of Stone, it flows through a valley diverſified with a variety of elegant parks; of which that of Wolſey, bordering on the chaſe of Cannock, is one of the moſt remarkable for the romantic beauty of its ſcenery. Purſuing its courſe, the Trent becomes the boundary between the counties of Stafford and Derby, till its junction with the river Dove; then, croſſing Derbyſhire, it runs through the counties of Nottingham and Lincoln, and at length pours its waters into the Humber. The Dove takes its riſe among the hills in the moorlands, near the points where the counties of Stafford, Derby, and Cheſter meet. From the declivity of its channel, its waters flow with uncommon rapidity: in ſome places it daſhes precipitately over rugged rocks; in others it is diſtinguiſhed by gentle caſcades. It falls into the Trent near Burton, on the confines of Derbyſhire. The Tame, another river of conſiderable ſize, ſprings from ſeveral ſources in the vicinity of Walſall and Coleſhill, enters Warwickſhire near Birmingham, returns into Staffordſhire at Tamworth, and finally joins the Trent. The Blythe riſes in the neighbourhood of Watley moor, in the northern diſtrict. Its courſe is nearly parallel to the Trent, into which it falls near King's-Bromley.

Canals.—Although an inland ſituation, without navigable rivers, appears to labour under peculiar diſadvantage for the purpoſes of trade; yet in Staffordſhire the deficiency is amply compenſated by the number and extent of the canals, with which this county is ſo largely ſupplied. The principal are the Grand Trunk Canal, the Coventry and Oxford, and the Birmingham Canal. Theſe, with their numerous branches and ramifications, have already been particularly deſcribed. See CANAL.

Lakes and Springs.—This county affords but few lakes, and thoſe of no great conſequence. Thoſe moſt worthy notice are that of Aquilate, which extends 1848 yards in length, and 672 in breadth; and Ladford Pool, which occupies the ſpace of about 60 acres. Salt ſprings are found in various places. The moſt conſiderable are thoſe in the pariſh of Weſton, whence ſalt is produced, equal in quality and colour to that of any part of the kingdom.

Minerals.—The number and value of the mineral productions of Staffordſhire claim particular notice. Coal is abundant: upwards of 50,000 acres have been aſcertained to contain an inexhauſtible ſupply, near enough to the ſurface to be eaſily raiſed. From the earlieſt times to the preſent, the conſumption does not appear to have exceeded a tenth part of the whole. In the ſouthern diviſion of the county, the coal diſtrict extends in length from the interior of Cannock-heath to the vicinity of Stourbridge, and in breadth from Wolverhampton to Walſall. To the north, likewiſe, it abounds in the neighbourhood of Newcaſtle and the Potteries, Lane-End, Hollybruſh, Cheadle, and Dillhorne. At Handley-Green a very peculiar ſpecies is dug, called the Peacock coal, from the priſmatic colours it diſplays. Limeſtone is ſtill more abundant than coal. At Sedgeley and Dudley-caſtle hills, Ruſhall and Haywood, and on the north-eaſt moorlands, the quantity is immenſe. The lime-works upon Caldon Low, and near the Weever hills, are particularly extenſive. This ſtone is, in ſome places, of a marble quality, and capable of taking a fine poliſh. In other parts it is chiefly compoſed of trelmintholopi, or petrified marine ſubſtances of the animal kind. Iron ore is plentiful throughout the coal diſtrict. Near Wedneſbury, Tipton, Bilſton, and Sedgeley, and to the weſt of Newcaſtle, it is peculiarly excellent and abundant. The ſtrata are generally ranged beneath a ſtratum of coal. Iron-works of great extent have been recently eſtabliſhed on the banks of the Birmingham Canal; and the trade is ſo rapidly increaſing, as to afford a proſpect of its precluding the neceſſity of any conſiderable importation. Copper and lead ore alſo abound in this county. A copper-mine is worked at Mixon, near Leek; but a more important one at Ecton-hill, near Warſlow, on the eſtate of the duke of Devonſhire. This hill has likewiſe a conſiderable vein of lead; and another of the ſame mineral has been found near Stanton-moor. In this part of the county, but particularly at Whiſton, Oakmoor, and Cheadle, ſmelting and braſs-works are carried on to a conſiderable extent. Quarries of good free-ſtone for various purpoſes are found in the different diſtricts. A durable kind for building, eaſily raiſed in blocks of any dimenſion, is found at Tixal. Alabaſter was formerly dug in great quantities, particularly on the banks of the Dove; but though it ſtill exiſts in plenty, very few of the quarries are now wrought. This county alſo yields various kinds of marble: that ſpecies, to which the name of rance-marble is given, abounds on Yelperſley Tor, and the adjacent hills. Clays of every denomination are abundant. Amblecot produces a clay of a dark-blue colour, of which are made the beſt glaſs-houſe pots of any in England. Glaſs-houſes have, in conſequence, been erected in the neighbourhood; and great quantities of the clay are ſent to different parts of the kingdom. Potters' clay of various ſorts is found here, particularly in the vicinity of Newcaſtle, where the potteries are chiefly carried on. Yellow and red ochre, and other earths uſed for colouring and painting, are among the productions of this county. At Darlaſton, near Wedneſbury, is a blue clay, which is ſold to glovers to dye aſh-colour. A black chalk is found in the beds of grey marble in Langley Cloſe; and under a rock near Hemley Hall is a reddiſh earth, nearly equal to the red chalk of France.

The farms of Staffordſhire are of all extents, from fifty acres to five hundred; but the number of the ſmaller has been lately much diminiſhed. The rent of land varies from 15*s.* to 40*s.* *per* acre, making the average about 25*s.* The cultivated lands of this county are nearly all incloſed, not more than 1000 acres ſtill remaining open. The fences in the ſouthern part are chiefly raiſed from quickſets, among which the white thorn is moſt approved.

Timber, Plantations, and Woodlands.—This county, notwithſtanding the great recent conſumption, is abundantly ſtocked with wood of every deſcription. Lord Bagot's eſtate, near Abbot's-Bromley, contains ſeveral acres of oaks, not to be ſurpaſſed in quality by any in the kingdom: the timber in many of them is to the height of ſixty or ſeventy feet. Chillingworth eſtate ranks next to this for the value of its woods. Thoſe at Beaudeſert, the ſeat of the earl of Uxbridge, and thoſe at Llimley, the property of lord Dudley, are alſo very extenſive. Teddeſley has very conſiderable plantations. Manſley wood is a coppice of fine oak. Wotteſley, Fiſherwick, Trentham park, Sandwell park, Enville, and Hilton, diſplay abundance of well-grown trees of every deſcription.

Waſte Lands.—The extent of uncultivated lands in this county is very great; being computed by Mr. Pitt to amount to an hundred thouſand acres. The chief waſte diſtricts in the ſouthern parts are Cannock-heath and Sutton-Coldfield, with Swindon, Wombourn, and Fradley commons. In the north are Morredge, Wetley-moor, Stanton-moor, Hollington-heath, Careſwell-common, and Needwood foreſt; which laſt, however, has been in part recently incloſed and cultivated.

Manufactures and Commerce.—Various branches of manufacture are carried on to a great extent, particularly in the ſouthern parts of the county: the chief are hardware articles, nails, glaſs, toys, japanned goods, and potters' ware; with productions in cotton, ſilk, leather, woollen, and linen. The manufacture of glaſs is moſt conſiderable in the vicinity of Stourbridge, where many ſpacious glaſs-houſes have been built. The potteries occupy an extent of ten miles, toward the north part of the county: theſe have acquired great reputation from the ingenious Mr. Wedgewood. (See Potteries.) Wolverhampton and the neighbouring villages are diſtinguiſhed for the manufacture of locks: buckles, ſteel-toys, and watch-chains, are among the eſteemed productions of that town. The ſtaple manufacture of Walſall and its vicinity is chiefly ſhoe-buckles, claſps, and ſadlers' ironmongery. Nail-making, in many country pariſhes, is a ſource of employment to great numbers of men, women, and children. Bilſton furniſhes a variety of plated, lackered, japanned, and enamelled goods. At Wedneſbury the gun-trade is extenſive. At Darlaſton, Willenhall, and the adjacent villages, tobacco and ſnuff-boxes are wrought in various modes. Stafford and its neighbourhood exhibit numerous articles in the cutlery and leather-trade: the hat manufacture is alſo carried on there, and in ſome other towns, on an extenſive ſcale. Tin and braſs are among the common productions of the county. The cotton manufactures at Roceſter, Fazeley, Tamworth, Burton, and Tutbury, are very conſiderable; as is likewiſe the ſilk-trade of Leek, and that of tape at Cheadle and Teyn. The woollen manufacture is but comparatively trifling; moſt of the raw wool being ſold into the clothing and ſtocking diſtricts. The making of linen is moſtly confined to private families, for their own uſe.

It is worthy of obſervation, that the original wooden almanac of the Norwegians and Danes is ſtill in uſe in this county, under the appellation of the Staffordſhire clogg. Engravings of this calendar, ſomething different from each other, may be ſeen in Dr. Plot's Natural Hiſtory of the County, and in Camden's Britannia, by Gough. The principal antiquities in this county are the cathedral at Lichfield; Tutbury caſtle and church; Dudley caſtle and priory; Eccleſhall caſtle; Croxton abbey; Alton caſtle; Wolverhampton church; bridge and abbey, at Burton-upon-Trent; Darleſton caſtle; Tixal manor-houſe; Hilton abbey; Rowton priory; Uttoxeter church; Careſwell caſtle; Chartley caſtle; Heyley caſtle.

Authorities.—Hiſtory, &c. of Staffordſhire, by the Rev. S. Shaw, 2 vols. folio, 1798, &c. an unfiniſhed work. General View of the Agriculture of the County of Stafford, by William Pitt, 8vo. 1808. The Natural Hiſtory of Staffordſhire, by Dr. Plot, fol. 1686. A Map of the County, begun in 1769, and finiſhed in 1775, by William Gates, ſix ſheets. Account of Staffordſhire, in the Beauties of England, vol. xiii.

STAFFURTH, a town of Germany, in the principality of Anhalt-Bernburg; 9 miles N.W. of Bernburg.

STAFLEFIT, a town of Pruſſia; 7 miles S. of Culm.

STAG, or *Red Deer*, or *Hart*, in *Zoology*. See CERVUS *Elaphas*. See alſo DEER, HART, HUNTING, and SHOT.

STAG, in *Rural Economy*, a term applied provincially to a young horſe.

STAG-*Beetle*, in *Natural Hiſtory*, is the LUCANUS *Cervus* of Linnæus; which ſee.

STAG-*Evil*, or *Hart*, in horſes and neat cattle, a kind of univerſal cramp or convulſion. See HART.

This is a diſeaſe with which young horſes are not unfrequently affected. It moſtly comes on after much expoſure to ſevere cold, or a high degree of cold moiſture, where heat takes place ſuddenly afterwards, and ſometimes in cooling too quickly after great heat. It attacks the whole body, but more particularly the joints, with a ſort of ſoreneſs, rigidity, and ſtiffneſs, which cauſe the animals to move about in a ſlow, aukward, almoſt lifeleſs manner. They gradually fall off in their appetites, and become incapable of performing any kind of labour, and often even the mildeſt exerciſe diſtreſſes and inconveniences them in a high degree.

In its removal, calomel, with opium and the powder of gum guaiacum, may be firſt had recourſe to in the form of a ball, made up with balſam copaiva, for ſome days; when the uſe of warm cordial ſtrengthening drinks or drenches, with oak or Peruvian bark in fine powder, may be found neceſſary to complete the cure; the horſe during the time being made to take as much gentle exerciſe as poſſible. And the uſe of a good dry graſs paſture is not unfrequently of great benefit in completing the removal of the diſorder.

Neat cattle are likewiſe frequently ſubject to a diſeaſe of the ſame nature, which, after much expoſure to intenſe cold, comes on with a ſtiffneſs in the joints, which is attended with a lumpy ſwelling on them and the legs, after a little time, without any inflammatory appearances. This ſtiffneſs and ſoreneſs ſometimes extend over the whole body, ſo that the beaſts become incapable of riſing, when down, without aſſiſtance. Where the chine or back is particularly affected, the diſeaſe is moſtly denominated the *chine fellon*; but where the joints have more of the diſorder than any other part, it is commonly termed the *joint fellon*, or *joint evil*; and where the whole body is deranged and diſordered, it has often the name of *cold fellon* given it.

The diſeaſe is particularly liable to attack milch-cows and young cattle in the ſpring ſeaſon, being occaſioned probably by their being kept through the winter in a low weak ſtate, and ſuddenly expoſed in the ſpring to the extreme coldneſs of the north and north-eaſterly winds, in low damp ſituations, or other ſimilar places.

In order to remove the diſorder, a ball of the ſame kind as that for horſes may be given for ſome days, until the ſoreneſs and ſtiffneſs begin to go off, when recourſe ſhould be had to ſuch powders or balls as thoſe recommended below, given in a hornful or two of warm ale.

The powder of gum guaiacum, in the quantity of about an ounce, with an ounce and a half of Æthiop's mineral, or ſulphuretted quickſilver, and two ounces of the grains of paradiſe, in fine powder: or, camphor in the proportion of about a drachm and a half, rubbed with a few drops of the ſpirit of wine, to which may be added guaiacum and Peruvian bark in fine powder, of each about an ounce and a half, warm ſeeds in powder three ounces, and treacle or honey two or three ounces, to form a ſort of ball.

The drinks of this ſort may be continued occaſionally for ſome time. And much utility may at firſt be derived from the uſe of a comfortable houſe of ſome kind or other for containing the animals, and afterwards by their being turned into dry warm paſtures, when the ſeaſon admits.

The rubbing of the ſwellings in the joints with ſtrong camphorated turpentine embrocations, as frequently practiſed, is moſtly improper, ſometimes injurious, and always hazardous.

Where the diſeaſe changes to, or puts on the appearance of a more inflammatory nature, as that of the acute rheumatic kind, with fever, pain, and tumefaction of or about the joints, it may be on ſome occaſions neceſſary to reſort to remedies of the camphor kind, with calomel, and a ſmall proportion of opium, giving at the ſame time ſome ſort of active opening or purging medicines. The above cordial ſtrengthening bark-powdery remedy will afterwards, for the moſt part, be of great utility.

STAG-*Horn Tree*, in *Gardening*. See RHUS.

STAG-*Worms*, in *Natural Hiſtory*, a name given to a ſpecies of worms produced from the eggs of a fly, and lodged in a very ſtrange place behind, and under the palate of the ſtag, or deer's mouth.

They are always found in great numbers together, and are contained in fleſhy bags, which are placed as the almonds of the ears in the human ſpecies. The huntſmen are well acquainted with theſe worms, and are of opinion that they are the cauſe of the falling off of the creature's horns; they eat their way to theſe, according to their opinion, through the proper parts of the head, and then gnawing them round at the roots, they are forced to fall, like a tree that is ſawed off at the bottom. This, however, is a vulgar error.

M. Reaumur has abundantly proved, that theſe worms never attempt ſo ſtrange a paſſage; they always remain where they are firſt found till they are in a ſtate to change into the flies to whoſe eggs they owe their origin, and whoſe forms they are at length to aſſume. Reaumur's Hiſt. Inſ. vol. ix. p. 8.

STAGE, in the *Modern Drama*, the place of action and repreſentation; included between the pit and the ſcenes.

The ſtage anſwers to the proſcenium or pulpitum of the ancient theatre.

For an account of the Engliſh ſtage, ſee MYSTERY, PLAYHOUSE, and SCENE. See alſo DRAMATIC *Machinery*, and SCENOGRAPHY.

Unlicenſed ſtage-plays are deemed public nuiſances, and may, upon indictment, be ſuppreſſed and fined.

STAGE, *Laws of the*, are the rules and decorums to be obſerved, with regard to the economy and conduct of a dramatic performance to be exhibited on the ſtage. Theſe relate, principally, to the unities, the diſpoſition of the acts and ſcenes, the unravelling, &c.

STAGE alſo denotes a certain diſtance to which ſtuff is to be wheeled, at ſtated prices *per* cubic yard: the uſual ſtage is an interval of 20 yards; but on very ſteep or quite level wheeling, they are ſometimes reckoned 15 yards, and in other caſes 25 yards.

STAGE *Iſland*, in *Geography*, a ſmall American iſland, near the coaſt of Maine, not far from Caſco bay, remarkable for being the firſt land inhabited by Europeans in New England. It is not now uninhabited.

STAGEBORG, a town of Sweden, in Eaſt Gothland; 15 miles S.E. of Nordkioping.

STAGGARD, among *Sportſmen*, a male deer only four years old.

STAGGERS, among *Farriers*, a diſeaſe of horſes, which has ſometimes been denominated *apoplexy* (which ſee), and which conſiſts of a giddineſs in the head, and which, in ſome caſes, is indicated by madneſs. Of this diſeaſe authors have deſcribed two ſpecies; *viz.* the *ſleepy*, and the *mad* ſtaggers. In the firſt ſpecies, the animal becomes inactive, and manifeſts a heavineſs of the eyes, and an inclination to ſleep, the head reſting in the manger; accompanied with coſtiveneſs, and other ſymptoms of fever. In the ſecond ſort of ſtaggers, the horſe, without indicating any previous ſigns of diſeaſe, falls down apparently deprived of all voluntary motion, with the eyes inſenſible to light, the breathing difficult, a great motion of the flanks, and a quick, full pulſe. In the mad ſtaggers the horſe often riſes, plunges violently in the ſtable, and again falls down in an inſenſible ſtate.

This diſeaſe is frequently occaſioned by turning out a horſe to graſs too ſoon, before he is well cold: where, by hanging down his head to feed, humours are generated, which oppreſſing the brain, are the proximate cauſe of this diſeaſe. Sometimes it comes by over-exerciſe in hot weather, which inflames the blood, &c. ſometimes by noiſome ſmells in the ſtable, exceſſive eating, &c. the rupture of a blood-veſſel, or external injuries on the head.

The ſigns of it are, dimneſs of ſight, reeling, and ſtaggering, watery eyes, &c. At length, through extreme pain, he beats his head againſt the wall, thruſts it into the litter, riſes and lies down with fury, &c.

The moſt approved remedy for this diſtemper is derived from the following treatment. Begin with copious bleeding from a large orifice in the neck-vein, and repeat the operation, if the ſtrength of the horſe admit of it, and the ſymptoms of the diſeaſe require it. After bleeding adminiſter a ball, prepared of two drachms of calomel, an ounce of Barbadoes aloes in powder, two drachms of ginger, and a ſufficient quantity of honey. Apply alſo a glyſter, prepared by mixing three quarts of oatmeal gruel, three ounces of common ſalt, and half a pint of olive oil. If the diſeaſe continue after this treatment, put a rowel under the jaw, and another in the cheſt; applying alſo, behind the ear, ſome bliſtering liniment: let the horſe be ſupported at the ſame time by maſhes, or if he refuſe theſe, by gruel in the quantity of two or three quarts, frequently given. After opening the bowels ſufficiently, let the following fever-powder be given: *viz.* one drachm of pulverized camphor, a ſcruple of antimonial powder, and ſix drachms of powdered nitre, all well mixed. When the ſymptoms are relieved, maſhes of bran or oatmeal may be occaſionally given, with a ſmall quantity of corn: hay ſhould be ſparingly allowed. Omit the powders, and give the following reſtorative ball every morning, till the horſe recovers ſtrength, taking care to keep his bowels open by maſhes: the ball is prepared of Peruvian bark and gentian, in powder, of each $\frac{1}{12}$th of an ounce; two drachms of ginger, one drachm of vitriolated iron, and a ſufficient quantity of honey. The rowel under the jaw ſhould be continued at leaſt a fortnight after the diſeaſe has been removed. Attention ſhould afterwards be obſerved with regard to the kind or quantity of food, the exerciſe and ſtable treatment.

Horſes are ſubject to convulſions and ſtaggers, ariſing from a retention of the dung and aliment; which are indicated by ſwoln eyes, reeling and tottering motion, ſhort breath and cough, and irregular motion of the flanks; averſeneſs from lying down, coſtiveneſs, indiſpoſition to ſtale, and dark-coloured urine; and ſometimes jaundice. Gibſon directs the dung to be raked out by the hand from the rectum, which dung is generally hard, in ſmall balls of a blackiſh colour, without moiſture. After this operation, adminiſter plenty of emollient oily glyſters of marſhmallows, or pot liquor, water gruel or water; adding to three pints or two quarts of the liquor a pint of linſeed-oil, and half a pound of treacle; which ſhould be given milk-warm, and repeated every day, till the dung comes away with eaſe, and in a ſoft ſtate: accompanying this medical treatment with diet of the beſt hay, ſcalded bran or chaff, or boiled barley. When the dung comes away with facility, and in great abundance, the following gentle lenitive purge may be given; *viz.* lenitive electuary and cream of tartar, of each four ounces, and two ounces of common ſugar, mixed in a pint and half of hot ale; to which, when the tartar is diſſolved, add the ſugar, and laſt of all the lenitive electuary. Let this be given in the morning, upon an empty ſtomach, blood-warm; and repeated three or four times, with a reſpite of two or three days between the draughts, keeping the horſe to an opening diet, with proper exerciſe, till he recovers his uſual vigour.

Mr. Boyle mentions a cure of this diſeaſe in horſes, by rubbing their gums with the coach-whip till they bleed. Works, Abr. vol. i. p. 88.

STAGGERS, a diſeaſe in ſheep, in which they are moſtly conſidered as extremely liable to move or turn themſelves about in a quick manner.

The remedy for this diſorder was formerly to drive them to a change of grounds often, to keep the grounds from tainting. And it has been noticed by Liſle, that thoſe lambs which die of the ſtaggers do not die till they begin to eat graſs, and of thoſe the fineſt and luſtieſt; whence he concludes, that it is not the cold weather alone that brings ſtaggers, but their feeding on cold watery graſs in the months of March and April. The diſeaſe was much prevented by the early folding of the lambs. See GID.

The diſeaſe moſtly appears in the autumn, and is ſaid to be produced by a variety of cauſes; ſuch as improper food, the leaves of the oak-tree, on account of their aſtringent quality, cobwebs beſprinkled with dew, and different others. And it probably often proceeds from local affections, and water in the brain. Some have likewiſe ſuppoſed that it ariſes from the operation of a poiſonous graſs, the *lolium temulentum*, which is alone met with in thoſe ſituations of Scotland where the ſtaggers in ſheep prevail. But what effect ſuch caſes have on the brain, to produce or cauſe ſuch a diſeaſe, is not pretended to be explained.

Where this diſeaſe continues for any length of time in the ſame ſheep, it is liable to become fatal.

The change of paſture is ſuppoſed to be the only effectual remedy in ſuch caſes, but the uſe of calomel and bark may often be found of material advantage, as well as other means which have a tendency to remove water from the brain.

STAGGERS is alſo a diſeaſe in neat cattle, which is often very troubleſome and unpleaſant in its conſequences and management. The principal ſeats of the diſorder would ſeem to be the head and the ſtomach, which naturally ſympathize with each other. It may proceed from a variety of different cauſes, as improper and inſufficient feeding, too much expoſure to cold, drinking too largely of very cold water, under particular circumſtances, water and local affections of different kinds in the brain and parts about it, and many others of the ſame nature.

It is moſt liable to attack ſuch cattle as have been poorly fed, or ſtarved in the winter ſeaſon, on their being firſt turned out upon good paſtures in the early ſpring; but it not unfrequently happens to other cattle which have been regularly fed. It likewiſe occurs in very different ſtates and degrees of violence, according to the circumſtances and habits of body of the animals. And it occaſionally takes place in calves, and other young ſtock of this ſort.

The diſeaſe ſhews itſelf by the reeling, wavering, ſtaggering, and imperfect gait of the animal; by the heavy, dull, and ſluggiſh motion and appearance of it; and an inclination to become drowſy, and the reſting or reclining of the head upon any convenient place near it.

It ſometimes, however, puts on a more local inflammatory appearance, in which caſes the beaſts have commonly a leſs heavy drowſy diſpoſition, with more of the wild raving or raging tendency and quality in their aſpects and diſpoſitions.

In the former of theſe ſtates, the diſeaſe may be attempted to be removed by the giving of calomel in pretty large doſes, as a drachm or more to a large beaſt, two or three times in the courſe of the week, and powders compoſed of camphor rubbed with a few drops of ſpirit of wine, in the quantity of about two drachms. Common nitre, or ſaltpetre in powder, two ounces and a half; and the roots of rhubarb in powder, or ſome other ſimilar matter, from one to two ounces and upwards, in the intervals between the doſes of calomel. The beaſt, during the time, ſhould be kept moderately warm, and have good hay and warm maſhes occaſionally given to it, preſerving it as much as poſſible in a temperate ſtate in every reſpect.

In the latter ſtate it may ſometimes be neceſſary to take away blood in proportion to the ſize and ſtrength of the beaſts, as from one to two or three quarts; after which, the bowels may be well opened by the uſe of pretty ſtrong purgatives of the ſaline kind; then, where there is much fever of the inflammatory kind attending the diſeaſe, a ball compoſed of tartarized antimony, in the quantity of from half to a whole drachm, with about two drachms of camphor rubbed as above, and from a drachm and a half to two drachms of prepared ammonia in powder, made up with a little treacle, may be given in a hornful or two of warm oatmeal gruel, once or oftener in the day to the beaſts, until it diſappears. In tedious caſes of this ſort, with much affection of the head, great relief may ſometimes be gained by the application of ſtrong bliſters about the head, or the rubbing of the parts near and upon it, and on the ſides of the neck, with ſtrong ointment of the bliſtering kind, after the hair has been well clipped off and removed from them.

Afterwards it will only be neceſſary to let the beaſts have a ſtrengthening cordial drink or two, and the uſe of a good dry paſture, when the ſeaſon will admit of it.

STAGGERWORT, in *Agriculture*. See RAGWORT.

STAGIRA, or STAGIRUS, in *Ancient Geography*, a town of Macedonia, in the vicinity of mount Athos, upon the Strymonic gulf, between Amphipolis on the north, and Acanthus on the ſouth. This town was the native place of Ariſtotle, hence called the Stagirite.

STAGNANT *Watery Land*. See WATERY *Land*.

STAGNO, in *Geography*, a ſea-port town of the republic of Raguſa, on the Adriatic, the ſee of a biſhop, ſuffragan of Raguſa: about a mile from the town is a fortreſs, called "Stagno Piccolo," or Little Stagno; 30 miles N.W. of Raguſa. N. lat. 43° 30′. E. long. 17° 59′.

STAGONIAS, a word uſed by the old authors to expreſs that ſort of male frankincenſe which is in round drops, and very clear and fine.

STAGONIUS, a name ſometimes given to ſtorax.

STAGS, in *Geography*. Several rocks on the coaſt of Ireland are ſo called; as, the Stags on the ſouth-eaſt entrance of Cork harbour, near Roches tower, where a lighthouſe is erecting; the Stags of Caſtlehaven, ſouth of Toehead, county of Cork; and the Stags of Broadhaven, north of Binwy-head, on the Mayo coaſt.

STAHL, GEORGE ERNEST, in *Biography*, a celebrated phyſician and chemiſt, was born at Anſpach, in Franconia, in October 1660. He ſtudied medicine at the univerſity of Jena, and laid the foundation of his fame, immediately after his graduation in 1684, by commencing a courſe of private lectures among the ſtudents of that place. His advancing reputation procured for him the appointment of phyſician in ordinary to the duke of Saxe-Weimar in 1687. On the eſtabliſhment of the univerſity at Halle, in 1694, Frederic Hoffmann, with his accuſtomed liberality, ſolicited the appointment of a medical profeſſorſhip for Stahl, who accepted the office, and became the rival of that diſtinguiſhed phyſician as a teacher of medical ſyſtems, but not in the exerciſe of candour and liberality towards his colleagues. Stahl was conſcious of poſſeſſing conſiderable mental powers, and paid little reſpect to the opinions of others; and he became the leader of a ſect or ſchool of phyſicians, in oppoſition to the mechanical theoriſts, in which he was followed by many eminent perſons, not only in Germany, but in other countries, as by Perrault in France, Gaubius in Holland, Porterfield and Simpſon in Scotland, and by Nichols and Mead in England, notwithſtanding the very fanciful nature of the hypotheſis on which his ſyſtem was founded. The "Conſpectus Medicinæ" of Juncker was publiſhed to illuſtrate his doctrines in Germany; and a ſuccinct account of the ſyſtem was given by Dr. Nichols, in his work "De Animâ Medicâ," in this country.

Phyſicians had always remarked a certain power in the animal body of reſiſting injuries and correcting ſome of its diſorders, which they had called *nature*, and *vis medicatrix naturæ*, and Van Helmont had already aſcribed ſome degree of intelligence to this power. But it remained for Stahl to refer this power entirely to the *rational ſoul*, which, he affirmed, not only originally formed the body, but is the ſole cauſe of its motions, in the conſtant excitement of which life conſiſts. For he maintained that the ſoul abhors the diſſolution of its body, and therefore excites and directs all its motions, the vital and involuntary as well as the voluntary motions, to prevent that diſſolution, by obviating putrefaction, and expelling the corrupted humours by various appropriate organs or excretories; in a word, that all the functions of the body are entirely directed by the mind, which intelligently perceives the tendency of all impreſſions, external and internal, made upon the body, and excites ſuch motions as may favour the beneficial, and obviate the injurious influence of all cauſes acting upon it. Whence he farther contended, that diſeaſes, ſuch as fevers and ſpaſmodic affections, were in fact the motions voluntarily excited by the rational ſoul, for the purpoſe of opening emunctories, and expelling ſome offending cauſe. Generally ſpeaking, therefore, it was maintained, that diſeaſes were ſalutary efforts of the preſiding ſoul, and were to be aſſiſted, and not interrupted, by the interference of art: yet it was ſomehow admitted, that the mind, from ſurpriſe, fear, or deſpair, occaſioned by too ſudden or vehement impreſſions made upon it, occaſionally excited adverſe motions, which it was right to moderate. Independently of the viſionary character of this hypotheſis, it was juſtly deprecated as leading phyſicians to neglect the uſe of remedies, or to uſe only the moſt inert and frivolous ones; and alſo to ſet little value upon the collateral ſtudies of medical ſcience, even upon anatomical reſearches, which Stahl maintained had little or no reference to the art of healing. And, in fact, both he and his followers, truſting principally to the attention and wiſdom of nature, adopted that inactive mode of *curing by expectation*, la médecine expectante, as the French have called it; they zealouſly oppoſed the uſe of ſome of the moſt efficacious remedies, ſuch as opium, cinchona, and mercury; and were extremely reſerved, even in the uſe of general evacuants, ſuch as bleeding, vomiting, &c. although their ſyſtem led them to refer almoſt all the diſturbances of the motions of the ſyſtem to a plethora, or too great abundance of the blood. This hypotheſis was maintained by Stahl in ſeveral publications, with much ability and ingenuity; and it continued to influence a great number of intelligent phyſicians for a long time. His principal medical work, in which his ſyſtem is diſplayed in its moſt matured form, is entitled "Theoria Medica vera, Phyſiologiam et Pathologiam ſiſtens," printed at Halle in 1708.

The merits of Stahl as a chemical philoſopher are of a much higher character; and the ſchool which he founded in this ſcience, after extending its influence long and univerſally among thoſe who purſued the ſame inquiries, has only been ſuperſeded of late by farther diſcoveries. He was the inventor of the celebrated theory of *phlogiſton*, which appeared to explain the phenomena of combuſtion and inflammability, and was received every where with high applauſe, and which, in fact, occaſioned Germany to become the great ſchool of chemiſtry. It cannot be denied, indeed, although later experiments have ſubverted the groundwork, that this hypotheſis tended greatly to ſimplify the ideas, and perfect the operations of chemiſts, and entitled its author to a high rank amongſt the improvers of ſcience. His principal chemical work was entitled, "Fundamenta Chymiæ dogmaticæ et experimentalis," firſt printed in 1729, and ſeveral times reprinted: but before that period he had publiſhed ſeveral other works on this ſubject, ſuch as "Diſſertationes de Metallurgiæ et Docimaſtiæ Fundamentis," 1697; and, in the ſame year, "Experimenta et Obſervationes 300 Chymicæ et Phyſicæ," in which work he principally advanced his doctrine of phlogiſton. He alſo publiſhed in the German language ſome eſſays "On Sulphur," and "On Salts."

Stahl was elected a member of the Academy Naturæ Curioſorum in 1700. He was called to viſit Frederic William, king of Pruſſia, at Berlin, in 1716; and afterwards returned ſeveral times to that capital, where his reputation was very high, and where at length he was attacked with a fatal diſeaſe, in 1734, in the ſeventy-fourth year of his age. See Eloy Dict. Hiſt. de la Médecine. Gen. Biog. Cullen's Firſt Lines. *Pref.* And Hoffmann's eſſay, "De Differentiâ Doctrinæ Stahlianæ et Hoffmannianæ."

STAIDENFELD, in *Geography*, a town of the duchy of Wurzburg; 4 miles S. of Schweinfurt.

STAIN, a town of the county of Tyrol; 2 miles S.W. of Meran.—Alſo, a town of Auſtria, on the Danube, conſiſting almoſt wholly of one ſtreet, and containing two churches. It is near Crems, and governed by the ſame magiſtrates. It is joined by a long bridge with Mautern, on the other ſide of the Danube; 32 miles W.N.W. of Vienna. —Alſo, a town of Auſtria; 2 miles N. of Steyr.

STAIN. See STEIN.

STAINABRUNN, a town of Auſtria; 6 miles W.S.W. of Ehrnſprunn.

STAINBACH, a town of Auſtria, on the Teichel; 6 miles S. of Steyr.

STAINER, JACOB, in *Biography*, a German maker of violins of the moſt ſprightly and brilliant tone. His ſignature, paſted on the inſide of the back, is the following; "Jacobus Stainer, in Abiam prope Œnopontum, 1647." Œnopons is the Latin name of Inſpruck in Germany, the chief city of Tyrol. Theſe violins, ſince ſolos have been laid aſide, have loſt ſomewhat of their former favour, and the Amati and Straduarii violins of Cremona, which are of a more full and rich tone, are preferred for leading a band, playing modern ſymphonies, and ſolo concertos *à grande orcheſtra*.

STAINES, or STANES, in *Geography*, a market-town in the hundred of Spelthorne, and county of Middleſex, England, is ſeated on the northern banks of the river Thames, over which there is a ſtrong timber bridge at this place, connecting the counties of Surrey and Middleſex. It is ſixteen miles from Hyde-Park corner, and moſt of its houſes extend along the ſides of the great weſtern road; but the pariſh church, with a few buildings, are ſituated nearly half a mile N.W. of the chief maſs of building. The pariſh conſiſts of 748 acres 16 perches of cultivated land, with 666 acres 1 rood and 20 perches of arable land. On a ſtratum of loam is a ſoil of fine black mould, and gravel is found in ſome places. According to the population report of 1811, this pariſh contained 355 houſes, and 2042 inhabitants.

In old records Staines was written *Stana*, a Saxon word for a ſtone; and Camden ſuppoſes that the name was derived from a ſtone, which was fixed in, or on the bank of the river here, to denote the extent of the juriſdiction of the city of London over the Thames, weſtward. A ſtone, bearing the date of 1280, on the margin of the water near the church, is ſtill preſerved here. An annual fair of four days was granted in the year 1228 to the abbot and convent of Weſtminſter, and is ſtill continued: a weekly market is held on Fridays. The civil government of the town is veſted in two conſtables and four headboroughs. Staines bridge appears to have been one of the moſt ancient in the country; ſo far back as the year 1262, three oaks out of Windſor foreſt were granted for its repairs by Henry III.; and numerous grants of pontage, or temporary tolls for the ſame purpoſe, were made from time to time, in many of the ſubſequent reigns, as appears by the records in the Tower. Theſe tolls were confirmed and enforced by acts of parliament in 1509 and 1597. In 1791 an act was paſſed for building a new bridge, and allowing certain tolls to defray the expence of the building. Under this act a ſtone bridge, of three arches, was begun in Auguſt 1792, and opened in March 1797: but in conſequence of one of the piers giving way, the bridge was neceſſarily taken down. One of caſt-iron was next ſubſtituted, but this alſo failed, and the builders were obliged to ſupport it by wooden piles and frame-work. The bridge in its preſent ſtate was completed in 1807. The pariſh church conſiſts of a chancel, nave, and north aiſle, ſeparated by circular columns and pointed arches. The door of the chancel is of early Norman architecture. A ſquare embattled tower at the weſt end was built by Inigo Jones in 1631, as appears by an inſcription on the ſouth ſide. In an apartment under the gallery ſtaircaſe are two unburied coffins, covered with crimſon velvet, and richly embelliſhed, containing the bodies of Jeſſie Aſpaſia, wife of F. W. Campbell, eſq. and of her brother, H. Caulfield, eſq.; the former died in 1812, the latter 1808. The Quakers, Anabaptiſts, and Methodiſts, have each a meeting-houſe in this town. A ſchool on the Lancaſtrian principle of education has been recently eſtabliſhed, and is ſupported by voluntary contribution; a convenient building has been erected for this purpoſe. Lyſons's Middleſex Pariſhes, 4to. 1800. Beauties of England and Wales, vol. x. Middleſex. By J. N. Brewer.

STAINHOF, a town of Auſtria; 3 miles S.W. of Vienna.

STAINING *of Bone*, *Horn*, *Hair*, and *Ivory*. See each article, and alſo DYEING *of Bone*, &c..

Staining *of Marble.* See Marble, and *Solutions, &c. of* Stones.

Staining *of Paper and Parchment.* See Paper and Parchment.

Staining *of Porcelain.* See Porcelain.

Staining *of Stones.* See *Solution,* and *Colours of* Stones.

Staining *of Wood.* See Wood and Dyeing

STAINKIRCHEN, in *Geography,* a town of Auſtria; 4 miles N. of Schwanaſtadt.

STAINS, a town of France, in the department of Paris; 6 miles N. of Paris.—Alſo, a lake of Pruſſia, in Natangen; 48 miles S.E. of Konigſberg.

STAINTZ, a town of the duchy of Stiria; 10 miles S.E. of Voitſberg.

STAINVILLE, a town of France, in the department of the Meuſe; 7 miles S.E. of Bar-le-Duc.

STAJO, or Staja, in *Commerce,* a corn meaſure of Italy, equal at Florence to 4 quarti, 16 metadeli, or 32 mezzate. The moggio, which contains 8 ſacchi, or 24 ſtaja, is equal to about 16 Engliſh buſhels. Salt is meaſured by the ſtajo, which weighs 72 lbs. Florence weight, or 54 lbs. avoirdupois. The ſtajo of Corſica is equal to 6104 cubic inches, and 28.60 ſtajo = 10 Engliſh quarters. The ſtaji of Leghorn = 1501 cubic inches, and 114.60 ſtaji = 10 Engliſh quarters. The ſtaji of Lucca = 1472 cubic inches, and 116.85 ſtaji = 10 Engliſh quarters. The ſtaji of Milan = 1055 cubic inches, and 162.96 ſtaji = 10 Engliſh quarters. That of Modena = 4297, and 40 ſtaji = 10 Engliſh quarters. The ſtaji of Turin = 2388 cubic inches, and 73.56 ſtaji = 10 Engliſh quarters. The ſtaji of Venice = 4943 cubic inches, and 34.78 ſtaji = Engliſh quarters.

STAJOLUS, among the *Romans,* a meaſure of length, uſed in ſurveying land; it was equal to five palms and three-fourths of a palm.

STAIRCASE, an aſcent incloſed between walls, or a baluſtrade, conſiſting of ſtairs or ſteps, with landing-places and rails; ſerving to make a communication between the ſeveral ſtories of a houſe.

The dimenſions of ſtairs are differently aſſigned by different authors; in this however they agree, that they muſt not be more than ſix, nor leſs than four inches high; nor more than eighteen, nor leſs than twelve inches broad; nor more than ſixteen, nor leſs than ſix feet long each ſtair. But theſe meaſures have only regard to fine buildings, ordinary houſes are excepted; yet even in theſe, the ſtairs are not to exceed eight inches in height, nor be leſs than nine inches in breadth, nor three feet in length.

To reduce the dimenſions of ſtairs to ſome natural, or at leaſt geometrical ſtandard, Vitruvius borrows the proportions of the ſides of a right-angled triangle, which the ancient ſchool expreſſed by the numbers 3, 4, and 5. The firſt for the perpendicular height; the ſecond for the horizontal breadth; and the third for the whole ſlope or inclination, from the edge of one ſtair to that of another.

But this rule is ſet aſide, and with good reaſon, by the modern builders. For, on this principle, the lower the ſtairs, the narrower they muſt be; and ſtairs, for inſtance, four inches high (ſuch as we find mentioned by ancient architects), muſt be but five and one-third inches broad.

One rule to be regarded in the making of ſtairs is, that they be laid according to the Italian phraſe, *con un tantino da ſcarpa, i. e.* ſomewhat ſloping, or a little higheſt behind, that the foot may, as it were, both aſcend and deſcend at once; which, though obſerved by few, is found a ſecret and delicate deception of the pains in mounting.

The conſtruction of a complete ſtaircaſe is one of the moſt curious works in architecture. The common rules to be obſerved in it are as follow.

1. That it have a full free light to prevent accidents of ſlipping, falling, &c.

2. That the ſpace over head be large and airy, which the Italians call *un bel ſfocato,* good ventilation, becauſe a man ſpends much breath in mounting.

3. That the half paces, or landing-places, be conveniently diſtributed for repoſing in the way.

4. That to prevent rencounters, &c. the ſtaircaſe be not too narrow; but this laſt is to be regulated by the quality of the building.

5. That care be taken in placing the ſtaircaſe, ſo that the ſtairs may be diſtributed, without prejudice to the reſt of the building.

The kinds of ſtaircaſes are various: in ſome, the ſtairs are *ſtraight,* in others *winding,* in others both ways, or *mixed.*

Again, of *ſtraight* ſtairs, called alſo *fliers,* ſome fly directly forwards; others are ſquare; others triangular; and others are called *French flights.*

Of *winding* ſtairs, called alſo *ſpiral,* or *cockle-ſtairs,* ſome are ſquare, ſome circular, and ſome elliptical. And theſe, again, are various; ſome winding round a ſolid, and others round an open newel.

Laſtly, of *mixed* ſtairs, ſome are called *dog-legged;* others both wind about a ſolid newel, and fly about a ſquare open newel.

Stairs, *Straight,* are ſuch as always fly, that is, proceed in a right line, and never wind; whence their denomination.

Of theſe there are ſeveral kinds; as,

Direct fliers, or *plain fliers,* which proceed directly from one floor to another, without turning either to the right or left; theſe are ſeldom uſed, except for garret or cellar ſtairs.

Square fliers, which fly round the ſides of a ſquare newel, either ſolid or open, having at every corner of the newel a ſquare half ſtep, taking up one-fourth of a circle; ſo that they fly from one half ſtep to another, and the length of the ſtairs is perpendicular to the ſide of the newel.

Triangular fliers, which fly round by the ſides of a triangular newel, either ſolid or open, having at each corner of the newel a trapezial half ſtep, taking up two-thirds of a circle; ſo that they fly from one half ſtep to another; and their length is perpendicular to the ſide of the newel.

French fliers, which fly firſt directly forwards, till they come within the length of a ſtair of the wall; and then have a ſquare half pace, from which you immediately aſcend to another half pace, from which the ſtairs fly directly back again, parallel to their firſt flight.

Stairs, *Winding,* are ſuch as always wind, and never fly; of theſe there is great variety; as,

Circular winding ſtairs, of which there are four kinds, *viz.* ſuch as wind about a ſolid newel, the fore-edge of each being in a right line, pointing to the centre of the newel; commonly uſed in church-ſteeples, and great old houſes: ſuch as wind round an open newel, the fore-ſide of each being in a right line, pointing to the centre of the newel; as thoſe in the Monument, London: ſuch as wind round a ſolid newel, only the fore-ſide of each an arc of a circle, either concave or convex, pointing near to the circumference of the newel: and ſuch as reſemble the laſt in all other reſpects, ſave that they have an open newel. Any of theſe winding ſtairs take up leſs room than other kinds.

In ſtairs that wind round a ſolid newel, architects make the diameter of the newel either $\frac{3}{6}$; or $\frac{1}{4}$, or $\frac{1}{3}$, or $\frac{2}{7}$ of that of the ſtaircaſe, according as that is in bigneſs. If very ſmall, the newel is but $\frac{3}{8}$, and if large $\frac{3}{7}$, &c.

In ſtairs that wind round an open newel, Palladio orders the newel to be one half of the diameter of the ſtaircaſe; though there does not appear any reaſon why the newel here ſhould not be proportioned to the ſtaircaſe, as in the former.

As to the number of ſtairs in each revolution; Palladio orders, that, in a ſtaircaſe ſix or ſeven feet diameter, the ſtairs in each revolution be twelve; if the diameter be eight, the ſtairs to be ſixteen; if nine or ten, the ſtairs to be twenty; and if eighteen, to be twenty-four.

Elliptical winding ſtairs, of which there are two kinds; the one winding round a ſolid, the other round an open newel: they are much of the ſame nature as circular ſtairs, excepting that, in the one, the newel is a circle, and, in the other, an ellipſis.

Square winding ſtairs are ſuch as wind round a ſquare newel, either ſolid or open; the fore-ſide of each ſquare being in a right line, pointing to the centre of the newel.

Triangular winding ſtairs are ſuch as wind round a triangular newel; the fore-ſide of each being a right line, pointing to the centre of the newel.

Columniated winding ſtairs.—Palladio mentions a ſtaircaſe, in Pompey's portico at Rome, ſet on columns, ſo as that the light they receive from above, may diſtribute itſelf to all parts alike.

Double winding ſtairs.—Scamozzi mentions a ſtaircaſe in this form, made by Piedro del Bergo, and Jean Coffin, at Sciamberg, in France, in the king's palace. It is ſo contrived, as that two perſons, the one aſcending, and the other deſcending, ſhall never meet.

Dr. Grew deſcribes a model of this kind of ſtaircaſe, kept in the Muſeum of the Royal Society. The foot of one of the ſtaircaſes, he ſays, is oppoſite to that of the other; and both make a parallel aſcent, and within the ſame cylinder. The newel in the middle is hollow, and built with long apertures, to convey light from candles placed at the bottom, and on the ſides of the newel into both caſes.

Quadruple winding ſtairs.—Palladio mentions a ſtaircaſe of this form, in the caſtle of Chambor, near Bloys. It conſiſts of four ſtaircaſes, carried up together, having each its ſeveral entrance, and going up one over another, in ſuch manner, as that, being in the middle of the building, the four ſerve to lead to four apartments; ſo that the people of the one need not go up and down the ſtairs of the other; yet being open in the middle, they all ſee each other paſs.

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Square fliers and winders have a ſquare newel, either ſolid or open; and fly by the ſides of the newel, winding a quadrant of a circle at each corner.

Solid and open newelled fliers and winders are of two kinds; the one winds a quadrant of a circle about a ſolid newel; then flies by the ſide of a ſquare open newel; then winds again by the ſide of a ſolid newel; then flies again, and ſo alternately. The other flies firſt, then winds, and then flies again alternately.

STAIRING, in *Geography*, a town of Auſtria; four miles W. of Voglabruck.

STAIRS, in *Building*, the ſteps by which we aſcend and deſcend from one ſtory of a houſe to another. See Staircase.

STAITH is a ſtage or ſtrong wooden ſcaffold, to which coal-waggons are conducted by a rail-way, in order to ſhoot their contents into ſhips, boats, or carts.

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Stake, the name of a ſmall anvil uſed by ſmiths; ſometimes it ſtands on a broad iron foot, on the work-bench, to be moved up and down occaſionally; and ſometimes it hath a ſtrong iron ſpike at the bottom, by which it is fixed to ſome place on the work-bench. Its uſe is to ſet ſmall and cold work ſtraight, by hammering it on the ſtake, or to cut and punch upon it with the cold chiſſel, or cold punch.

Stake *of a Plough*. The ſtake is an upright piece of wood, paſſing at its bottom through that link of the tow-chain which paſſes through the box of the plough, and at its upper end receiving the end of what is called the *bridle-chain*, which ties it to the crow-ſtaff, or if it be not long enough, a wyth, or cord, is uſed to tie it: it is alſo tied to it again, a little below the pillow of the plough, by another wyth or cord. See Plough, Pillow, Crow-staves, &c.

Stakes, in *Ancient Armoury*, were long and pointed at both ends, and uſed to protect the archers from the attacks of the enemy's horſe: theſe were planted in the earth, ſloping before them. In the firſt of Edward VI. three hundred and fifty of theſe were in the ſtores of the town of Berwick, under the article of archers' ſtakes: there were alſo at the ſame time eight bundles of archers' ſtakes in Pontefract caſtle.

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Stake-*Poſts*, are poſts of oak, about four feet high and twelve inches diameter, with a mortiſe-hole in each, for the ſtake-heads to go in and out, to keep the rope from the ground. They are placed about ten yards diſtant from each other, along the whole length of the rope-walk.

STAKING, *Pointing*, or *Sharpening Hop-poles*, the art and practice of rendering their bottom parts pointed and ſharp, in ſomewhat the manner of the common hedge-ſtake, in order that they may be ſet into the ground or ſoil in a firm and ready manner. See Hop, and Stacking *and Preſerving Hop-poles*.

STAL-*Boat*, a kind of fiſhing-boat mentioned 27 Eliz. c. 21.

STALACTAGNIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek ϛαλακτος, *ſtillatitious*, or formed by dropping, and αγνος, *pure*.

The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the purer ſort of what are called by authors *ſtalactitæ*. They are cryſtalline ſparry bodies, formed into oblong conical figures, compoſed of various cruſts, and uſually found in form of icicles. Of this genus there are three known ſpecies. Hill.

STALACTITE, plural *Stalactites*, in *Mineralogy*, are the pendent protuberances from the roofs or ſides of caverns, formed by the depoſition of calcareous or other earths, from the water which percolates through rocks.

Some waters, that riſe from beds of limeſtone, are ſo overcharged with calcareous earth, as to form an incruſtation of ſtone round any ſubſtance that is immerſed in them for a ſhort time; of which we have well-known inſtances in the waters of Matlock, in Derbyſhire, and Knareſborough, in Yorkſhire: ſuch are called petrifying ſprings. It is by a ſimilar proceſs that ſtalactites are formed, by the water dropping from ſome projecting point and depoſiting a part of its contents; ſucceeding drops continue to enlarge the depoſition, which frequently aſſumes the form of an icicle, and is ſometimes of conſiderable ſize.

Stalactites form ſo rapidly in ſome caverns and mines as to cloſe up the entrance, and even fill up the excavation entirely. The depoſitions of calcareous earth formed on the floors of caverns, by the water which drops from the roof, are called *ſtalagmites*.

Though the formation of ſtalactites apparently depends on the mechanical depoſition of earthy matter, and may ſeem to admit of an eaſy explanation, there are ſome peculiarities of ſtructure in ſtalactitical maſſes which it is more difficult to account for.

In ſome ſtalactites we may obſerve a radiated diverging cryſtalline ſtructure; in others, the lamellar ſtructure of calcareous ſpar is obſervable when broken, and they divide into rhombs, or the regular primitive cryſtals of carbonate of lime. The progreſs from the radiated to the regular cryſtalline ſtructure may be ſeen in the ſame ſpecimen: thus it ſhould appear, that the particles of the ſtalactite, after they had been mechanically depoſited, and formed a ſolid, were capable of a certain degree of motion, which permitted their cryſtalline arrangement to proceed to its ultimate form, or the primitive rhomb. Some ſtalactites have occaſionally been found which were tubular; other ſtalactites, that are ſolid, are covered with minute cryſtals, and ſometimes are terminated by a knob, reſembling a muſhroom. Stalactites are not unfrequently formed under the arches of bridges, by the percolation of water through the mortar.

In the Geyſers, or boiling ſprings of Iceland and other parts of the world, ſiliceous ſtalactites and ſtalagmites are formed on the ſides of the rocks on which the water falls, or in the baſins which ſurround the ſprings. Theſe natural baſins are indeed entirely formed of ſiliceous depoſitions, and it has been aſcertained, that the waters contain a conſiderable portion of ſilex in ſolution.

The larger and more compact maſſes of ſtalactites are employed in ſtatuary. This ſubſtance was much uſed by the ancients, and called *alabaſtron* and *alabaſtrites*. The alabaſter of the moderns is more frequently gypſum, or ſulphate of lime.

The alabaſter from ſtalactite is ſometimes of a pure white, but this kind is not ſo durable as that which is of a light yellow colour, or veined. The iron, which is the colouring matter, communicates to the ſtone a great degree of hardneſs, and on this account the coloured alabaſter was more prized by the ancient ſculptors than the pure white. See STONE *for Statuary*.

STALACTITICAL, formed like ſtalactite.

STALACTOCIBDELA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek ϛαλακτος, *ſtillatitious*, or formed by the dropping of water, and κιβδηλος, *impure*.

The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the coarſer kinds of what authors have called ſtalactitæ. They are cryſtallino-terrene ſpars, formed into oblong bodies, and found hanging from the roofs of caverns and grottoes. Of this genus there are only two known ſpecies. Hill.

STALAGMITÆ. See STALACTITE and STALAGMOSCIERIA.

STALAGMITE, in *Mineralogy*, the depoſition of earthy matter, formed by drops of water on the floors of caverns. The word is derived from the Greek ϛαλαγμα, *a drop*. See STALACTITE.

STALAGMITIS, in *Botany*, ſo called by Murray, in the Göttingen Tranſactions, v. 9, from ϛαλαγμος, *a dropping*, or *diſtillation*, becauſe of the gum yielded by this tree.—Schreb. Gen. 729. Willd. Sp. Pl. v. 4. 980.—Claſs and order, *Polygamia Monoecia*, or rather *Polyadelphia Polyandria*. Nat. Ord. *Guttiferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, deciduous, of four roundiſh, concave, coloured leaves, fleſhy in the middle, bordered; the two outermoſt coriaceous, ſmalleſt; the two innermoſt thinner and veiny. *Cor.* Petals four, obovate, rather coriaceous, fringed, ſpreading, larger than the calyx; the two oppoſite ones largeſt. *Stam.* Filaments about thirty, inſerted into a fleſhy quadrangular receptacle, club-ſhaped, abrupt, ſomewhat quadrangular, erect, the length of the corolla, united into five ſets; anthers erect, of two round lobes. *Piſt.* Germen ſuperior, globoſe; ſtyle erect, thick, ſhort; ſtigma of four inverſely heart-ſhaped, ſpreading, permanent lobes. *Peric.* Berry globoſe, of one cell, crowned with the ſtyle and ſtigma. *Seeds* three, oblong, obſcurely triangular, "terminated by a joint."

Some male flowers are interſperſed, in which there is no germen, only the thread-ſhaped rudiment of a ſtyle in ſome of them, with a prickly unequal imperfect ſtigma. Koenig obſerved the calyx to conſiſt occaſionally of ſix leaves, while the ſtigma was only three-cleft. Schreber doubted whether the ſtamens were always polyadelphous.

1. S. *cambogioides*. "Murray Comm. Goett. v. 9. 173." Willd. n. 1.—Native of Camboja and Ceylon. A middle-ſized *tree*, with oppoſite ſpreading *branches*. *Leaves* oppoſite, ovate, acute, entire, flat, coriaceous, rigid, dark-green, ſmooth on both ſides; occaſionally obovate. *Footſtalks* very ſhort. *Flowers* axillary or lateral, whorled; the male ones either intermixed with the others, or in a cluſter by themſelves. *Murray*. This tree appears nearly akin to the XANTHOCHYMUS of Roxburgh, ſee that article hereafter; Ait. Hort. Kew. v. 4. 420; yet we muſt preſume them to be different on account of the great authorities on which the latter depends.

STALAGMODIAUGIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek ϛαλαϛμος, *a drop*, and διαυγης, *pellucid*. The bodies of this genus are the purer kinds of what authors call ſtalagmitæ, or drop-ſtones.

They are ſpars found in form of ſmall balls, each compoſed of numerous cruſts, and conſiderably pellucid and cryſtalline. Of this genus there are three known ſpecies. Hill.

STALAGMOS, a term uſed by authors to expreſs a diſtillation of rheum from the head.

STALAGMOSCIERIA, the name of a genus of ſpars. The word is derived from the Greek ϛαλαϛμος, *a drop*, and σκιερος, *opaque*, and expreſſes an opaque ſpar, which has received its form from the dropping of water.

The bodies of this genus are the coarſer kinds of what are called by authors ſtalagmitæ, and are ſmall round maſſes, compoſed of numerous thin cruſts, and of an opaque and coarſe ſtructure.

Of this genus we have only two known ſpecies. Hill.

Scotland affords a vaſt variety of the ſtalagmitæ. One the ſtaircaſe, according as that is in bigneſs. If very ſmall, the newel is but $\frac{3}{8}$, and if large $\frac{3}{7}$, &c.

In ſtairs that wind round an open newel, Palladio orders the newel to be one half of the diameter of the ſtaircaſe; though there does not appear any reaſon why the newel here ſhould not be proportioned to the ſtaircaſe, as in the former.

As to the number of ſtairs in each revolution; Palladio orders, that, in a ſtaircaſe ſix or ſeven feet diameter, the ſtairs in each revolution be twelve; if the diameter be eight, the ſtairs to be ſixteen; if nine or ten, the ſtairs to be twenty; and if eighteen, to be twenty-four.

Elliptical winding ſtairs, of which there are two kinds; the one winding round a ſolid, the other round an open newel: they are much of the ſame nature as circular ſtairs, excepting that, in the one, the newel is a circle, and, in the other, an ellipſis.

Square winding ſtairs are ſuch as wind round a ſquare newel, either ſolid or open; the fore-ſide of each ſquare being in a right line, pointing to the centre of the newel.

Triangular winding ſtairs are ſuch as wind round a triangular newel; the fore-ſide of each being a right line, pointing to the centre of the newel.

Columniated winding ſtairs.—Palladio mentions a ſtaircaſe, in Pompey's portico at Rome, ſet on columns, ſo as that the light they receive from above, may diſtribute itſelf to all parts alike.

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Dr. Grew deſcribes a model of this kind of ſtaircaſe, kept in the Muſeum of the Royal Society. The foot of one of the ſtaircaſes, he ſays, is oppoſite to that of the other; and both make a parallel aſcent, and within the ſame cylinder. The newel in the middle is hollow, and built with long apertures, to convey light from candles placed at the bottom, and on the ſides of the newel into both caſes.

Quadruple winding ſtairs.—Palladio mentions a ſtaircaſe of this form, in the caſtle of Chambor, near Bloys. It conſiſts of four ſtaircaſes, carried up together, having each its ſeveral entrance, and going up one over another, in ſuch manner, as that, being in the middle of the building, the four ſerve to lead to four apartments; ſo that the people of the one need not go up and down the ſtairs of the other; yet being open in the middle, they all ſee each other paſs.

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Dog-legged ſtairs, which firſt fly directly forwards, then wind a ſemicircle, and then fly directly backwards, parallel to that.

Square fliers and winders have a ſquare newel, either ſolid or open; and fly by the ſides of the newel, winding a quadrant of a circle at each corner.

Solid and open newelled fliers and winders are of two kinds; the one winds a quadrant of a circle about a ſolid newel; then flies by the ſide of a ſquare open newel; then winds again by the ſide of a ſolid newel; then flies again, and ſo alternately. The other flies firſt, then winds, and then flies again alternately.

STAIRING, in *Geography*, a town of Auſtria; four miles W. of Voglabruck.

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STAKE *of a Plough*. The ſtake is an upright piece of wood, paſſing at its bottom through that link of the tow-chain which paſſes through the box of the plough, and at its upper end receiving the end of what is called the *bridle-chain*, which ties it to the crow-ſtaff, or if it be not long enough, a wyth, or cord, is uſed to tie it: it is alſo tied to it again, a little below the pillow of the plough, by another wyth or cord. See PLOUGH, PILLOW, CROW-STAVES, &c.

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The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the purer ſort of what are called by authors *ſtalactitæ*. They are cryſtalline ſparry bodies, formed into oblong conical figures, compoſed of various cruſts, and uſually found in form of icicles. Of this genus there are three known ſpecies. Hill.

STALACTITE, plural *Stalactites*, in *Mineralogy*, are the pendent protuberances from the roofs or ſides of caverns, formed by the depoſition of calcareous or other earths, from the water which percolates through rocks.

Some waters, that riſe from beds of limeſtone, are ſo overcharged with calcareous earth, as to form an incruſtation of ſtone round any ſubſtance that is immerſed in them for a ſhort time; of which we have well-known inſtances in the waters of Matlock, in Derbyſhire, and Knareſborough, in Yorkſhire: ſuch are called petrifying ſprings. It is by a ſimilar proceſs that ſtalactites are formed, by the water dropping from ſome projecting point and depoſiting a part of its contents; ſucceeding drops continue to enlarge the depoſition, which frequently aſſumes the form of an icicle, and is ſometimes of conſiderable ſize.

Stalactites form ſo rapidly in ſome caverns and mines as to cloſe up the entrance, and even fill up the excavation entirely. The depoſitions of calcareous earth formed on the floors of caverns, by the water which drops from the roof, are called *ſtalagmites*.

Though the formation of ſtalactites apparently depends on the mechanical depoſition of earthy matter, and may ſeem to admit of an eaſy explanation, there are ſome peculiarities of ſtructure in ſtalactitical maſſes which it is more difficult to account for.

In ſome ſtalactites we may obſerve a radiated diverging cryſtalline ſtructure; in others, the lamellar ſtructure of calcareous ſpar is obſervable when broken, and they divide into rhombs, or the regular primitive cryſtals of carbonate of lime. The progreſs from the radiated to the regular cryſtalline ſtructure may be ſeen in the ſame ſpecimen: thus it ſhould appear, that the particles of the ſtalactite, after they had been mechanically depoſited, and formed a ſolid, were capable of a certain degree of motion, which permitted their cryſtalline arrangement to proceed to its ultimate form, or the primitive rhomb. Some ſtalactites have occaſionally been found which were tubular; other ſtalactites, that are ſolid, are covered with minute cryſtals, and ſometimes are terminated by a knob, reſembling a muſhroom. Stalactites are not unfrequently formed under the arches of bridges, by the percolation of water through the mortar.

In the Geyſers, or boiling ſprings of Iceland and other parts of the world, ſiliceous ſtalactites and ſtalagmites are formed on the ſides of the rocks on which the water falls, or in the baſins which ſurround the ſprings. Theſe natural baſins are indeed entirely formed of ſiliceous depoſitions, and it has been aſcertained, that the waters contain a conſiderable portion of ſilex in ſolution.

The larger and more compact maſſes of ſtalactites are employed in ſtatuary. This ſubſtance was much uſed by the ancients, and called *alabaſtron* and *alabaſtrites*. The alabaſter of the moderns is more frequently gypſum, or ſulphate of lime.

The alabaſter from ſtalactite is ſometimes of a pure white, but this kind is not ſo durable as that which is of a light yellow colour, or veined. The iron, which is the colouring matter, communicates to the ſtone a great degree of hardneſs, and on this account the coloured alabaſter was more prized by the ancient ſculptors than the pure white. See STONE *for Statuary.*

STALACTITICAL, formed like ſtalactite.

STALACTOCIBDELA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek ϛαλακτος, *ſtillatitious*, or formed by the dropping of water, and κιϐδηλος, *impure.*

The bodies of this genus are formed by the dropping of water from the roofs of ſubterranean caverns, and are the coarſer kinds of what authors have called ſtalactitæ. They are cryſtallino-terrene ſpars, formed into oblong bodies, and found hanging from the roofs of caverns and grottoes. Of this genus there are only two known ſpecies. Hill.

STALAGMITÆ. See STALACTITE and STALAGMOSCIERIA.

STALAGMITE, in *Mineralogy*, the depoſition of earthy matter, formed by drops of water on the floors of caverns. The word is derived from the Greek ϛαλαγμα, *a drop*. See STALACTITE.

STALAGMITIS, in *Botany*, ſo called by Murray, in the Göttingen Tranſactions, v. 9, from ϛαλαγμος, *a dropping*, or *diſtillation*, becauſe of the gum yielded by this tree.—Schreb. Gen. 729. Willd. Sp. Pl. v. 4. 980.—Claſs and order, *Polygamia Monoecia*, or rather *Polyadelphia Polyandria.* Nat. Ord. *Guttiferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, deciduous, of four roundiſh, concave, coloured leaves, fleſhy in the middle, bordered; the two outermoſt coriaceous, ſmalleſt; the two innermoſt thinner and veiny. *Cor.* Petals four, obovate, rather coriaceous, fringed, ſpreading, larger than the calyx; the two oppoſite ones largeſt. *Stam.* Filaments about thirty, inſerted into a fleſhy quadrangular receptacle, club-ſhaped, abrupt, ſomewhat quadrangular, erect, the length of the corolla, united into five ſets; anthers erect, of two round lobes. *Piſt.* Germen ſuperior, globoſe; ſtyle erect, thick, ſhort; ſtigma of four inverſely heart-ſhaped, ſpreading, permanent lobes. *Peric.* Berry globoſe, of one cell, crowned with the ſtyle and ſtigma. *Seeds* three, oblong, obſcurely triangular, "terminated by a joint."

Some male flowers are interſperſed, in which there is no germen, only the thread-ſhaped rudiment of a ſtyle in ſome of them, with a prickly unequal imperfect ſtigma. Koenig obſerved the calyx to conſiſt occaſionally of ſix leaves, while the ſtigma was only three-cleft. Schreber doubted whether the ſtamens were always polyadelphous.

1. S. *cambogioides.* "Murray Comm. Goett. v. 9. 173." Willd. n. 1.—Native of Camboja and Ceylon. A middle-ſized *tree*, with oppoſite ſpreading *branches*. *Leaves* oppoſite, ovate, acute, entire, flat, coriaceous, rigid, dark-green, ſmooth on both ſides; occaſionally obovate. *Footſtalks* very ſhort. *Flowers* axillary or lateral, whorled; the male ones either intermixed with the others, or in a cluſter by themſelves. *Murray.* This tree appears nearly akin to the XANTHOCHYMUS of Roxburgh, ſee that article hereafter; Ait. Hort. Kew. v. 4. 420; yet we muſt preſume them to be different on account of the great authorities on which the latter depends.

STALAGMODIAUGIA, in *Natural Hiſtory*, the name of a genus of ſpars. The word is derived from the Greek ϛαλαγμος, *a drop*, and διαυγης, *pellucid*. The bodies of this genus are the purer kinds of what authors call ſtalagmitæ, or drop-ſtones.

They are ſpars found in form of ſmall balls, each compoſed of numerous cruſts, and conſiderably pellucid and cryſtalline. Of this genus there are three known ſpecies. Hill.

STALAGMOS, a term uſed by authors to expreſs a diſtillation of rheum from the head.

STALAGMOSCIERIA, the name of a genus of ſpars. The word is derived from the Greek ϛαλαγμος, *a drop*, and σκιερος, *opaque*, and expreſſes an opaque ſpar, which has received its form from the dropping of water.

The bodies of this genus are the coarſer kinds of what are called by authors ſtalagmitæ, and are ſmall round maſſes, compoſed of numerous thin cruſts, and of an opaque and coarſe ſtructure.

Of this genus we have only two known ſpecies. Hill.

Scotland affords a vaſt variety of the ſtalagmitæ. One cave, about eight miles diſtant from Aberdeen, on the ſea-ſide, has its whole roof cruſted over with ſtalactitæ, of a foot in length, hanging down like the fringe of a bed; the floor alſo is as deeply covered with congeries of ſtalagmitæ; the upper coat, both of theſe and the ſtalactites, is of a ſea-colour, but the inner parts are as white as ſal prunellæ; the water which drops from theſe is of a very peculiar nature, for it is ſo acrimonious, that if it touch the ſkin but ever ſo ſlightly, it makes it ſmart. Near this cave there is another hollow rock, in which the ſtalactitæ make a very beautiful figure: they are all formed into long and thick columns, and ſtand perpendicularly, ſo that they repreſent the pipes of an organ; when broken, they are all found to be hollow within. The rock, and all the ſtone thereabouts, is of the limeſtone kind.

STALBRIDGE, in *Geography*, a ſmall market-town in the hundred of Brownſhall, in the Sherbourne diviſion of Dorſetſhire, England, is ſituated near the banks of the river Stour, on the N. ſide of the county; 9 miles E. from Sherbourne, and 113 miles W.S.W. from London. The manor was anciently the property of the abbey of Sherbourne: after the diſſolution of monaſteries, Edward VI. granted it to the duke of Somerſet; on his death it paſſed to the Audley family, and afterwards to Richard, earl of Corke; he bequeathed it to his ſon Robert Boyle, who reſided here many years; and his firſt chemical experiments were made in the manor-houſe in 1647. Peter Walter, eſq. clerk of the peace for Middleſex, afterwards purchaſed the manor, and in his family it has ſince continued. The town of Stalbridge, and the greater part of the pariſh, are ſeated on a rocky ſtratum, whence the vicinity is ſupplied with ſtone for building and other uſes: the principal manufactory here is that of ſtockings, which is carried on to a very conſiderable extent. Two fairs are held annually, and a market weekly, on Thurſdays. In the population report of 1811, the number of houſes in this pariſh is ſtated to be 141, of inhabitants 890.

In the centre of the town is a ſtone croſs, which, including the baſe, is thirty feet high. At the top is a ſquare block, with four niches; thoſe on the eaſt and weſt fronts have the Crucifixion, with the Virgin, and St. John. On this block ſtood a croſs; and from the top of the free-ſtone of the pyramid to the hole in which this croſs was fixed, the height is ten feet. At the bottom of this block are ſeveral coats of arms; one of them ſeems a chevron or feſs between three roſes or eſcallops. The pyramid itſelf is twelve feet high, and all the angles are fluted. On one ſide of it is a defaced figure of our Saviour, with the lamb at his feet. The four ſides of the baſe are adorned with reliefs, one of which ſeems to repreſent the reſurrection of Chriſt, who holds a croſs in his hand. The whole ſtands on three octagonal flights of ſteps, each diminiſhing in the aſcent. Hutchins's Hiſtory of Dorſetſhire, 3 vols. fol. 1796, &c.

STALE, in *Agriculture*, a term uſed provincially to ſignify the handle of any thing or kind of tool, as a fork-ſtale, &c.

Stale, in *Rural Economy*, a term applied to the urine of animals: the ſtale of horſes and ſome other animals ſhould be carefully preſerved for uſe in the way of manure. See Urine.

Stale alſo denotes a living fowl, put in a place to allure and bring others where they may be taken. See Decoy.

For want of theſe, a bird, ſhot, his entrails taken out, and dried in an oven, in his feathers, with a ſtick thruſt through to keep it in a convenient poſture, may ſerve as well as a live one.

Stale *Furrow*, in *Agriculture*, a term applied to a furrow which has been long turned up, or in which the ſlice has been for ſome time expoſed to the weather, in contradiſtinction to that which is newly formed, or in a freſh ſtate. See Sowing.

Stale *Seeding*, the cuſtom or practice of ſeeding or ſowing land which has been long turned up, or in the ploughed ſtate. The practice, though common, and held in much eſteem with ſome in different places, ſhould probably never be had recourſe to, except in ſome caſes with wheat, as where a firm and ſolid bottom is required in conſequence of the too great friability or looſe powdery quality of the ſoil, as in putting that crop in after potatoes, in ſome inſtances, and other ſimilar products, which are apt to cauſe a very light ſtate of the mould or ſoil. On account of the convenience of breaking up the lay grounds during a part of the winter ſeaſon in ſome ſituations, ſtale ſeeding of the land has been practiſed, eſpecially with oats and ſome other ſorts of ſeed; but how far it has been found either beneficial or detrimental, has not yet perhaps been fairly put to the teſt of experiment. See Sowing.

Stale *Sowing*, in *Gardening*, the practice of ſowing or putting in ſome ſorts of ſeed into ground which has been dug up ſome time, and is in a ſtale condition. This is in ſome inſtances the caſe with peas, beans, and ſome other leguminous ſeeds, as well as thoſe of ſome other kinds; but it ought always to be as much as poſſible avoided. See Sowing *of Seeds*.

STALECKE, in *Geography*, a town of France, in the department of Mont Tonnerre; 1 mile N.N.W. of Bacarach.

STALIKON, a town of Switzerland, in the canton of Zurich; 6 miles S.W. of Zurich.

STALIMENE. See Lemnos.

STALING, a term uſed to ſignify the act of evacuating the urinary bladder in the horſe or mare, or other animal of the ſame kind. In team as well as other horſes, it is a humane and neceſſary practice to ſuffer them to void their urine at full leiſure, and to encourage them to it by *whiſtling*, or any other of the ſoothing methods which they may underſtand. The evacuation of urine is liable to interruption, profuſion, and to be diſeaſed from various cauſes, and thereby to produce much injury to the animals.

But neither team nor other horſes are much ſubject to ſtale blood, unleſs in caſes where they have ſuſtained ſome hurt, or been ſtrained in the loins or kidnies, and when ſome of the blood-veſſels about the neck of the bladder have been ruptured or burſt open, or in caſes of eroſion taking place there, or in the paſſage of the urine, by means of which ſome of the ſmaller and more minute veſſels of theſe parts may have been laid open, and ſend forth a bloody ſort of diſcharge; but when this laſt happens, it is moſtly very ſmall in quantity, and but of ſhort duration, commonly going off without any aſſiſtance in the way of medicine.

In caſes where the urine paſſes off in an intermixed bloody ſtate, or blood comes away in an almoſt pure or clear condition immediately after the ſtaling of the animal, the complaint may be removed, if the horſe is ſtrong, well fed, and in a full condition, by bleeding in a pretty plentiful manner, according to the ſize and ſtate of the animal; but if he be of the team hard wrought kind, and low in condition, it muſt be uſed in a much more ſparing way, and, in many inſtances, be wholly omitted. After bleeding, and in thoſe ſtates of the diſeaſe in which it is unneceſſary, the uſe of mild aſtringent opiate remedies may often be employed internally with great advantage; ſuch as the red reſtringent gum, in the quantity of two, three, or more drachms, according to circumſtances, in fine powder; oak-bark, or that of the Peruvian kind, in powder, two or three ounces; and powdered crude opium, from a ſcruple to about half a drachm; mixed and made up into a ball with a little honey or treacle, and given to the horſe once or oftener in the day, until the bloody ſtaling diſcharge goes off and wholly diſappears, which is aſcertained by the animal ſtaling in a free and perfect manner. Other ſimilar ſorts of aſtringent ſubſtances and barks may likewiſe be made uſe of with perhaps equal benefit, where theſe cannot be had, as well as ſome reſtringent tinctures, ſuch as thoſe of the above gummy matter and ſeveral others. All theſe remedies ſhould conſtantly be given in large quantities of ſome kinds of mucilaginous liquids, as the free uſe of ſuch ſubſtances is found to be highly beneficial in all caſes of this nature.

After ſuch complaints are wholly removed, the ſtrength of the animals may be reſtored by the giving of ſuch powdery ſubſtances as are directed below, in full quantities of oatmeal or other ſorts of gruel, as there may be occaſion. The powder of the root of gentian, and that of Peruvian bark, in the proportion of from one to two or more ounces; ginger in powder, one ounce or more; and ſometimes the ruſt, or the ſalt of ſteel powdered, in the quantity of about half an ounce of the former, and from one and a half to two drachms of the latter. The horſes ſhould likewiſe have a pretty free uſe of maſhes of different nouriſhing ſorts.

There is a profuſe ſort of ſtaling in horſes of the farm, team, and other kinds, which ſometimes conſtitutes and becomes a diſeaſe. See DIABETES.

STALK, among *Botaniſts*, that part of a plant which riſes immediately from the root, and which uſually ſupports the leaves, the flowers, and the fruit.

The term *ſtalk* is uſed on all occaſions; but in ſpeaking of the graſſes, and gramineous plants, the word *culm* is uſed in its place, to diſtinguiſh that peculiar kind of ſtalk which is general to all theſe plants, and is not found in any others.

The terms uſed in deſcribing the ſtalks of plants are, a *ſimple* ſtalk, one which runs up undivided from the root to the top.

Naked ſtalk, one that has no leaves.

Folioſe ſtalk, one with leaves on it.

Ramoſe ſtalk, that which ſends out branches.

Erect ſtalk, that which riſes ſtraight up.

Oblique ſtalk, that which is ſlanting.

Voluble ſtalk, that which twiſts round other things.

Flexuous ſtalk, that which bends.

Reclinate ſtalk, that which ſtoops towards the ground.

Procumbent ſtalk, that which lies on the ground.

Creeping, or *ſarmentous* ſtalk, that which emits roots as it runs along.

If the ſtalk be rounded in ſhape, it is called *round;* if it make two angles, *ancipital;* if three, *trigonal;* if four, *ſquare;* if more, *polygonal.*

If the ſtalk be lightly ridged and furrowed on the ſurface, it is ſaid to be *ſtriated;* if more deeply, *canaliculate;* if full of protuberances, *ſcabrous;* if lightly hairy, *villoſe;* if more roughly, *hiſpid.*

In the *branched* ſtalk, if the branches riſe erect, it is expreſſed by *aſcendant;* if they ſpread, by *diffuſe;* if they are very large, it is called *branchiated.*

If the ſtalk divaricate, or, inſtead of ſending out branches, it divide into them, it is called a *compoſite* ſtalk. If theſe divarications proceed by pairs, or if every branch be divided only into two others, it is called *dichotomous;* if it part into two ſeries of branches, it is expreſſed by the term *diſtichous;* if it part into a multitude of ramifications, it is called *ſubdivided.*

All theſe terms are uſed alſo in expreſſing the different ſtates of the *culm*, which, having no articulations, is called *equal;* when ſcaly, *ſquamoſe.*

STALK, in *Agriculture*, the ſtem or ſtock part of any ſort of grain, graſs, or other kind of plant that is grown as a field crop.

The ſtalks of many ſorts of field plants are much diſpoſed to be affected with different kinds of vegetable diſeaſes, as thoſe of the mildew, the ruſt, and ſeveral other ſorts, which produce ſpeckled, ſpotted, freckled, or other appearances on them.

The ſtalks or ſtems of many different field plants of the cabbage, borecole, rape, and other kinds, are not unfrequently left ſtanding as very uſeful and neceſſary ſpring feed for ewes and lambs, as well as other ſorts of ſheep-ſtock, by the ſprouts or ſmall leaves which they throw out at that ſeaſon in ſuch an abundant manner.

The cutting over the ſtems or ſtalks of ſome ſorts of plants is occaſionally practiſed in the view of increaſing the ſize or quantity of their produce, as in the caſe of the potatoe, and ſome other ſimilarly rooted kinds; but from the trials which have lately been made on the ſubject, it would ſeem that harm rather than good is moſtly the conſequence of the practice.

The ſtalks of graſſes and ſome other plants of that ſort may, in ſome inſtances, and in particular caſes, be cut over, cropped, or fed down by animals, eſpecially of the ſheep kind, with great benefit in rendering them more fine and more ſpreading, by which the herbage as well as the ſward of the land is much improved.

There may likewiſe be other ways in which the management of the ſtalks in different ſorts of plants may probably be beneficial in their cultivation, as by thinning, topping, and ſtripping off their leaves, &c.

STALK, in *Gardening*, the ſtem, upright, or riſing part of any ſort of culinary vegetable or other plant which is raiſed or cultivated in gardens or pleaſure-grounds. The ſtalks of garden vegetables are, for the moſt part, of either the criſp, tender, fleſhy eatable kinds, or of the more hard and ligneous ſorts. The former are, in moſt caſes, rendered more ſuitable and proper as food by being blanched, or having their colouring matters diſcharged from them in ſome way or other, as in celery, endive, ſea-kale, and ſome others. The latter, being commonly only for temporary or future uſe and produce, rarely require any thing to be done to them, except the cutting and clearing away of the irregular or decayed parts towards the cloſe of the ſummer, or other ſeaſon; as they are of the annual, biennial, or perennial kind.

The ſtalks of ſome ſorts of garden plants occaſionally require to be ſtopped in their growth, in order to render them more productive in fruit, ſeed, or other matters, by having their extreme parts twiſted or cut off, as is ſometimes practiſed with the cucumber and other ſimilar plants, as well as in the bean and other crops of that deſcription. And the hard ſolid ſtalks of ſome kinds of garden plants, after they have been cut over, and their heads removed for uſe, are ſtill ſuffered to ſtand in their places, or to be taken up and replanted in other ſituations, in the view of throwing out or ſending forth freſh crops of edible ſhoots of the green kind. See SPROUTS, *Eſculent.*

The ſtalks of all garden vegetables ſhould, in general, be kept in as free and open a ſtate of growth as poſſible, as when too cloſe or too much crowded they never ſucceed ſo well, in whatever intention the plants from which they proceed may be raiſed or cultivated. They likewiſe, in ſome caſes, require to riſe quickly, in order to be good or of a proper quality.

The ſtalks of ſeveral different ſorts, too, ſtand in need of ſupport, as all thoſe of the twining and ſome other kinds.

STALKER, in *Brick-making*. See Brick.

Stalkers, in our *Old Writers*, a kind of fiſhing-nets. Stat. 13 Rich. II. cap. 20.

STALKING, a term of conſiderable import in fowling; applied to a kind of ſcreen, or device to hide the fowler, and amuſe the game, while he gets within ſhot.

Of ſuch devices there are ſeveral kinds.

Stalking-*Horſe*, is a horſe trained up for the purpoſe. This horſe ſhould be choſen of the talleſt and largeſt kind; no matter how old he is, but he muſt be well trained, and ready at command. The horſe, being properly trained, will walk ſlowly along in any ſort of ground, as ſtubble-fields, mooriſh places, or the banks of rivers, and will always feed, or pretend to feed, as he is directed. The ſportſman is to conceal himſelf and his gun behind the horſe's fore-ſhoulder, bending his body low by his ſide, and keeping the whole body of the horſe always full between the fowl and himſelf: when by this means the ſportſman is come ſo near to the birds, that the gun will reach them with ſtrength to kill, he is not to attempt advancing any nearer, that they may not be diſturbed. Some recommend the ſhooting over the horſe's buttocks, and ſome over his neck, but the beſt way is under the neck, and before the breaſt, for by this means the body of the ſportſman is covered by the ſhoulder, and his legs by the legs of the horſe. When the birds are ſhot, the dog will bring them to his maſter, and as they often fall in places where a man cannot come at them, this creature is of very neceſſary ſervice.

This is the beſt of all methods of ſtalking; but as ſuch a horſe is difficult to train, chargeable to keep, and is not always to be had, there are many contrivances introduced to ſupply the place of it: among theſe, the principal are the ſtalking-wheelbarrow, the ſtalking-buſh, and the ſtalking-hedge. The firſt of theſe is to be thus contrived; take a wheelbarrow, made on purpoſe of light fir, and ſet round about it boughs and buſhes in ſuch a manner, that you may ſit in it, and not be diſcovered by the fowl, and drive it along without giving them diſturbance.

The ſtalking-buſh is to be contrived of ſeveral buſhes well platted together, with all their leaves on; it is to be faſtened to a ſtake, which is to have an iron point at the end; the whole is to be the height of a man, and thickly ſet with boughs all the way, from top to bottom. When the ſportſman ſees his game before him, he is to advance ſlowly with this artificial buſh between him and them; when he is come within a proper diſtance, he is to fix the buſh into the ground, by running in the iron ſpike, and then to ſhoot through the boughs.

The ſtalking-hedge is generally made about nine feet long, and a yard and a half high: it is to be made of ſmall wands, ſo woven together, as to give room for the placing of green boughs among them, that it may reſemble a great growing hedge: this is to be carried before the ſportſman, and, in the manner of the buſh, it is to be faſtened down when near enough for the gun to kill from it.

As birds, however, are apt to have ſome apprehenſion of terror from ſeeing a tree or hedge move, theſe machines are to be carried on very ſlowly; and the reſemblance of a real animal, as a horſe, or cow, are better for the purpoſe: theſe may be made of canvas, ſupported on a ſlight frame, and with tails of hair. For pheaſants, woodcocks, and the like fooliſh birds, the common flat figure of a horſe will do; but the water-fowl are generally much more ſhy, and it is neceſſary, for the getting near them, to have the body made hollow, and ſtuffed with hay, or ſome other matter, to keep it out. The proper time to uſe theſe engines is either early in the morning, or late in the evening; for the ſun-ſhine in the middle of the day very ſoon diſcovers to the fowl the imperfection of the engine.

STALL, in *Rural Economy*, a ſort of incloſed place, in which a horſe, cow, or any other kind of animal of the ſame or other deſcription, is fed, foddered, or kept; as a diviſion or ſeparate portion in a ſtable, cattle-ſhed, cow-houſe, or any other building of the ſame nature. See Cattle-*Shed*, Cow-*Houſe*, and Stable.

In the ſtalls, the cattle, in the moſt improved modes, are commonly tied up, and faſtened to upright round poſts of about four inches in diameter, made perfectly ſmooth on their ſurfaces, by means of looſe iron rings and ſmall wooden bows or bands, which are put round the necks of the cattle, and ſlide readily up and down in the rings on the poſts, as the cattle may want them. The upper parts of the bows, yokes, or bands, are moſtly flat, and have two holes in them; and the bow or band parts, which are in general formed of tough ſplit aſh, have a ſort of button or knob at each end of them, which is put into the circular holes of the flat head-pieces, when, by the ſpring of the bows or bands, the knobs or buttons are prevented from returning, by their ſlipping over into nicks or notches made in one end of the head-pieces, where they become fixed until the animal be wanted to be let out, which is readily done by a little preſſure being made on the bow parts. Theſe ſtalls have, in many caſes, cribs alſo contrived for the cattle to eat their fodder out of or in. And paſſages are not unfrequently formed in front, or before the heads of the cattle, for the convenience and facility of giving them their fodder from, as much ſaving in time and labour is thereby produced.

The ſtalls in the cow-ſheds, houſes, or *linneys*, as they are called in ſome of the ſouth-weſtern diſtricts of the kingdom, have their boxes or cribs ſo formed, as to contain the hay, ſtraw, and other ſimilar matters for the cows in winter, and the lucern, tares, vetches, and other ſuch materials, in the ſummer ſeaſon. They have alſo troughs for turnips, potatoes, cabbages, and other food of the ſame kind. And likewiſe vealing places for the calves, which are rendered a little dark, in order to promote the proceſs of fattening them. There are ſometimes, too, large ſeparate ſtalls or diviſions for ſuch cows as are near calving, or have juſt calved. For young cattle-ſtock they are occaſionally divided, alſo for three-years old, two-years old, and one-year old ones, in order that the young beaſts may not get injured or inconvenienced by running among the others. And the head-ways, by being made ſhorter in proportion to the ſize of the different year's growth of the animals, render them capable of all dunging into the ſame grip or gutter, and conſequently of being more readily cleaned and kept in order.

The diviſions or ſtalls for the fattening of bullocks or oxen ſhould always have ſufficient ſpace, without allowing any unneceſſary waſte of it, as where two oxen are fattened in one ſtall from eight to ten feet, that is, four or five feet to each beaſt, according to the ſize of the beaſt uſually fattened. Theſe diviſions, in the beds or foundations of them, ſhould conſtantly decline in a gentle manner backwards, ſo as to draw off the urine, and have a ſmall riſing at the heels of the animals, as in the cow-ſheds or houſes, and for the ſame purpoſes.

There ſhould be a crib or manger in each ſtall, which ſhould have the conveniency of a ſeparate partition for different articles of food, as meal, oil-cake, bran, chaff, and others of the ſame kind, without their mixing or being blended with turnips, cabbages, potatoes, hay, or other ſuch matters of fodder; and beſides, a pump for ſupplying water to the animals, conducting or leading it to the different troughs which are formed for receiving it in each of the ſtalls.

In ſome caſes, keelers are put in every ſtall for affording water to the cattle, which have troughs of communication, in order to convey it from pumps in the farm-yards to large general troughs on the outſide of the ox-houſes, which is afterwards ſeparately conducted to each keeler, ſo that all the time and trouble in untying, tying, and driving to the water, are ingeniouſly and uſefully avoided. The keelers or troughs, in theſe circumſtances, are placed even with the cribs or mangers, and are moſtly of the ſame ſizes and dimenſions.

In connection with all large ranges of ox-ſtalls, there ſhould always be a weighing machine, in order that the owners may at any time inſtantly aſcertain what are the ſtate and progreſs of the beaſts, as well as that the improvement they make, and the expence of food, or the fleſh, and the food neceſſary to produce it, may be fairly compared. By this means, the ſorts of cattle which give the greateſt quantity of fleſh meat with the ſmalleſt quantity of food, in theſe feeding ſtalls, may likewiſe be uſefully and readily decided, which is a point of the utmoſt importance to the ſtock-feeding farmer.

Stall-*Fed*, a term applied to animals fed in the ſtall with dry food, and not with graſs or other ſimilar matters.

This ſort of feeding is highly beneficial to the farmer, in raiſing and producing large quantities of the beſt kind of dung manure; but is rather expenſive in the materials, and the different conveniencies which are neceſſary for the practice of it. See the following article.

Stall-*Feeding*, the art or proceſs of fattening neat cattle in the ſtall. The beſt practice in this ſort of fattening is, probably, that of wholly confining them to the ſtalls, which is uſually termed ſtall-feeding; as by this means they are kept quiet, and free from interruption, and of courſe feed more quickly, and with greater regularity, which ſeem to be points of great importance in this ſyſtem of management with theſe animals; though there are ſome who are ſtill in favour of the yard management.

In regard to the ſorts of food that may be employed in the way of winter fattening the animals in this practice, the principal of the more ſucculent kinds are carrots, parſnips, potatoes, Swediſh turnips, cabbages, common turnips, grains, and ſome others; and of the more dry ſorts, oil-cake, and other matters of that kind, oats, barley-meal, rye-flour, bean and pea-meal, and others of the ſame nature, with different ſorts of ſtraw and haulm cut into chaff by means of machinery, or hay cut in the ſame manner. It is uſual with ſome to employ the different meals in a ſtate of mixture in nearly equal proportions, except the bean-meal, which, from its heating quality, is moſtly made uſe of in ſmaller quantities. But on the principle of freſh ſorts of food having a more powerful effect on the ſyſtems of animals, when firſt applied, it may be more beneficial to have them given in alternation, or at diſtant intervals, as their effects may in this way be more fully experienced. And in reſpect to the cut ſtraw and hay that are made uſe of in this way, the firſt ſhould, contrary to the practice uſually adopted, be prepared from that which is freſh threſhed out, and not ſuch as has been long packed together, and is become fuſty. The hay, inſtead of being of the inferior kind, ſhould be the beſt the farm affords, and ſuch as is not in the leaſt injured in the ſmell or taſte by keeping. It has, however, been ſtated by Mr. Dark of Herefordſhire, an experienced grazing farmer, that the more inferior ſort of hay has, by the addition of a very ſmall proportion of common ſalt, been made to be preferred to the beſt, when not prepared in that way. The quantity of it uſed with flooded meadow hay was only about eight pounds to the ton; and his oxen of the breed of that diſtrict did better with it than others which had the beſt hay. The whole of the advantage is aſcribed to the portion of ſaline matter mixed with it, acting as a ſtimulus or condiment on the ſtomachs of the animalss.

Upon the principles of this ſort of feeding, the author of the Syſtem of Practical Agriculture has offered ſeveral phyſiological obſervations, that deſerve attention, but which our limits will not allow us to inſert.

In this management, it is a matter of the utmoſt importance for the animals to be kept conſtantly free from ſtanding in any dirt or naſtineſs, by having the dung daily removed and cleaned out, and their ſtandings ſwept out as clean as poſſible; being then littered down with dry clean litter, ſo as to prevent any ſort of naſtineſs from adhering to their ſkins, or affording them uneaſineſs during their fattening. And in order to effect the littering in the moſt perfect manner, as much ſtraw, or other ſimilar matters, ſhould be made uſe of as can be converted into manure, as from one to two or three tons each beaſt; as the dung will fully repay the expence of it, in the improvement which it muſt afford to the land on which it is applied. In this proceſs it is alſo of much advantage to have the cattle ſheltered, and kept in a due degree of warmth, without being too hot; as when the heat is too great, there may be diſadvantage by too much perſpiration being produced. In regard to the giving of the food in this proceſs, the ſtate of the appetites of the cattle, or other animals, ſhould be nicely watched, and the quantities adapted, ſo as that it may be eaten up perfectly clean. With the more ſweet ſucculent ſorts, too much ſhould not, however, be given at a time; but be duly combined with ſome of the dry kind. And where cut dry meat is chiefly employed, it is the beſt practice, probably, to keep ſome of it always in the cribs or boxes, ſo that the cattle may take it at pleaſure, or as they find themſelves diſpoſed.

It has been ſtated, that where ſucculent food is made uſe of with cut dry meat, which is in general a more profitable method to the farmer than that of having recourſe to corn and oil-cake, or the different ſorts of meals ſtated above, carrots, parſnips, potatoes, and the Swediſh turnip, would ſeem to ſtand the higheſt as articles for this uſe; the common turnip and cabbages having been found much inferior in their fattening properties. The two firſt are equal to almoſt any other ſort of food in this view, being capable of fattening the largeſt cattle. And the moſt general practice is to employ theſe roots and plants without any other preparation, except that of being ſometimes cut, ſliced, or chopped, in a box for the purpoſe; giving only a ſmall proportion at a time, at three or four different periods in the courſe of the day, in cribs properly contrived for the purpoſe; due ſupplies of ſuch cut ſtraw, in mixture with hay, being, where neceſſary, provided and given in the intervals of ſuch feeds. It is found that in this method much leſs water will be neceſſary, than when dry meat is wholly made uſe of in the proceſs, as the animals are much leſs thirſty from the ſucculence of the food.

Farther, the nutritious properties of the carrot have been found very conſiderable, when employed in this way; and this root has ſome great advantages, as the animals readily take to it, and a great proportion of food is capable of being raiſed on the acre. It was found by Mr. Young, in his trials with this root, that the conſumption with an ox of about ſixty ſtone weight was *per* day about ten ſtone, giving in addition cut hay and chaff, or ſome other ſimilar dry material. The parſnip is alſo a root of equal, if not ſuperior, merit in this management. An acre of either of theſe roots would complete the fattening of two ſuch beaſts as the above, if taken from the paſtures in a half-fattened condition. It has indeed been ſuggeſted, that theſe two roots and the potatoe approach the neareſt of any to that of the oil-cake in their fattening properties, but are certainly inferior to that ſubſtance in this intention.

The white and red beets, and the ſcarcity root, or mangel wurzel, have alſo been found highly beneficial in this application.

And there have been many trials made with potatoes in the ſtall-fattening of animals, in which it has been fully ſhewn that, both in the raw and boiled or ſteamed ſtates, they are a root that occaſionally anſwer very well. It has been found, that ſmall cattle of the Welſh and Scotch runt kind have been aſcertained to conſume about a buſhel each in the courſe of the day, with from fourteen to ſixteen pounds of hay, or ſome other cut dry food. In the raw ſtate, ſome dry food of theſe ſorts is indiſpenſibly neceſſary, in order to correct the purgative quality of the root; and when boiled or ſteamed, it has likewiſe a good effect in affording due diſtention to the ſtomach. When given to milch-cows in a raw ſtate, the milk is found to be greatly increaſed, but to be of a poor thin quality. There can be no doubt, but that where the ſteaming or baking of the root can be accompliſhed at a cheap rate, and in a convenient manner, the food will be much better ſuited to the purpoſes of ſtall-feeding, as being much more nutrient and agreeable to the animals.

On this ſubject it is ſtated by an excellent grazier, J. H. Campell, eſq. of Charlton, in Kent, in anſwer to queries propoſed to him by Mr. Young, that 100 buſhels of potatoes and 700 weight of hay are generally ſufficient to fatten an ox that thrives tolerably well. And in giving the roots, they ſhould at firſt be uſed in ſmall quantities, which ſhould then be gradually increaſed to one or two buſhels *per* day, dry food being always intermixed, and the proportion of hay being uniformly regulated by the effect which the potatoes produce on the bowels. There ought to be at leaſt four or five ſervings in the courſe of a day, as according to the quantity of roots which a beaſt can be induced to eat with appetite, he will fatten the ſooner, and of courſe with leſs expence to the farmer, and conſequently more profit be obtained. The hay ſhould be cut once, or, if it be not very weighty, twice along and three times acroſs the truſs, ſo as to be in ſquare pieces of eight or ten inches in proportion; in which ſtate the cattle will eat it and digeſt it more readily, while their fattening is conſiderably expedited. But the potatoes need not, he thinks, be cut, except at firſt, in order to entice the beaſt to eat them; but they ought always to be freſh and clean. Corn or meal is not abſolutely neceſſary; but when at a moderate price, it may be employed with advantage. But in caſe a ſcowering ſhould be brought on by the uſe of raw potatoes, which often happens, the quantity of hay, meal, or other dry food given with them, ſhould be increaſed conſiderably, till the beaſts become accuſtomed to the roots, when this inconvenience will be removed.

Stall-feeding of bullocks with potatoes, given in different ſtates of preparation, has been for ſome time extenſively practiſed in Suſſex, and is much approved of by many. They there find that a beaſt of from one hundred and forty to one hundred and ſixty ſtone weight eats from one to two buſhels of the roots in the courſe of the day, but conſumes little hay, as not much more than ten or twelve pounds, in that ſpace of time. This root has probably not yet been tried, by giving it when artificially ſprouted; but it would perhaps anſwer well in this way. Some have, however, lately begun to queſtion the merit of potatoes in this mode of cattle-feeding, as not being ſo valuable, when compared with ſome other ſorts of food. And a careful experimenter, who was largely in the practice of fattening oxen with them, it is ſaid, gave them up, from the conviction that, with every advantage of breed, attention, warmth, and cleanlineſs, in regard to the animals, they would not pay more than four-pence the buſhel.

Further, the Swediſh turnip, when it is cultivated in a proper manner, is a moſt valuable root, when uſed in this intention, being very ſweet and palatable to the animals, and at the ſame time poſſeſſing more nouriſhing power than the common turnip; of courſe, going much farther. In ſome trials which we have lately attended to, it was found to have the advantage nearly in the proportion of one-fourth; and in other experiments, it is ſaid to have gone ſtill farther in this uſe.

Alſo cabbages, in combination with dry chaffy materials of different kinds, have been long known to anſwer well in keeping ſtore animals in the winter; and, when made uſe of with good hay, to be capable of fattening large cattle in an expeditious manner. It has been found by correct trials, that the daily conſumption of this vegetable is moſtly in the proportion nearly of one-fifth the weight of the animal: of courſe, an ox weighing about ſixty ſtone conſumes about twelve ſtone *per* day. In ſome experiments made long ago by Mr. Turner, detailed in the ſecond volume of Mr. Young's Six Months' Tour, an ox of eighty ſtone was found to conſume fifteen ſtone of this plant, with the addition of half a ſtone of hay. And that with regard to its properties of feeding oxen put to it, when in low condition, in November, they became in a ſtate of fatneſs, and ready for the market, in the March following, having the weight of eighty ſtone; moſtly increaſing in value in the courſe of four months, about five pounds ten ſhillings. It is evident that, in this proportion, an acre of this crop of thirty tons would be ſufficient for ſtall-fattening three beaſts of the ſame ſize and weight.

And common turnips, according to Mr. Marſhall, are, in Norfolk, given in different ways to cattle in fattening them; as by being drawn and thrown thinly and evenly upon the graſs, ſtubble, and other lands, in order that the cattle may conſume them in ſuch ſituations; in which caſes, they have not any allowance of hay during the whole proceſs of fattening.

But another mode of giving this root to fattening cattle is, it is ſaid, by means of cloſe bins, or ſmall cribs, with boards or bars nearly cloſe at the bottom, while the beaſts are kept in a looſe ſtraw-yard. Theſe bins are diſperſed over the yard, and the turnips are put into them whole; the tap-root, and alſo the tops, unleſs they are freſh and palatable, being previouſly cut off, ſo that the fattening animals receive only the bulbs; the tops, if eatable, being conſumed by ſtore cattle. And that while the bullocks are in the yard, they have the ſtraw ſometimes given them in cribs, and at others it is ſcattered in ſmall heaps about the yard, twice or thrice a day: the quantity thus eaten is very trifling; and with the laſt mentioned management, the yard becomes evenly littered without farther trouble. But this mode of fattening is attended with ſomewhat more labour than that of throwing turnips abroad, which, it is thought, is the preferable management, if the ſoil be ſufficiently dry to ſupport the ſtock, and light enough to ſtand in need of being rendered firm by treading: on the contrary, where the land is deep, and the ſeaſon is wet or ſevere, the ſtraw-yard is the more comfortable place, provided it be kept dry and well littered, and be furniſhed with open ſheds, in which the ſtock can ſhelter themſelves. For though the *teathe* of fattening cattle abroad is greatly beneficial to light ſoils; yet, if bullocks, while fed in the yard with turnips, are well littered, they will make a large quantity of excellent manure, that will amply compenſate for the additional labour occaſioned in that way.

A ſtill farther method conſiſts in keeping the cattle tied up in ſtalls, hovels, or beneath open ſheds, with mangers or troughs for receiving the turnips, which, in this caſe, are frequently ſliced, or more generally, though perhaps leſs eligibly, cut into quarters, by means of a ſmall chopper, upon a narrow board or ſtool, beneath which is a baſket for catching the pieces.

It has, however, been ſuppoſed that turnips, though very frequently employed in the proceſs of ſtall-feeding, are greatly inferior to cabbages, as, beſides their being more liable to injury, they probably poſſeſs the fattening property in a leſs degree than any of the ſubſtances that have been noticed above. And the proportion in which they are conſumed by the fattening ſtock has been found to be ſomething more than a third of the weight of the cattle, by ſome; but by others, about a third in the day, as ſtated in the Gentleman Farmer. However, in other experiments, carefully made, an ox of from ſeventy to eighty ſtone has been aſcertained to eat ſomething leſs than three hundred weight in the courſe of the day, beſides chaff and hay; and ſmall cows of about thirty ſtone, one hundred weight and three quarters in the ſame ſpace of time. And in the Rev. Mr. Cloſe's trials, it was found, that when conſumed in ſtalls or ſheds, an acre of good turnips will completely winter-fat an ox of fifty ſcore, beſides affording manure for an acre and a half of land; but if fed upon the land, two acres will not fatten one ſo well, and the dreſſing will be partial, and of but little value. When this root is given in the ſtall, from its very ſucculent nature, it becomes neceſſary to employ as much dry food as poſſible during the uſe of it, in order to the expeditious fattening of cattle by ſuch means.

It has alſo been practically remarked by a late writer, that the turnip is often employed in the fattening of ſheep, ſomewhat in this way; and that in this application it is frequently advantageous, where the management is conducted with judgment. But to derive the greateſt profit from this practice, it is probably the beſt method to only make uſe of them for ſuch ſheep as are in a conſiderable ſtate of forwardneſs; as ſuch as are poor, when turned to this ſort of food, are ſeldom found to pay well for it. Every farmer who has applied turnip crops in this way, muſt, it is ſaid, have found this to be the caſe. Where the ſoils are ſufficiently dry, the beſt method of conſuming them may be on the lands, by means of hurdling; but under the contrary circumſtances, they may be drawn and eaten upon a dry piece of ſward.

Turnips, as well as potatoes, have been ſteamed for this purpoſe. See STEAMING *of Cattle-Food.*

As to the uſe of brewers' grains, they can only be had recourſe to in this way in particular ſituations, as near large towns, or other places where they can be had at a reaſonable rate, and in ſufficient quantity: and of this ſort of food, that which is the produce of large diſtilleries is found the moſt beneficial in this ſort of feeding. The quantity made uſe of for moderate ſized beaſts is uſually from a buſhel to a buſhel and a half, three times in the courſe of the day; hay or cut dry food being given between the periods of feeding with theſe matters. But this ſort of ſubſtance ſeems to be much leſs powerful in its fattening properties, than any of thoſe articles that have been mentioned above. Still, with good hay, it is probable that theſe matters may be made to fatten animals in a tolerably expeditious manner.

But beſides theſe different ſubſtances, there are others of a leſs ſucculent quality employed in this practice: the firſt, perhaps, in reſpect to the properties of feedng, is that of *oil-cake*, that is, the refuſe material left after expreſſing the oil from linſeed. See OIL-*Cake.*

It is aſſerted that theſe cakes have a very extraordinary effect on cows before calving, cauſing their milk to flow more copiouſly, and preparing the animal in a good manner for the period of calving. But as the fat of beaſts, fattened on oil-cake, is not ſuppoſed by ſome ſo good for food, and to be of a leſs firm texture, it has been adviſed to ſubſtitute linſeed jelly, which is infinitely ſuperior, and which, when mixed with a due proportion of hay or meal, affords an excellent compoſition for ſtall-feeding and fattening. This jelly is prepared in the following manner: to ſeven parts of water one part of linſeed is only put, for 48 hours; then boil it ſlowly for two hours, gently ſtirring the whole, leſt it ſhould burn; afterwards it ſhould be cooled, and mixed with meal, bran, or cut chaff. In the experiment of Mr. Moody, an eminent grazier, two quarts of this jelly were uſed *per* day to every large bullock, which proportion amounts to little more than one quart of ſeed in four days, and produced a great ſaving in the article of food in this proceſs. And in America, experiments have been made with *linſeed-oil*, mixed with the meal of Indian corn. The ſtall-fed ſteer, to which this compoſition was given, was obſerved to thrive rapidly, and to ſweat moſt profuſely; but, through inattention, too large a proportion of oil was given at one time with the food, which diſguſted the beaſt, and occaſioned the experiment to be diſcontinued. There can, however, be no doubt but that linſeed or flax-feed jelly is more agreeable to cattle than cake, while it renders them leſs liable to ſurfeit, in caſe an extra quantity ſhould be accidentally given; and is leſs liable to affect the meat with a peculiar taſte than either oil or cake, and conſequently it merits a further trial. To each bullock, or fattening animal, about half a gallon of jelly may be given every day, mixed with meal and cut ſtraw; but it will be requiſite to change this food about a month before the beaſt is killed, to prevent, if poſſible, the fleſh from retaining the flavour of the oil-cake or jelly, as they, each of them, may be liable to affect it in ſome meaſure.

Further, where ſheep are fattened with oil-cake, they require it to be brought into a much finer ſtate than for cattle in general, and which may then be mixed with bran, or other ſimilar ſubſtances, and put in the troughs or cribs for the animals to feed at.

Alſo, on the ſame principle as that of oil-cake, the uſe of linſeed-oil and bran has been attempted, but probably with leſs ſucceſs in the application. The conſumption in this mode, for beaſts of the ſmaller ſize, is ſomething more than half a peck of bran three times in the day, with a third of a pint of linſeed-oil well ſtirred into it: with this, good hay or cut chaff is uſually given. But it is a mode attended with more trouble than that of cake-feeding, without any great ſuperiority in the effect that is produced; and it can only be employed where the oil is cheap, and to be had with convenience.

Linſeed and barley mixed and ground together, in the proportion of two pecks of the former to two buſhels and a half of the latter, have been found very beneficial in ſtall-feeding, in Suſſex, when given to ſummer-ſoiled or paſtured animals in the yards, in the beginning of the winter ſeaſon. Of this mixture each ox has two buſhels in the week given him, beſides wheat-chaff and hay. They fatten rapidly, it is ſaid, in this way.

And another article, equal, if not ſuperior, to any of theſe laſt kinds, in this ſort of fattening, is that of oats, which may be given either in the ſtraw or when threſhed: for neat cattle it is probably beſt given in the former ſtate, but for ſheep in the latter, in ſhallow troughs or cribs made for the purpoſe, ſo as to prevent its being blown out of them. The conſumption, in this ſort of food by ſheep, is uſually from two or three to four or more pounds each *per* day, according to the ſize and kind which are fattened; but with neat cattle it muſt be proportioned to the animals in different reſpects.

Where barley or other meals are employed, they are beſt made uſe of in their dry ſtates for ſheep, in mixture with the cut or other matters that are given at the ſame time in their cribs or bins; but for neat cattle they are ſometimes mixed up and blended with liquid materials in different forms. Theſe ſubſtances have much effect in promoting the fattening of the animals; but they can ſeldom be made uſe of with much profit, except for the beſt ſort of cattle or ſheep. Where ſheep are fattening on the turnips, theſe ſorts of food are alſo excellent in correcting the watery properties of that root. Several other ſubſtances of the dry kind have likewiſe been employed in the ſtall-feeding of different ſorts of animals, ſuch as the duſt and combs of malt, cut pea and bean-haulm, and other ſimilar matters, which have been found highly beneficial.

Alſo, in this practice, the uſe of food in a ſour ſtate has been adviſed by ſome; as in this condition, it is ſaid, experience has ſhewn it to be uſeful in the keeping and fattening of ſwine. But experiments are ſtill wanting on this ſubject. And on the ſame principle, it has been recommended as a food for large cattle, which has been done by fermenting rye, flour, and water, into a kind of paſte, and then diluting it with water; and alſo, when thickened with hay, cut ſmall, it is ſaid to fatten quickly. This practice chiefly prevails in France, whence it was introduced into this country. But concerning the efficacy of acid food in ſtall-fattening animals, there is much difference of opinion.

It may be ſtated, that it is now found that the waſh or refuſe of malt, remaining after diſtillation, which was formerly applied excluſively to the feeding of ſwine, may be uſed in this way with profit; and that it has, of late years, been applied with much ſucceſs. The cattle fed in this manner are aſſerted, not only to repay the expence of their keeping, by fattening ſpeedily, but alſo to yield a large quantity of valuable manure. This ſubſtance has been extenſively and ſucceſsfully applied in ſtall-feeding by Meſſrs. Hodgſon and Co., the proprietors of Bolingbroke-Houſe diſtillery, Batterſea, near London, where the proprietors have erected ſtalls for fattening about 350 head of cattle at one time, with waſh and grains, and a certain portion of hay *per diem*, with the view of enabling them to chew the cud. They are ſaid, between October and April, which is their regular working ſeaſon in the diſtillery, to fatten about 600 bullocks; having generally about 300 in the houſe tied up at one time, and about 100 in an adjoining orchard to take in, to replace ſuch as are ſold off, or in conſequence of any expectation of an approaching advance in meat. They have no ſtated period for fattening theſe bullocks, being regulated entirely by the ſtate of the markets; but from ten to ſixteen weeks are about the uſual time, and the cattle are found to gain, upon an average, from three to four ſtone *per* week.

Another ſubſtance has been employed in this way with equal ſucceſs, which is that of moloſſes or treacle; though the expence incurred by the uſe of this article will probably prevent its general application. It was firſt uſed in the Weſt Indies by Mr. Millington, who found it, in combination with farinaceous ſubſtances, and, when theſe could not be procured, with cane-tops, oil-cake, and other articles of dry food, together with a little hay, or not too green fodder, greatly to expedite the fattening of cattle in general, and of old and decayed oxen in particular. He gave from half a pint to a pint of moloſſes twice in the day to very ſtarving animals, which had been exhauſted by continual and ſevere labour for a ſeries of years. In adopting this article, a gallon of oats, or other damaged grain, roughly ground, or the ſame quantity of potatoes, ſhould be boiled in a ſufficient proportion of water to form a thick waſh. It muſt be well ſtirred while on the fire, to prevent it from burning or ſticking to the ſides of the veſſel; and when it becomes cool, the mixture is to be formed into balls of about one pound weight each. Theſe balls are divided into two equal portions, which, being previouſly immerſed in the treacle, are given to the beaſts morning and evening. They will devour them with eagerneſs, and will ſpeedily thrive and fatten by the addition of a little hay, or any green fodder, that is not too ſucculent. Farther, one or two ſpoonfuls of ſalt may be diſſolved in the compoſition, which will contribute to preſerve the health of the animals; and in caſe corn cannot be conveniently procured and ground, pulverized oil-cake, diluted in water, and ſeaſoned with a ſmall quantity of ſalt, with the ſame proportion of moloſſes, may be advantageouſly ſubſtituted. And there are probably many other refuſe ſaccharine or ſweet ſubſtances, formed in different manufactures, that might be employed in the fattening of cattle in this way.

Where this ſort of buſineſs is conducted on an extenſive ſcale, it is of the greateſt utility to have a machine for the occaſional weighing of the cattle, as they advance in their fattening; as, without ſuch aſſiſtance, there are but few perſons who are capable of judging whether they go on in a profitable manner or not. But by weighing them from time to time, at the diſtance of every eight or ten days, in the morning before they are fed, this may be correctly aſcertained; and where they fall off, or do not advance in a ſufficient degree to the preceding weighing, ſuch changes may be made in their food, water, and management, as are the moſt likely to promote their fattening in the moſt perfect manner, and with the greateſt profit.

STALLAGE, Stallagium, in our *Old Writers*, the liberty, or right of pitching and erecting ſtalls in fairs and markets, or the money paid for the ſame.

STALLATI, in *Geography*, a town of Naples, in Calabria Ultra; 1 mile E.S.E. of Squillace.

STALLED, in *Rural Economy*, a term ſignifying tired with eating in animals, or a kind of loathing of food in them. It alſo ſignifies ſet faſt in a ſlough or bad road with carts or waggons.

STALLING, in *Agriculture*, a term applied to the practice of foddering, feeding, and fattening neat cattle in ſtalls, or the tying or binding them up in them for any other purpoſe.

STALLION, in the *Manege*, in French *etalon*, a ſtone-horſe kept to breed. See Horse, and *Breeding of* Horses.

In the reign of Henry VII. a large number of mares, as well as geldings, were turned after harveſt into the common paſtures, and no ſtoned horſes were allowed to mix with them; and it is at this day contrary to law to turn a ſtoned horſe into a common paſture. Thoſe horſes which were kept to cover mares were always confined in ſafe and incloſed grounds, but more frequently in the ſtable, and were called "equi ad ſtabulum," by contraction, *ſtallum*. Hence were derived the Italian term "ſtalloni," the French "etalon," the Engliſh "ſtallion," or "ſtalled" horſe; which expreſſion prevails, and is in uſe at preſent with regard to the ox, which ſometimes being kept from the paſture in order to be fattened, is called "the ſtall-fed" and "ſtalled" ox. In the reign of the ſucceeding prince, particular regard was paid to the raiſing of a breed of good and ſtrong horſes, and laws were made for the more certain attainment of this end. The only method of ſecuring ſtrength and ſize in the progeny, is to ſelect the ſires and dams of a certain proportion, ſize, and mould, and to permit no mare or ſtallion to breed, but under theſe reſtrictions. In order further to ſecure a breed of large horſes, a ſingular kind of law was paſſed, which obliged every archbiſhop and duke, under penalties, to keep ſeven trotting ſtoned horſes for the ſaddle, each of which was to be fourteen hands high at the age of three years. Afterwards minute directions were iſſued, with regard to the number of horſes of the ſame kind, which were to be kept by other ranks and degrees, each in proportion to their circumſtances and ſtation.

The reaſons for enjoining ſtone-horſes to be kept muſt have been for the ſake of breeding, and for the ſuperior labour they were thought to be able to undergo; and as they were more expenſive to maintain than mares or geldings, it being neceſſary to ſeparate and keep them apart, the rich and noble only were required to keep them in numbers proportioned to their rank and ability; while the lower people uſed geldings, for the advantage of turning them to graſs. Brood-mares, two at leaſt, were ordered to be kept by thoſe who had parks, incloſures, and other conveniencies. Berenger's Horſemanſhip, vol. i.

STALLUPONEN, or Stallupehonen, in *Geography*, a town of Pruſſian Lithuania, the principal trade of which conſiſts in cattle; 33 miles S.E. of Tilſit. N. lat. 54° 33′. E. long. 22° 58′.

STALOWITZ, a town of Lithuania; 10 miles from Pinſk.

STALTWASSER, a river of Wurtemburg, which runs into the Lein, 2 miles S. of Welzen.

STAMBACH, a town of Germany, in the principality of Culmbach; 12 miles E. of Culmbach.

STAMEN, in *Botany* and *Vegetable Phyſiology*, the ancient Latin name for the part in queſtion, now become Engliſh in the place of its old appellation, *chive*. The ſtamens are organs of impregnation, eſſential to every flower, either in the ſame individual with the piſtils, or in a correſponding one of the ſame ſpecies. (See Pistillum, and Fecundation *of Plants*.) They are ſeated externally with reſpect to the piſtil, internally with reſpect to the calyx and corolla. They are inſerted either into the calyx, the corolla, or the receptacle, rarely either upon the germen, or the ſtyle. Their number differs in different genera or ſpecies of flowers, from one to an hundred or more.

Each *Stamen* commonly conſiſts of two parts, the Filament and Anther; ſee thoſe articles. The latter only is eſſential, being of a capſular texture, containing the Pollen, whoſe nature and office will be found explained in its proper place. The *Anther*, when arrived at maturity, either burſts by the contraction of its membranous coat, or opens by appropriate cells for the diſcharge of the pollen, of which laſt circumſtance the genus *Erica* affords beautiful examples. In *Laurus* and *Leontice*, even in ſome ſpecies of *Solanum*, each cell of the anther has a proper lid. Theſe cells are uſually two; but in *Tetratheca* and *Vatica* they are four. Sometimes the anther is ornamented with a creſt, or with a pair of briſtles, of both which various *Ericæ* exhibit ſpecimens. In *Pinus* the creſts of the anthers prove uſeful for ſpecific diſcrimination.

The *Stamens*, according to their number, ſituation, and proportion, furniſh the leading principles of diſtinction in the artificial, or ſexual, ſyſtem of Linnæus; ſee Classification.—Theſe organs are liable to be changed into petals, in what are termed double flowers; and if that change be complete, they can no longer ſerve the purpoſe of impregnation.

STAMFORD, in *Geography*. See Stanford.

Stamford, a townſhip of Upper Canada, in the county of Lincoln, lying on the W. ſide of Niagara river, and S. of Newark. A port of entry and clearance is eſtabliſhed in this townſhip, on the N. bank of Chippawa river, near the bridge.—Alſo, a townſhip of Vermont, in Bennington county; containing 378 inhabitants.—Alſo, a poſt-town of Connecticut, in Fairfield county, on a ſmall ſtream called Mill-river, which diſcharges itſelf into Long Iſland ſound; containing a congregational and epiſcopal church, and 4440 inhabitants; 10 miles S.W. of Norwalk, and 44 N.E. of New York. This townſhip was formerly called "Rippowanns," and was ſettled in 1641.—Alſo, a poſt-town of New York, in Delaware county, taken from Woodſtock, and incorporated in 1792, containing 284 families, and 1658 inhabitants; 60 miles S.W. from Albany.—Alſo, a poſt-town in Lincoln county, Kentucky; 628 miles from Waſhington.

Stamford *Iſlands*, a cluſter of ſmall iſlands near the coaſt of North Carolina. N. lat. 34° 37′. W. long. 77° 10′.

STAMINA. See Stamen.

Stamina, in the *Animal Body*, are thoſe ſimple, original parts, which exiſted firſt in the embryo, or even in the ſeed; and by whoſe diſtinction, augmentation, and accretion by additional juices, the human body, at its utmoſt bulk, is ſuppoſed to be formed.

All that is eſſential to the animal, are the ſtamina, which exiſt *in ovo*; the reſt being foreign, additional, and even accidental.

The ſtamina ſeem to coincide with the ſolids, which are ſurpriſingly ſmall in quantity.

STAMITZ, John, in *Biography*, the illuſtrious father of a renowned muſical family, concert-maſter and director of the chamber muſic, or court concerts of the elector palatine at Manheim, in 1756, was born at Teutechebrodt, in Bohemia, where his father was cantor in the principal church. It was during his time, and by his example, that German ſymphonies, in a ſtyle different from the overtures of Lulli, Handel, and the Italian opera compoſers, began to be cultivated and in favour all over Europe. It was under him that the late earl of Kelly placed himſelf as a ſcholar on the violin, and a ſtudent in compoſition; and it was alſo under him that the Manheim band, by its experiments and new effects, became, during thirty years, the moſt celebrated in the muſical world.

The genius of Stamitz was truly original, bold, and nervous: invention, fire, and contraſt, in his quick movements; a tender, graceful, and inſinuating melody, in the ſlow; together with the ingenuity and richneſs of the accompaniments; characterize his productions, all replete with great effects, produced by an enthuſiaſm of genius, refined, but not repreſſed, by cultivation.

The following is a liſt of his principal works, which we adviſe true lovers and judges of good muſic to purchaſe wherever they can find them: as, though more than forty years old, in ſpite of faſhion and a rage for novelty, they will long continue to be good muſic; "VI Sonate da Camera à 2 Violini e Baſſo," Noremb. 1761. "VI Sonate à Violino Solo e Baſſo, Op. 6," Paris. "VI Concerte de Violon à pluſieurs Inſtrum." Par. "VI Sonates choiſies pour le Clavecin avec Violon, Op. 1ma." Paris. In MS. he left unpubliſhed, ſix ſymphonies, twenty-one violin concertos, two harpſichord concertos, and nine violin ſolos.

Stamitz, Charles, the worthy ſon of ſo great a father, was born at Manheim in 1746, and ſtudied under Canabich. In 1767 he was admitted into the elector palatine's chapel, as principal ſecond violin. He has travelled ſince all over Europe, and given ſpecimens of his ſpirited compoſitions and performance, particularly on the tenor. He was in England about the year 1780, and performed at Bach and Abel's concerts. He compoſed a duet for a violin and tenor, which Cramer and himſelf performed to the wonder and delight of all hearers. This duet has often been played ſince by great performers on the tenor, violin, and violoncello. On this inſtrument, we believe Linley was the laſt.

In 1770 Charles Stamitz went to Paris, where he gained great applauſe by his compoſitions and performance on the tenor and viol d'amour. In 1785 he returned to his own country, and exerciſed his ſkill and talents at Berlin, Dreſden, and Heſſe Caſſel: in all which places he continued writing for almoſt all kinds of inſtruments.

Stamitz, Anthony, the younger brother of Charles, was born in 1753, and became eminent likewiſe by his compoſitions and performance.

STAMMERING, in *Phyſiology*, an heſitation or interruption of ſpeech, which ſeems generally to ariſe from fear, eagerneſs, or ſome violent paſſion, that prevents a child's articulating rightly, by the confuſion which it occaſions in the vibrations that deſcend into the muſcular ſyſtem, ſo that, finding himſelf wrong, he attempts again and again, till he hits upon the true ſound. It does not therefore begin, in general, till children are of an age to diſtinguiſh right from wrong in reſpect of pronunciation, and to articulate with tolerable propriety. A nervous diſorder of the muſcles of ſpeech may have a like effect. When the trick of ſtammering has once begun to take place in a few words, it will extend itſelf to more and more from very ſlight reſemblances, and particularly to all the firſt words of ſentences, becauſe then the organs paſs in an inſtant from inactivity to action, whereas the ſubſequent parts of words and ſentences may follow the foregoing from aſſociation; juſt as in repeating *memoriter*, one is moſt apt to heſitate at the firſt word in each ſentence. A defect of memory from paſſion, natural weakneſs, &c. ſo that the proper word does not occur readily, alſo occaſions ſtammering, and, like all other modes of ſpeaking, it is caught, in ſome caſes, by imitation.

Sometimes ſtammering takes place only in the utterance of ſuch words as begin with certain letters, which are generally ſome of the labial or guttural conſonants, as *b*, *p*, *m*, *c*, *g*, &c. Some perſons, on the contrary, ſtammer in the utterance of all words indiſcriminately, with whatever letter they begin, whether they be vowel or conſonant, at certain times only; as *e. g.* when the ſpeaker is placed in any ſituation that occaſions hurry or embarraſſment. Agreeably to the obſervations already made, we find that perſons of great nervous irritability, and lively conſciouſneſs, are moſt liable to ſtammering. This ſort of impediment is a bad habit, founded upon this conſtitutional ſuſceptibility: and in attempting to remove ſtammering, while every attention ſhould be paid to ſuch means as phyſical and medical ſcience will point out for the ſtrengthening of the corporeal ſyſtem, it is of the utmoſt importance to induce the perſons affected with it to reaſon on the ſubject. Let them practiſe the formation of the component parts of words, (that is, ſimple vocal ſounds and the powers of the conſonants,) ſingly, and in combination, alternately, till a facility and habit of ſubjecting the muſcles concerned in ſpeech to the will be acquired or regained. They ſhould be accuſtomed to conſider that which is true in fact, that the organs of ſpeech are moved by muſcles which, from the laws of animal economy, are the inſtruments of the will; though we are conſcious of an act of the will only at the commencement of ſuch actions.

To counteract ſtammering, therefore, we muſt appeal to the underſtanding, and endeavour to arouſe the will into vigilant and vigorous controul of the muſcles. When a heſitation happens, let a volition or direct act of this power take place: firſt to ceaſe muſcular motion altogether, and then to commence a new ſeries. The greateſt deliberation and recollection ſhould be uſed in ordinary converſation; and the act of ſpeaking, as ſuch ſhould be conſtantly preſent to the mind, till the wrong habit be overcome, and the right ſo confirmed as to leave no room to apprehend a relapſe. The voice ſhould be carefully pitched at that tone which nature in the individual points out as eaſieſt to the organs, and moſt agreeable to the ear; and by no means ſhould a hurried pronunciation, or fictitious voice, be reſorted to. It ſhould be ſtudiouſly remembered, that we are accountable to no one for the innocent and decorous exerciſe of our muſcular powers—that over them we ourſelves alone ought to have controul—that ſpeech, on proper occaſions, is not only an innocent and a decorous, but, in the eyes of others, a neceſſary and an agreeable exerciſe of our muſcles. Why then be thrown into perturbation and confuſion, when we are to perform an action, confeſſedly in our power; and which others have not only no right to prevent, but are deſirous that we ſhould perform? If this train of reaſoning be fairly entered upon, many other arguments will ſuggeſt themſelves, and muſt inevitably produce good.

The following directions, with variations according to circumſtances, will be found to be attended with advantage, if duly and perſeveringly complied with.

In order to raiſe a voice, or that material of which ſpeech is formed, let the vowels be practiſed in a natural key, but with firmneſs and ſtrength, for ten minutes or a quarter of an hour, at leaſt, every morning. Then let the powers of the conſonants be formed, in their order, ſingly, and variouſly combined with the vowels.

After a little reſt, if imagination ſupply a ſubject, by all means let an imaginary converſation take place for twenty minutes, half an hour, or even an hour, in a firm and natural tone of voice, uſing every effort of fancy, to ſuppoſe it directed to perſons indiſcriminately; that is, ſometimes to ſervants, ſometimes to equals in age and rank, and ſometimes to elders, or thoſe conſidered as ſuperior in conſequence and rank in ſociety, from whatever cauſe. But if imagination do not furniſh a topic, then let the time be ſpent in reading, in a tone as nearly approaching to the eaſe of familiar converſation as poſſible, taking care to manage the fancy as above. This will furniſh the leſſon :—and after an interval of a few hours, the ſame ſort of converſation or reading ſhould be repeated, two or three times more in the courſe of a day. And on mixing with real auditors, every exertion ſhould be made to aſſociate the ideas of their imaginary, with their actual preſence.

Theſe directions, it will be perceived, are founded upon the principle of the aſſociation of ideas; than which a more powerful principle, in the formation of human habits, cannot be conceived.

An ingenious writer, whoſe obſervations we are now citing, is of opinion, that it may be laid down as an incontrovertible poſition, that perſons poſſeſſing an ordinary mental capacity, with an adequate ſhare of induſtry and ſtrength, may *certainly* overcome the habit of ſtammering, by means ſuch as here pointed out. See "Inſtruction of the Deaf and Dumb," &c. by Joſeph Watſon, LL.D. 2 vols. 8vo. 1809.

STAMNOS, an urn, or veſſel for holding water. Some authors have made it ſignify the bucket-head, as it is called, of thoſe alembics which have no worm, but are cooled about the head by this means.

STAMP, a term uſed in ſome places for a weir, or water-fall.

STAMP-*Duties*, are a tax impoſed upon all parchment and paper, on which any legal proceedings, or private inſtruments of almoſt any nature whatſoever are written; and alſo upon licences for retailing wines of all denominations; upon all almanacs, newſpapers, advertiſements, cards, dice, and pamphlets containing leſs than ſix ſheets of paper. Theſe impoſts are very various, according to the nature of the thing ſtamped.

This tax, though in many inſtances very burdenſome, is of ſervice to the public in general, by authenticating inſtruments, rendering it much more difficult than formerly to forge deeds of any ſtanding; ſince, as the officers of this branch of the revenue vary their ſtamps frequently, by marks perceptible to none but themſelves, a man that would forge a deed of king William's time muſt know, and be able to counterfeit the ſtamp of that date alſo.

The firſt inſtitution of the ſtamp-duties was by ſtatute 5 & 6 Will. and Mar. c. 21; and they have ſince, in many inſtances, been increaſed by ſubſequent ſtatutes very far above their original amount. It would far exceed the limits of this work to recite all the duties of this kind that already exiſt; but it may not be improper to mention ſome of thoſe that are moſt common.

By 44 Geo. III. c. 98. the ſeveral ſtamp-duties granted by any act of parliament then in force were repealed, and upon every almanac or calendar, for any time not exceeding one year, was impoſed the duty of 1*s.*; for each and every year for which almanacs or calendars for ſeveral years ſhall be made, publiſhed, or intended, 1*s.*; and for a perpetual almanac or calendar, 10*s.* The calendar or perpetual almanac in any bible or common prayer book is ſpecially exempted. Books or pamphlets ſerving the purpoſe of an almanac or calendar are ſubject to the ſame duty reſpectively, and to the ſame exemptions. (See ALMANAC.) For the ſtamp-duty on newſpapers and pamphlets, ſee NEWSPAPERS.

By 44 Geo. III. c. 98. the ſeveral duties before impoſed upon cards and dice made in Great Britain were repealed, and a new duty was impoſed upon ſuch cards and dice, *viz.* upon every pack of cards which ſhall be made fit for ſale or uſe in Great Britain, 2*s.* 6*d.*; and upon every pair of dice fit for ſale or uſe in Great Britain, 1*l.* See CARDS.

In one of the acts, *viz.* 10 Ann. c. 19. relating to the ſtamp-duties, which are become in proceſs of time very numerous and intricate, there is a clauſe which brings all the reſt within the juriſdiction of the juſtices of the peace, and it is as follows: Two juſtices reſiding near the place where any pecuniary forfeitures not exceeding 20*l.*, or any act touching any of the duties under the management of the commiſſioners of the duties on ſtamped vellum, parchment, and paper, ſhall be incurred, or any offence againſt any of the ſame acts ſhall be committed in any wiſe relating to the ſame duties, by which any ſum of money only may be forfeited, may hear and determine the ſame; who ſhall, on information or complaint, within a year after the ſeizure made or offence committed, ſummon the party accuſed, and witneſſes; and may iſſue warrants for levying the penalties by diſtreſs and ſale, if not redeemed in ſix days. The ſaid juſtices may at pleaſure mitigate the penalties, the charges being firſt allowed; ſo that they do not reduce the penalty to leſs than double duty, over and above the ſaid charges. The juſtice, before whom the offending perſon is convicted, ſhall levy the penalty, and apply the ſame as the act directs; and in default of ſufficient direction, the ſame ſhall be applied, half to the king, and half to the perſon who ſhall proſecute for the ſame, if within ſix months after the offence is committed; but if after ſix months, the whole ſhall go to the king (26 Geo. III. c. 82.); which conviction ſhall be filed by the clerk of the peace, and ſhall not be removable by certiorari into any other court; but nevertheleſs ſubject to appeal to the quarter-ſeſſions, in ſuch manner as by any former act is directed. But now by the ſtat. 44 Geo. III. c. 98. ſ. 10. no action or information ſhall be commenced or filed in any court, or before any juſtice or juſtices of the peace, for any penalty or forfeiture under any of the ſtamp acts, but in the name of the attorney-general, or in the name of the ſolicitor or ſome other officer of the ſtamp-duties. And all penalties and forfeitures under the ſtamp-acts are to be applied to the uſe of the king, &c.; but the commiſſioners of the ſtamps may give ſuch part of the penalty to the informer as they may think expedient.

By the 44 Geo. III. c. 98. all the duties and drawbacks under the care of the commiſſioners of the ſtamps ſhall ceaſe from October 10, 1804, except as to the recovering of any penalties incurred previouſly thereto; and after that time certain duties are made payable, as ſpecified in the ſchedules to that act annexed. By the 48 Geo. III. c. 149. the ſeveral duties in the ſchedule (A) to the former act annexed are repealed, excepting in certain caſes.

By 55 Geo. III. c. 184. the duties granted by 48 Geo. III. c. 149. are repealed, together with the duties on pawnbrokers' licences (44 Geo. III. c. 98.), and thoſe on policies of inſurance in the Weſt Indies, or elſewhere beyond the ſeas, granted in the 50th year of his majeſty's reign, and the per-centage duty on inſurances againſt fire, granted by 44 Geo. III. c. 98, all arrears excepted. The duties ſpecified in the ſchedule annexed to 55 Geo. III. c. 184. are to be levied, and are committed to the management of the commiſſioners of ſtamps, who are to provide proper ſtamps, &c. By the ſame act, any perſon actually forging ſtamps, &c. and his aider or abettor, being lawfully convicted, ſhall ſuffer death as a felon, without benefit of clergy. It is further enacted, that all powers and proviſions of former acts, together with fines, forfeitures, &c. ſhall extend to this act. The proviſions of former acts reſpecting agreements ſhall be applied only to thoſe that are charged with 1*l.*; and it is enacted, that the agreements charged with a duty of 1*l.* 15*s.* ſhall be ſubject to the ſame regulations as deeds hereby charged with a like duty. This act provides, that inſtruments having wrong ſtamps, but of ſufficient value, ſhall be valid; except in caſes where the ſtamps uſed on ſuch inſtruments ſhall have been ſpecially appropriated to any other inſtrument, by having its name on the face thereof. It is further enacted, that the penalty for making, accepting, or paying bills of exchange, &c. without being duly ſtamped, ſhall be the forfeiture of 50*l.*; and the penalty of poſt-dating bills of exchange, &c. ſhall be the forfeiture of 100*l.* The penalty for iſſuing unſtamped drafts on bankers, without ſpecifying the place where iſſued, or if poſt-dated, is 100*l.* The penalty for receiving ſuch drafts is 20*l.*, and on bankers for paying them, 100*l.* It is enacted, that promiſſory notes to bearer on demand, not exceeding 100*l.*, may be re-iſſued by the original makers, without further duty; nor ſhall ſuch notes be liable to further duty, though re-iſſued by certain perſons, not ſtrictly the original makers. Notes re-iſſuable under 48 or 53 Geo. III. are to continue re-iſſuable till the end of three years from the date; the penalty on each fraud in the buſineſs being 50*l.* The penalty on iſſuing promiſſory notes for the payment of money to the bearer on demand, with printed dates, is 50*l.* Notes re-iſſuable for a limited period are to be cancelled, on payment afterwards; and notes not re-iſſuable are to be cancelled immediately on payment. The penalty for re-iſſuing notes, &c. contrary to law, and for not cancelling them, is 50*l.*: the penalty for taking notes, &c. re-iſſued contrary to law, is 20*l.* However, notes and bills of the bank of England are exempted from ſtamp-duty; and any ſuch notes may be re-iſſued after payment, as often as it ſhall be thought fit. The compoſition annually payable by the governor and company of the bank of England, for the duties on their bills and notes, is the ſum of 3500*l.* for every million, and after that rate for half a million, but not for a leſs ſum than half a million, of the ſaid averagement or value of their ſaid notes and bank poſt-bills in circulation: but when the governor and company reſume their payments in caſh, a new averagement for the compoſition on account of ſtamp-duties ſhall be ſubmitted to parliament. It is alſo enacted, that the bank of Scotland, and royal bank of Scotland, and Britiſh linen company, may iſſue ſmall notes on unſtamped paper, accounting for the duties.

It is further enacted, that re-iſſuable notes are not to be iſſued by bankers or others, without a licence; which licences are ſubject to certain regulations, ſpecified in the act. But no banker ſhall take out more than four licences for any number of towns in Scotland. Several towns in England may, in certain caſes, be included in one licence. Perſons applying for licences are to deliver ſpecimens of their notes; and the penalty for iſſuing notes without licence is 100*l.*

It is enacted, that promiſſory notes made out of Great Britain are not to be negociable, unleſs ſtamped; and the penalty on circulating ſuch notes is 20*l.* for each.

The duty on fire-inſurances is to be collected by the companies undertaking the ſame, who ſhall render to the commiſſioners of ſtamps quarterly accounts, making up ſuch accounts to their own quarter-days. Theſe companies have an allowance for collecting the duties of 4*l.* *per cent.* at the head office in London or Weſtminſter, and of 5*l.* *per cent.* elſewhere.

The penalty, by this act, for not proving wills, or taking letters of adminiſtration within a given time, *viz.* ſix calendar months after the deceaſe of any perſon, or two calendar months after the termination of any depending ſuit, is a forfeiture of 100*l.*, and 10*l.* *per cent.* on the duty. Eccleſiaſtical courts are forbidden to grant probates or letters of adminiſtration, without affidavit of the value of effects; and ſuch affidavits are to be free of ſtamp-duty, and to be tranſmitted to commiſſioners of ſtamps; the penalty for neglect being 50*l.* Proviſion is made for adjuſting the ſtamp-duty, when it is either too high or too low. The penalty on executors, &c. for not paying the full duty on probates, &c. within a given time after diſcovery of a deficiency, is 100*l.*, and 10 *per cent.* on the deficient duty. The commiſſioners of ſtamps may give credit for the duty on probates and letters of adminiſtration, in certain circumſtances; and may extend the credit, if neceſſary. A return of duty on probates, &c. is to be made in reſpect of debts, if claimed within three years.

Articles of confectionary are exempted from ſtamps, unleſs they be avowedly ſold as medicines. The money accruing from all the duties ariſing from this act is to be paid to the receiver-general, and by him into the exchequer.

The ſchedule belonging to this act conſiſts of three parts: the *firſt* containing the duties on admiſſions to offices, &c.; on inſtruments of conveyance, contract, obligation, and ſecurity for money; on deeds in general; and on other inſtruments not included under the following heads. The *ſecond* part contains the duties on law proceedings. The *third* part contains the duties on probates of wills and letters of adminiſtration; on confirmations of teſtaments; on inventories to be exhibited in the commiſſary courts of Scotland; on legacies out of real or perſonal, heritable or moveable eſtates; and on ſucceſſions to perſonal or moveable eſtates upon inteſtacy. Out of this maſs of matter we ſhall content ourſelves with ſelecting thoſe articles that are moſt common and moſt intereſting; referring for thoſe of more rare occurrence, or of leſs general intereſt, to the act itſelf.

Under the *firſt* part we ſhall begin with the duty on the admiſſion of any perſon to act as an advocate in any of the eccleſiaſtical courts, or in the high court of admiralty, or in any of the courts of juſtice in Scotland, which is 50*l.*; and the ſame ſum on the admiſſion of any perſon to the degree of barriſter at law in either of the inns of court in England. On admiſſion of any perſon to act as an attorney, ſolicitor, or proctor, in any court in England; or as a ſworn clerk, clerk in court, or other clerk or officer in any court in England, whoſe buſineſs and emoluments depend, like thoſe of an attorney or ſolicitor, on his being retained and employed by clients or ſuitors, the duty is 25*l.* Theſe duties are ſubject to certain regulations, which we ſhall not detail. The ſame ſum is alſo payable on the admiſſion of any perſon to act as a writer to the ſignet, or as a ſolicitor, &c. in any court in Scotland. For the admiſſion of any perſon to act as a ſolicitor, &c. in the court of ſeſſion, juſticiary, or commiſſion of teinds in Scotland, who ſhall not have ſerved a clerkſhip for five years, to a writer to the ſignet, or a ſolicitor, under regular articles, which ſhall have paid the ſtamp-duty payable by law, his admiſſion ſhall be charged with a *further* duty of 60*l.*; and if any perſon be admitted to act as a procurator or ſolicitor in the high court of admiralty in Scotland, the commiſſary court, or any inferior court in Scotland, without having ſerved a five years' clerkſhip or apprenticeſhip, &c. he ſhall be charged with a further duty of 30*l.* Theſe payments are ſubject to certain exemptions. For admiſſion of any perſon as a maſter in ordinary in chancery, or as one of the ſix clerks, or one of the curſitors of the court of chancery in England, or as a ſworn clerk, &c. in any court in Great Britain, the duty, where the ſalary, fees, &c. ſhall not amount to 50*l.* a year, is 2*l.*; between 50*l.* and 100*l.*, 4*l.*; from 100*l.* to 200*l.*, 6*l.*; from 200*l.* to 300*l.*, 12*l.*; from 300*l.* to 500*l.*, 25*l.*; from 500*l.* to 750*l.*, 35*l.*; from 750*l.* to 1000*l.*, 50*l.*; from 1000*l.* to 1500*l.*, 75*l.*; from 1500*l.* to 2000*l.*, 100*l.*; from 2000*l.* to 3000*l.*, 150*l.*; and from 3000*l.* upwards, 200*l.* The duty for admiſſion

miſſion as a notary public in England, is 30*l.*; and in Scotland, 20*l.*; for admiſſion to be a member of either of the four inns of court in England, 25*l.*; into either of the ſocieties called inns of chancery, 3*l.*; into the college of phyſicians in England or Scotland, 25*l.*; as a licentiate, 15*l.*; on matriculation in either of the Engliſh univerſities, 1*l.*; to the degree of a bachelor of arts in either Engliſh univerſity, 3*l.* when conferred in ordinary courſe, and 5*l.* when conferred by ſpecial grace, or royal mandate, or by reaſon of nobility, or out of the ordinary courſe; to any other degree in either Engliſh univerſity, for regiſtry, in the ordinary courſe, 6*l.*, out of ſuch courſe, 10*l.*; to the degree of doctor of medicine in either of the univerſities of Scotland, 10*l.*

For the admiſſion of any perſon into any corporation, in reſpect of birth, apprenticeſhip, or marriage, the duty is 1*l.*; but upon any other ground, 3*l.* For an affidavit, the ſtamp-duty is 2*s.* 6*d.*, ſubject to various exemptions. For an agreement, or memorandum of the ſame, made in England under hand only, or in Scotland without any clauſe of regiſtration, on a matter of the value of 20*l.*, or upwards, containing no more than 1080 words, 1*l.*; for more than 1080 words, 1*l.* 15*s.*; and for every quantity of 1080 words after the firſt, a progreſſive duty of 1*l.* 5*s.* This duty is ſubject to ſeveral general exemptions.

On the appointment of a chaplain, empowering to hold two eccleſiaſtical benefices in England, the duty is 2*l.*; on the appointment or deputation of a game-keeper, 1*l.* 15*s.* On the appraiſement or valuation of any eſtate or effects, or any intereſt therein, or its annual value, or of any dilapidation, or of any repairs, &c. if the valuation ſhall not exceed 50*l.*, 2*s.* 6*d.*; from 50*l.* to 100*l.*, 5*s.*; from 100*l.* to 200*l.*, 10*s.*; from 200*l.* to 500*l.*, 15*s.*; and above 500*l.*, 1*l.* For the indenture of apprenticeſhip or clerkſhip (articles of clerkſhip to attornies excepted), when the ſum of money paid to the maſter or miſtreſs ſhall not amount to 30*l.*, 1*l.*; from 30*l.* to 50*l.*, 2*l.*; from 50*l.* to 100*l.*, 3*l.*; from 100*l.* to 200*l.*, 6*l.*; from 200*l.* to 300*l.*, 12*l.*; from 300*l.* to 400*l.*, 20*l.*; from 400*l.* to 500*l.*, 25*l.*; from 500*l.* to 600*l.*, 30*l.*; from 600*l.* to 800*l.*, 40*l.*; from 800*l.* to 1000*l.*, 50*l.*; from 1000*l.* and upwards, 60*l.* For an indenture, without any conſideration to the maſter or miſtreſs, containing more than 1080 words, 1*l.*; and for more than that quantity, 1*l.* 15*s.* Theſe indentures are ſubject to exemptions in favour of poor children apprenticed. For articles of clerkſhip, in order to admiſſion as an attorney or ſolicitor in any of his majeſty's courts at Weſtminſter, 120*l.*; in any of the courts of the great ſeſſions in Wales, or of the counties palatine of Cheſter, Lancaſter, and Durham, or in any other court of record in England, holding pleas, in which the debt or damage amounts to 40*s.*, 60*l.*; and for any duplicate of ſuch articles, 1*l.* 15*s.* With a view to admiſſion as a ſworn clerk in the office of the ſix clerks, or as a ſworn clerk, &c. in the office of pleas, &c. in England, 120*l.*; and for any duplicate, 1*l.* 15*s.* For articles of clerkſhip, in order to admiſſion as a proctor, 120*l.*; and for a duplicate, 1*l.* 15*s.* For indenture of clerkſhip, in order to admiſſion as a writer to the ſignet, or ſolicitor in any of the courts of ſeſſion, &c. in Scotland, 60*l.*; and for a duplicate, 1*l.* 15*s.* For indenture of clerkſhip, in order to admiſſion to act as a procurator or ſolicitor in the high court of admiralty, the commiſſary court at Edinburgh, or any other inferior court in Scotland, 30*l.*; and for any duplicate, 1*l.* 15*s.*

For an inland bill of exchange, on demand or otherwiſe, not exceeding two months after date, or 60 days after ſight, the duty for any ſum amounting to 40*s.*, and not exceeding 5*l.* 5*s.*, is 1*s.*; from 5*l.* 5*s.* to 20*l.*, 1*s.* 6*d.*; from 20*l.* to 30*l.*, 2*s.*; from 30*l.* to 50*l.*, 2*s.* 6*d.*; from 50*l.* to 100*l.*, 3*s.* 6*d.*; from 100*l.* to 200*l.*, 4*s.* 6*d.*; from 200*l.* to 300*l.*, 5*s.*; from 300*l.* to 500*l.*, 6*s.*; from 500*l.* to 1000*l.*, 8*s.* 6*d.*; from 1000*l.* to 2000*l.*, 12*s.* 6*d.*; from 2000*l.* to 3000*l.*, 15*s.*; and exceeding 3000*l.*, 1*l.* 5*s.* For an inland bill of exchange, to bearer or order, exceeding two months after date, or 60 days after ſight, for any ſum from 40*s.* to 5*l.* 5*s.*, 1*s.*; from 5*l.* 5*s.* to 20*l.*, 2*s.*; from 20*l.* to 30*l.*, 2*s.* 6*d.*; from 30*l.* to 50*l.*, 3*s.* 6*d.*; from 50*l.* to 100*l.*, 4*s.* 6*d.*; from 100*l.* to 200*l.*, 5*s.*; from 200*l.* to 300*l.*, 6*s.*; from 300*l.* to 500*l.*, 8*s.* 6*d.*; from 500*l.* to 1000*l.*, 12*s.* 6*d.*; from 1000*l.* to 2000*l.*, 15*s.*; from 2000*l.* to 3000*l.*, 1*l.* 5*s.*; and above 3000*l.*, 1*l.* 10*s.* The duty for a foreign bill of exchange, drawn ſingly and not in a ſet, the ſame duty as on an inland bill of the ſame amount and tenor. The duty on foreign bills of exchange, drawn in ſets according to the cuſtom of merchants, is for every bill of each ſet, where the ſum made payable doth not exceed 100*l.*, 1*s.* 6*d.*; from 100*l.* to 200*l.*, 3*s.*; from 200*l.* to 500*l.*, 4*s.*; from 500*l.* to 1000*l.*, 5*s.*; from 1000*l.* to 2000*l.*, 7*s.* 6*d.*; from 2000*l.* to 3000*l.*, 10*s.*; and for more than 3000*l.*, 15*s.* The bills exempt from the preceding and all other ſtamp-duties, are thoſe iſſued by the governor and company of the bank of England, navy-bills, bills for the pay and allowances of his majeſty's land forces, and ſome others. (See PROMISSORY *Notes.*) A bill of lading is chargeable with a duty of 3*s.* A bond in England, and perſonal bond in Scotland, given as a ſecurity for the payment of any definite ſum of money, is chargeable, when the ſum does not exceed 50*l.*, with a duty of 1*l.*; from 50*l.* to 100*l.*, 1*l.* 10*s.*; from 100*l.* to 200*l.*, 2*l.*; from 200*l.* to 300*l.*, 3*l.*; from 300*l.* to 500*l.*, 4*l.*; from 500*l.* to 1000*l.*, 5*l.*; from 1000*l.* to 2000*l.*, 6*l.*; from 2000*l.* to 3000*l.*, 7*l.*; from 3000*l.* to 4000*l.*, 8*l.*; from 4000*l.* to 5000*l.*, 9*l.*; from 5000*l.* to 10,000*l.*, 12*l.*; from 10,000*l.* to 15,000*l.*, 15*l.*; from 15,000*l.* to 20,000*l.*, 20*l.*; and exceeding 20,000*l.*, 25*l.* For a bond in England, and a perſonal bond in Scotland, given as a ſecurity for the transfer, or re-transfer of any ſhare in any of the government parliamentary ſtocks or funds, or in the ſtock and funds of the bank of England, or Eaſt India company, or of the South-ſea company, the duty is the ſame as on a bond for a ſum of money, equal to the value of the ſtock or fund ſecured, according to its average price, on the day of the date of the bond, or on either of the ten days preceding.

For a bond in England, and perſonal and heritable bond in Scotland, given as a ſecurity for the payment of any annuity, except upon the original creation and ſale thereof, or of any ſum or ſums of money at ſtated periods, not being intereſt for any principal ſum, nor rent reſerved or payable upon any leaſe or tack, for any definite and certain term, ſo that the total amount of the money to be paid can be previouſly aſcertained, the ſame duty as on a bond of the like nature, for the payment of a ſum of money equal to ſuch total amount. For a ſimilar bond, for the payment of an annuity, &c. for any indefinite period, or the term of life, ſo that the whole money to be paid cannot be previouſly aſcertained, if the annuity, or ſums ſecured, ſhall not amount to 10*l.* *per annum*, 1*l.*; from 10*l.* to 50*l.* *per annum*, 2*l.*; from 50*l.* to 100*l.*, 3*l.*; from 100*l.* to 200*l.*, 4*l.*; from 200*l.* to 300*l.*, 5*l.*; from 300*l.* to 400*l.*, 6*l.*; from 400*l.* to 500*l.*, 7*l.*; from 500*l.* to 750*l.*, 9*l.*; from 750*l.* to 1000*l.*, 12*l.*; from 1000*l.* to 1500*l.*, 15*l.*; from 1500*l.* to 2000*l.*, 20*l.*; and from 2000*l.* *per annum* and upwards, 25*l.* The duties on various kinds of bonds are ſubject to various exemptions and regulations, for which we refer to the ſtatute. For a yearly certificate taken out by every perſon admitted as an attorney or ſolicitor, and as a proctor, in England, and by every perſon admitted as a writer to the ſignet, ſolicitor, agent, attorney, or procurator, in any of the courts of Scotland; and by every ſworn clerk, &c. and any other clerk or officer in any of the courts aforeſaid, who ſhall act, in expectation of any fee or reward, as an attorney, ſolicitor, agent, proctor, procurator, or notary public, though not admitted or enrolled as ſuch, if he ſhall reſide in the city of London, or city of Weſtminſter, or within the limits of the two-penny poſt in England, or within the city or ſhire of Edinburgh, who has been in poſſeſſion of his office for three years or upwards, 12*l.*, or if he has not been in poſſeſſion ſo long, 6*l.*; or if he ſhall reſide elſewhere, in the firſt circumſtance above ſtated, 8*l.*, and in the ſecond, 4*l.* For a certificate taken out yearly by a member of one of the four inns of court in England, who acts as a conveyancer, ſpecial pleader, draftſman in equity, or otherwiſe, if he ſhall reſide in the city of London, &c. as before ſtated, 12*l.*; or if he ſhall reſide elſewhere, 8*l.* The exemptions comprehend ſergeants at law and barriſters; attornies, ſolicitors, proctors, and notaries public; and other perſons acting as ſuch by virtue of any office or appointment, taking out certificates in theſe characters; and public officers preparing deeds, &c. by virtue of their office. A certificate of marriage, that of any common ſeaman, marine, or ſoldier excepted, is chargeable with a duty of 5*s.*; and ſo is the certificate of a perſon's having received the holy ſacrament. The duty upon a charter-party is 1*l.* 15*s.*; that upon collation by an archbiſhop or biſhop to any eccleſiaſtical benefice or promotion of 10*l.* or upwards yearly value in the king's books, is 20*l.*; that of collation to any other eccleſiaſtical benefice, &c. in England, is 10*l.*; that of collation, or admiſſion by any preſbytery or competent authority, to any eccleſiaſtical benefice in Scotland, is 2*l.* For the duties on different kinds and modes of conveyance, ſee the ſtatute. The duty on a debenture or certificate for entitling a perſon to receive a drawback of duties in the cuſtoms or exciſe, or bounty payable out of the revenue of either, if the ſame ſhall not exceed 100*l.*, is 5*s.*; from 100*l.* to 200*l.*, 10*s.*; from 200*l.* to 500*l.*, 1*l.*; and above 500*l.*, 2*l.* For a declaration of truſt, &c. the duty is 1*l.* 15*s.* For every ſkin or piece of vellum, &c. upon which ſhall be written the exemplification or conſtat under the great ſeal of the united kingdom of Great Britain and Ireland, of any letters patent or grant, the duty is 5*l.*

For a faculty from the archbiſhop of Canterbury, or the maſter of the faculties for the time being, or from the guardian of the ſpiritualities during a vacancy of the archbiſhop's ſee, not otherwiſe charged, the duty is 30*l.* For a grant or letters patent under the great ſeal, or the ſeal of the county palatine of Lancaſter, or the ſeal kept and uſed in Scotland, of the honour or dignity of a duke, 350*l.*; of a marquis, 300*l.*; of an earl, 250*l.*; of a viſcount, 200*l.*; of a baron, 150*l.*; of a baronet, 100*l.*; of a congé d'elire for any dean and chapter, for the election of an archbiſhop or biſhop, 30*l.*; of the royal aſſent to or ſignification of ſuch election, or of the nomination and preſentation by his majeſty, in default of ſuch election, of any perſon to be an archbiſhop or biſhop, 30*l.*; of or for the reſtitution of the temporalties to any archbiſhop or biſhop, 30*l.*; of any other honour or franchiſe, &c. to any perſon or perſons, body or bodies politic or corporate, 30*l.*; and if ſuch grant or letters patent are contained in more than one ſkin, piece of vellum, &c., then for every ſkin, ſheet, or piece thereof, after the firſt, a progreſſive duty of 20*l.* For a grant or warrant of precedence to take rank among nobility, under his majeſty's ſign manual, 100*l.*; for a grant or licence, under the ſign manual, to take and uſe a ſurname and arms, or a ſurname only, in compliance with any will or ſettlement, 50*l.*; for arms to the ſame, on voluntary application, 10*l.*; and for grant of arms, or armorial enſigns only, 10*l.* For a grant, under the great ſeal, &c. of any definite ſum of money, not amounting to 100*l.*, 1*l.* 10*s.*; from 100*l.* to 250*l.*, 4*l.*; from 250*l.* to 500*l.*, 10*l.*; from 500*l.* to 750*l.*, 20*l.*; from 750*l.* to 1000*l.*, 30*l.*; from 1000*l.* and upwards, for every 500*l.*, 5*l.*

The duty on a grant of any annuity or penſion, not amounting to 100*l.* *per annum*, is 1*l.* 10*s.*; from 100*l.* to 200*l.*, 4*l.*; from 200*l.* to 400*l.*, 10*l.*; from 400*l.* to 600*l.*, 20*l.*; from 600*l.* to 800*l.*, 30*l.*; from 800*l.* to 1000*l.*, 40*l.*; from 1000*l.* and upwards, 50*l.* For his majeſty's grant of any office or employment, by letters patent, deed, or other writing, the profits of which do not amount to 50*l.* *per annum*, 2*l.*; from 50*l.* to 100*l.*, 4*l.*; from 100*l.* to 200*l.*, 6*l.*; from 200*l.* to 300*l.*, 12*l.*; from 300*l.* to 500*l.*, 25*l.*; from 500*l.* to 750*l.*, 35*l.*; from 750*l.* to 1000*l.*, 50*l.*; from 1000*l.* to 1500*l.*, 75*l.*; from 1500*l.* to 2000*l.*, 100*l.*; from 2000*l.* to 3000*l.*, 150*l.*; from 3000*l.* and upwards, 200*l.*

For inſtitution to any eccleſiaſtical benefice in England upon preſentation, 2*l.*; upon petition of the patron to be admitted, if the benefice or promotion be of the yearly value of 10*l.* and upwards in the king's books, 30*l.*; or if the ſame ſhall be of any other deſcription, 15*l.*

The duty on a letter of attorney, made by a petty officer, ſeaman, marine, or ſoldier ſerving as a marine, for receiving prize money, is 1*s.*, for receiving wages, 1*l.* For a letter of attorney for the ſale, transfer, acceptance, or receipt of dividends in any of the government ſtocks or funds, 1*l.*; for that of any other kind, or commiſſion or factory, 1*l.* 10*s.*; and if more than 1080 words be uſed, a progreſſive duty for every 1080 words, after the firſt, of 1*l.* For a letter of licence from creditors to a debtor, the duty is 1*l.* 15*s.*; and a progreſſive duty for every 1080 words above the firſt number, of 1*l.* 5*s.*: for letters of marque and repriſal, 5*l.*: for licence for marriage in England, if ſpecial, 5*l.*; if not ſpecial, 10*s.*: for licence to uſe the occupation of an appraiſer, taken out yearly, 10*s.*: for a banker or any other perſon who ſhall iſſue any promiſſory notes for money payable to the bearer on demand, and allowed to be re-iſſued, 30*l.*: for exerciſing the trade of a pawnbroker within the cities of London and Weſtminſter, or within the limits of the two-penny poſt, 15*l.*; and elſewhere, 7*l.* 10*s.* For policy of aſſurance on life or lives, if the ſum inſured ſhall not amount to 500*l.*, 1*l.*; from 500*l.* to 1000*l.*, 2*l.*; from 1000*l.* to 3000*l.*, 3*l.*; from 3000*l.* to 5000*l.*, 4*l.*; from 5000*l.* and upwards, 5*l.* For policy of inſurance from loſs or damage by fire to goods, &c. 3*s.* *per cent. per annum*. For policy of inſurance on any ſhip or veſſel, or any goods on board, &c. where the premium ſhall not exceed the rate of 20*s.* *per cent.* on the ſum inſured, if the whole ſum does not exceed 100*l.*, the ſtamp-duty is 1*s.* 3*d.*; if the whole ſum ſhall exceed 100*l.*, then for every 100*l.*, and alſo for any fractional part of 100*l.*, 1*s.* 3*d.*; and where the premium ſhall exceed the rate of 20*s.* *per cent.* on the ſum inſured, if the whole ſum inſured ſhall not exceed 100*l.*, 2*s.* 6*d.*; if it ſhall exceed 100*l.*, then for every 100*l.*, and alſo for any fractional part of 100*l.*, 2*s.* 6*d.* If the inſurance be made upon any ſhip or veſſel, or goods, or freight, for any other voyage beſides that above mentioned,

tioned, from any part in the united kingdom or the adjacent iſlands, to any other part in the ſaid kingdom or iſlands, or for any certain term or period of time not exceeding twelve calendar months, if the premium be 20*s.* *per cent.* on the ſum inſured, and the whole ſum do not exceed 100*l.*, the duty is 2*s.* 6*d.*; but if it ſhall exceed 100*l.*, then for every 100*l.*, and for any fractional part, 2*s.* 6*d.*: and if the premium exceed 20*s.* *per cent.* on the ſum inſured, if the whole ſum ſhall not exceed 100*l.*, the duty is 5*s.*; and if it ſhall exceed 100*l.*, then for every 100*l.*, and any fractional part of 100*l.*, of which the ſame ſhall conſiſt, 5*s.*

For a preſentation by his majeſty, or by any patron, to any eccleſiaſtical benefice, &c. of the yearly value of 10*l.* or upwards in the king's books, the duty is 20*l.*; and to any other eccleſiaſtical benefice or promotion in England, 10*l.* For a deed of procuration, 1*l.* 10*s.* Of PROMISSORY *Notes* we have already given an account under that article; but the act, the proviſions of which we are now reciting, has repealed the 48th of Geo. III. and made ſome addition to the ſtamp-duties. The note for payment of any ſum of money to the bearer on demand is chargeable, for 1*l.* 1*s.* with a duty of 5*d.*; from 1*l.* 1*s.* to 2*l.* 2*s.* with 10*d.*; from 2*l.* 2*s.* to 5*l.* 5*s.* with 1*s.* 3*d.*; from 5*l.* 5*s.* to 10*l.*, with 1*s.* 9*d.*; from 10*l.* to 20*l.*, with 2*s.*; from 20*l.* to 30*l.*, with 3*s.*; from 30*l.* to 50*l.*, with 5*s.*; from 50*l.* to 100*l.*, with 8*s.* 6*d.* The promiſſory note for payment in any other manner, &c. but not exceeding two months after date, or 60 days after ſight, from 40*s.* to 5*l.* 5*s.*, is chargeable with a duty of 1*s.*; from 5*l.* 5*s.* to 20*l.*, 1*s.* 6*d.*; from 20*l.* to 30*l.*, 2*s.*; from 30*l.* to 50*l.*, with 2*s.* 6*d.*; from 50*l.* to 100*l.*, with 3*s.* 6*d.* Thoſe notes either to the bearer on demand, or in any other manner, but not exceeding two months after date, or 60 days after ſight, are chargeable, from 100*l.* to 200*l.*, with a duty of 4*s.* 6*d.*; from 200*l.* to 300*l.*, with 5*s.*; from 300*l.* to 500*l.*, 6*s.*; from 500*l.* to 1000*l.*, 8*s.* 6*d.*; from 1000*l.* to 2000*l.*, 12*s.* 6*d.*; from 2000*l.* to 3000*l.*, with 15*s.*; above 3000*l.* with 1*l.* 5*s.* Thoſe payable at any time exceeding two months after date, or 60 days after ſight, from 40*s.* to 5*l.* 5*s.*, are chargeable with a duty of 1*s.* 6*d.*; from 5*l.* 5*s.* to 20*l.*, 2*s.*; from 20*l.* to 30*l.*, 2*s.* 6*d.*; from 30*l.* to 50*l.*, 3*s.* 6*d.*; from 50*l.* to 100*l.*, 4*s.* 6*d.*; from 100*l.* to 200*l.*, 5*s.*; from 200*l.* to 300*l.*, 6*s.*; from 300*l.* to 500*l.*, 8*s.* 6*d.*; from 500*l.* to 1000*l.*, 12*s.* 6*d.*; from 1000*l.* to 2000*l.*, 15*s.*; from 2000*l.* to 3000*l.*, 1*l.* 5*s.*; exceeding 3000*l.*, 1*l.* 10*s.* (See PROMISSORY *Notes.*) For proteſt of a bill of exchange or promiſſory note, for any ſum under 20*l.*, 2*s.*; from 20*l.* to 100*l.*, 3*s.*; from 100*l.* to 500*l.*, 5*s.*; from 500*l.* upwards, 10*s.* For every ſheet on which a proteſt is written, after the firſt, a progeſſive duty of 5*s.* For receipts from 2*l.* to 5*l.*, 2*d.*; from 5*l.* to 10*l.*, 3*d.*; from 10*l.* to 20*l.*, 6*d.*; from 20*l.* to 50*l.*, 1*s.*; from 50*l.* to 100*l.*, 1*s.* 6*d.*; from 100*l.* to 200*l.*, 2*s.* 6*d.*; from 200*l.* to 300*l.*, 4*s.*; from 300*l.* to 500*l.*, 5*s.*; from 500*l.* to 1000*l.*, 7*s.* 6*d.*; from 1000*l.* upwards, 10*s.*; and in full of all demands, 10*s.* (See RECEIPT.) For ſettlement upon or for the benefit of any perſon or perſons, in poſſeſſion or reverſion, if the ſum ſhall not amount to 1000*l.*, the duty is 1*l.* 15*s.*; from 1000*l.* to 2000*l.*, 2*l.*; from 2000*l.* to 3000*l.*, 3*l.*; from 3000*l.* to 4000*l.*, 4*l.*; from 4000*l.* to 5000*l.*, 5*l.*; from 5000*l.* to 7000*l.*, 7*l.*; from 7000*l.* to 9000*l.*, 9*l.*; from 9000*l.* to 12,000*l.*, 12*l.*; from 12,000*l.* to 15,000*l.*, 15*l.*; from 15,000*l.* to 20,000*l.*, 20*l.*; from 20,000*l.* and upwards, 25*l.* For teſtimonial or certificate of the admiſſion of any perſon to the degree of bachelor of arts, in either of the Engliſh univerſities, 3*l.*; to any other degree, 10*l.* For transfer of any ſhare in bank ſtock, or South-ſea ſtock, 7*s.* 9*d.*; in the ſtock of the Eaſt India company, 1*l.* 10*s.*; in the ſtock of any other corporation, company, or ſociety, 1*l.* 10*s.*

For an account of the *ſecond* part of the ſchedule annexed to the 55th Geo. III. c. 184. containing the duties on law proceedings, we refer to the act itſelf.

The *third* part contains the duties on probates of wills and letters of adminiſtration, on confirmations of teſtaments, inventories, legacies, and ſucceſſions. The duties on probates of a will, and letters of adminiſtration with a will annexed, to be granted in England, confirmation of any teſtament and inventory to be recorded in any commiſſary court in Scotland, by the 55th Geo. III. which alters the amounts ſtated from 48 Geo. III. under PROBATE, are ſhewn in the following table:

	£		£	£	*s.*	*d.*
From	20	to	100	0	10	0
——	100	—	200	2	0	0
——	200	—	300	5	0	0
——	300	—	450	8	0	0
——	450	—	600	11	0	0
——	600	—	800	15	0	0
——	800	—	1,000	22	0	0
——	1,000	—	1,500	30	0	0
——	1,500	—	2,000	40	0	0
——	2,000	—	3,000	50	0	0
——	3,000	—	4,000	60	0	0
——	4,000	—	5,000	80	0	0
——	5,000	—	6,000	100	0	0
——	6,000	—	7,000	120	0	0
——	7,000	—	8,000	140	0	0
——	8,000	—	9,000	160	0	0
——	9,000	—	10,000	180	0	0
——	10,000	—	12,000	200	0	0
——	12,000	—	14,000	220	0	0
——	14,000	—	16,000	250	0	0
——	16,000	—	18,000	280	0	0
——	18,000	—	20,000	310	0	0
——	20,000	—	25,000	350	0	0
——	25,000	—	30,000	400	0	0
——	30,000	—	35,000	450	0	0
——	35,000	—	40,000	525	0	0
——	40,000	—	45,000	600	0	0
——	45,000	—	50,000	675	0	0
——	50,000	—	60,000	750	0	0
——	60,000	—	70,000	900	0	0
——	70,000	—	80,000	1,050	0	0
——	80,000	—	90,000	1,200	0	0
——	90,000	—	100,000	1,350	0	0
——	100,000	—	120,000	1,500	0	0
——	120,000	—	140,000	1,800	0	0
——	140,000	—	160,000	2,100	0	0
——	160,000	—	180,000	2,400	0	0
——	180,000	—	200,000	2,700	0	0
——	200,000	—	250,000	3,000	0	0
——	250,000	—	300,000	3,750	0	0
——	300,000	—	350,000	4,500	0	0
——	350,000	—	400,000	5,250	0	0
——	400,000	—	500,000	6,000	0	0
——	500,000	—	600,000	7,500	0	0
——	600,000	—	700,000	9,000	0	0
——	700,000	—	800,000	10,500	0	0
——	800,000	—	900,000	12,000	0	0
——	900,000	—	1,000,000	13,500	0	0
——	1,000,000	and upwards		15,000	0	0

For letters of adminiſtration, without a will annexed, to be granted in England, and alſo confirmation and inventory in Scotland, the duties are as follow:

	£		£	£	*s.*	*d.*
From	20	to	50	0	10	0
——	50	—	100	1	0	0
——	100	—	200	3	0	0
——	200	—	300	8	0	0
——	300	—	450	11	0	0
——	450	—	600	15	0	0
——	600	—	800	22	0	0
——	800	—	1,000	30	0	0
——	1,000	—	1,500	45	0	0
——	1,500	—	2,000	60	0	0
——	2,000	—	3,000	75	0	0
——	3,000	—	4,000	90	0	0
——	4,000	—	5,000	120	0	0
——	5,000	—	6,000	150	0	0
——	6,000	—	7,000	180	0	0
——	7,000	—	8,000	210	0	0
——	8,000	—	9,000	240	0	0
——	9,000	—	10,000	270	0	0
——	10,000	—	12,000	300	0	0
——	12,000	—	14,000	330	0	0
——	14,000	—	16,000	375	0	0
——	16,000	—	18,000	420	0	0
——	18,000	—	20,000	465	0	0
——	20,000	—	25,000	525	0	0
——	25,000	—	30,000	600	0	0
——	30,000	—	35,000	675	0	0
——	35,000	—	40,000	785	0	0
——	40,000	—	45,000	900	0	0
——	45,000	—	50,000	1,010	0	0
——	50,000	—	60,000	1,125	0	0
——	60,000	—	70,000	1,350	0	0
——	70,000	—	80,000	1,575	0	0
——	80,000	—	90,000	1,800	0	0
——	90,000	—	100,000	2,025	0	0
——	100,000	—	120,000	2,250	0	0
——	120,000	—	140,000	2,700	0	0
——	140,000	—	160,000	3,150	0	0
——	160,000	—	180,000	3,600	0	0
——	180,000	—	200,000	4,050	0	0
——	200,000	—	250,000	4,500	0	0
——	250,000	—	300,000	5,625	0	0
——	300,000	—	350,000	6,750	0	0
——	350,000	—	400,000	7,875	0	0
——	400,000	—	500,000	9,000	0	0
——	500,000	—	600,000	11,250	0	0
——	600,000	—	700,000	13,500	0	0
——	700,000	—	800,000	15,750	0	0
——	800,000	—	900,000	18,000	0	0
——	900,000	—	1,000,000	20,250	0	0
——	1,000,000	and upwards		22,500	0	0

For an account of legacies and ſucceſſions, as under the article Receipt, Schedule, part iii. with the following alteration agreeably to 55 Geo. III. c. 184; inſerting inſtead of 10th October 1808, the 31ſt day of Auguſt 1815; inſerting alſo in col. 2. line 13 from the bottom, after "deceaſed," or the father or mother, or any lineal anceſtor of the deceaſed; inſtead of *2l.* 10*s.* — *3l.*; inſtead of 4*l.* — *5l.*, and inſtead of *5l.* — *6l.*

Stamp-*Office*, an office under the direction of ſix commiſſioners, who are empowered to ſubſtitute inferior officers for the management of the ſtamp-duties. (5 Will. cap. 21. 9 & 10 Will. c. 25.) To this office belong a receiver-general, a comptroller, a ſecretary, and a number of clerks, &c. &c.

STAMPALIA, or Stampalæa, in *Geography*, formerly *Aſtypalæa*, properly ſignifying the ancient city, and called alſo *Pyrrha*, *Pilea*, and at length *Theon Trabeza*, *i. e.* the table of the gods, becauſe its ſoil is fertile, and it is almoſt every where enamelled with flowers, an iſland of the Archipelago, which, in the time of Pliny, was an independent country, and where Achilles had a temple, and that ſort of worſhip that was paid to valour, contributed to maintain among its inhabitants the energy neceſſary for people who are not willing to ſubmit to the yoke of a conqueror. From the irregular form of this iſland, it might be called the "Indented Iſland;" its ſhores preſenting a variety of points, or ſinuoſities, that form ſo many coves and bays fit for the anchorage of ſhips or boats, though we can ſcarcely reckon more than two harbours, the one to the ſouth, the other to the north. It is about ſix leagues in length, and only two in its greateſt breadth; it is not very lofty, nor has it any high mountains that can be diſcovered at a great diſtance. Its ſoil, as we have already ſaid, is fertile, being of that kind which is obſerved on plains and hills, and which does not extend to the tops of ſteep mountains. Stampalia is reckoned one of the moſt fertile iſlands of the Archipelago: its inhabitants experience the mildneſs of the climate and the goodneſs of the ſoil; and in theſe reſpects they differ in character from the rough iſlanders of Calamo and Lero, which are rugged countries. Its fertility, however, is checked by the empire of the Turks, to which it is ſubject; and the oppreſſive exactions to which its inhabitants are compelled to ſubmit: the ſhores abound with a great variety of fiſh. N. lat. 36° 40′. E. long. 26° 16′.

STAMPE, or Tempé, in *Commerce*, a ſmall copper coin in the Weſt India iſlands. In the Engliſh Leeward iſlands 1 ſtampe = $1\frac{1}{2}$ dog = $2\frac{1}{4}$*d.* Leeward currency, and 8 dogs or 4 ſtampes = 1 bit = 9*d.* of the ſame currency; the dollar in this currency being reckoned at 9*s.* In the French iſlands, the noir or dog is = 2 ſols 6 deniers = $1\frac{1}{2}$*d.* Leeward currency, and the tempé or ſtampe = 3 ſols 9 deniers = $2\frac{1}{4}$*d.* Leeward currency.

STAMPERS *and* Stamping, in *Coinage*. See Coin and Coinage.

STAMPING-Mill, or *Knocking-Mill*, an engine uſed in the tin-works to bruiſe the ore ſmall.

STAMPS, in *Metallurgy*, a ſort of large peſtles lifted up by water-wheels, and ſerving to beat to powder the ores, and refuſe of ores of metals.

STAMSLO, in *Geography*, a town of Hungary; 15 miles N.E. of Gros Wardein.

STAMWOOD, in *Agriculture*, a term applied to the roots of trees grubbed up. Any ſorts of root-wood are ſo termed in different ſituations and places.

STANCH, or Staunch, a name given by the country people of Northamptonſhire, and ſome other counties, to a ſpecies of foſſile called ſelenites, from its ſuppoſed virtue in ſtopping fluxes of blood. See Pachodecarhombis.

STANCHING *of Blood*, the ſtopping of blood in caſes of wounds in horſes or other animals. This is moſtly beſt performed by means of doſſels of lint and tow applied to the parts which are wounded.

STANCHIO, or Stancho, in *Geography*, an iſland in the Grecian Archipelago, anciently known by the name of *Cos* (which ſee), and by ſome modern geographers called "Lango." Of the ancient magnificence of this iſland no traces now remain. The modern town of Stancho is ſmall; its buildings are not particularly remarkable; though its ſituation on the ſea-ſhore is the ſame with that of the ancient city, and its environs are ſtill agreeable. It is ſurrounded by orchards of lemon and orange-trees, the flowers and fruit of which are equally regaling and refreſhing to its inhabitants, and afford them a valuable article of commerce. Cargoes of oranges and lemons are ſhipped here, and conveyed to different parts of Turkey, but principally to Smyrna and Conſtantinople. The harbour, which is defended by a caſtle, kept in bad order, though formerly ſafe and deep, can no longer receive any but ſmall veſſels: large ſhips remain without, in a road which has good holding-ground, but in winter it is open to the winds, and the ſwell from the north and weſt, and therefore avoided. The population of the town of Stancho is in a great meaſure compoſed of Turks: the Greeks occupy the remaining part of the iſland, but they are not numerous. The iſland, which is much longer than it is broad, is not very extenſive; but the beauty of its climate and of its ſoil, its fecundity, and its natural allurements, would render the paucity of its inhabitants extraordinary, if we did not recollect that it is under the immediate command of the Turks. Some writers have aſſerted that Stancho is an iſland ſubject to epidemical diſeaſes, and dangerous to be inhabited: but Sonnini ſays, that this aſſertion is ill-founded. Stancho retains the high character for mildneſs of climate, richneſs of ſoil, and ſalubriouſneſs of the air, given by the ancients to Cos. Some very high mountains command the ſouth part of the iſland: and navigators, deſirous of a ſhelter from the impetuous northerly winds, find a propitious retreat in that quarter in the little harbour of Safodino. The remainder of the iſland is a beautiful plain, abounding with various fruits, ſuch as oranges, lemons, figs, grapes, &c. which are delicious. The wine drawn from its grapes is delicate and agreeable. Its excellent paſtures formerly fed numerous flocks, that furniſhed wool, with which the inhabitants manufactured ſtuffs, held in high eſtimation for their fineneſs, and alſo for the brilliant colours with which they were dyed. But this kind of induſtry and its benefits are loſt. Its ſilk has alſo failed; though the climate is favourable to mulberry-trees, and the worm which feeds on them. Stancho is famous for a plane-tree, which covers the little public ſquare in which it is found with its antique and twiſting branches, and cools it with its impervious ſhade. Its thick branches are ſupported by pillars, or rather fragments of pillars, of marble and granite; and theſe pillars are the only ancient monuments which the iſland affords, if we except a few medals of little value. Under the ſhade of the plane-tree is a fountain, which ſupplies the Turks with water, and a coffee-houſe, which furniſhes a beverage that ſerves them in lieu of wine and every other fermented liquor. It is not improbable, that ten centuries have elapſed ſince this tree was planted. N. lat. 36° 46′. E. long. 26° 56′. The bay of Stanchio lies on the S.W. coaſt of Natolia, oppoſite to the iſland. N. lat. 36° 48′ to 37° 4′. E. long. 27° 14′ to 27° 44′.

STANCHIONS, in *Building*. See Punchion.

Stanchions, in a *Ship*, thoſe ſmall pillars of wood or iron which are uſed for various purpoſes; as to ſupport the decks, the quarter-rails, the nettings, the awnings, &c. The firſt of theſe are two ranges of ſmall columns fixed under the beams, throughout the ſhip's length between decks; one range being on the ſtarboard, and the other on the larboard ſide of the hatchways. They are chiefly intended to ſupport the weight of the artillery.

Stanchions *of the Nettings*, are either ſlender bars of iron, whoſe lower ends are fixed in iron ſockets at proper diſtances; or ſquare wooden pillars, let into the upper part of the ſhip's ſide. See Quarter-*Netting*.

STAND, Stableſtand. See Stableſtand.

Stand, in *Commerce*, a weight from two hundred and a half to three hundred of pitch.

Stand *of Arms*. See Arms.

Stand, *Bee*, in *Rural Economy*, is conſtructed in the form and manner of a ſlight ſhed, and made of good ſeaſoned wood, ſo framed, that the fore-part of the ſhed or ſtand may be about ſix or ſeven feet high, and the hind-part five or ſix. The top, and alſo the ends and back, muſt be well covered with ſtrong boards. The inſide ſhould, likewiſe, have a lining of very thin deal-boards, and be furniſhed with ſtrong ſhelves, ſo proportioned, as to ſuit the number of hives, boxes, or glaſſes, that are to be placed on them. And to the front, which ſhould be open, thin ſhades of wood ſhould be ſo formed and fixed up, that they may be raiſed or lowered, as may be neceſſary for the protection of the bees againſt either heat or moiſture. See Hive.

Stand, *Grain* or *Corn*, in *Agriculture*, the name of ſuch as are made of framed wood, ſtones, low walls, or other contrivances, and which are raiſed for placing grain upon, in making it into ſtacks.

The moſt ordinary mode of forming theſe ſtands is merely that of placing two or three pieces of large timber lengthways, and then putting ſmaller ones croſs-ways at the ends, filling up the middle parts with ſmaller pieces of wood or other materials. This is, however, a mode by no means to be generally employed, as it provides no ſecurity for the bottom of the ſtack. But in other caſes, a ſtrong framing of good timber is put upon poſts of wood, or what is better, of ſtones, about two feet high, provided with round caps of good flat ſtones, and on theſe the ſtacks reſt in a very ſolid and ſecure manner, and it affords a good and ſecure ſupport for the corn.

Theſe ſtack-ſtands are, however, much better when conſtructed wholly of ſtone, being built to the ſame height as in the former caſe, in a rather ſlanting manner outwards, and covered on the tops with copings of oak-planking or flat ſtones, which project over the edges ſeveral inches, and in that way prevent the depredations of rats and mice on the grain, as well as their lodging in the ſtacks. In both theſe modes, pieces of timber are placed as a frame in the middle, to ſupport the grain upon.

Further, in conſtructing theſe ſtands, the foundation ſhould be ſunk a conſiderable depth into the ground, and the bottoms be well laid, to prevent vermin getting to the grain of the ſtacks by working under them; and no ſort of ſubſtances ſhould ever be ſuffered to reſt againſt them, or the looſe corn to hang down during the time of building the ſtacks. It is obvious that the form of theſe ſtands muſt vary according to that in which the ſtacks are to be made, which is different in different diſtricts. The circular and oblong forms are the moſt uſual; but the long narrow ſhape is probably to be preferred, as it is ſaid, in the Agricultural Report of Northumberland, to keep the corn better, more dry, and freer from heating.

It has been remarked, that on brick or ſtone ſtands, ſtacks of the parallelogrammical form may be built to any ſize; but that for ſmall ſtacks, eſpecially where wood is employed, the octagonal form of ſtand ſhould rather be preferred to the circular one, as the copings may be cut with leſs waſte, and from ſmaller timber; and it is juſt as eaſy to build a circular ſtack on an octagonal ſtand as on a circular one. But that where ſtone can be eaſily procured, it is without doubt the moſt proper material for the bottoms ; and brick, when properly made for the purpoſe, anſwers very well, eſpecially if proper care be taken in the laying of it. Slate is alſo another material, where it can be had at a reaſonable expence, that may be a very good ſubſtance for this uſe. Likewiſe flag-ſtones would anſwer extremely well ; but neither ſlates nor flag-ſtones are neceſſary, if the foundations be laid ſufficiently deep to prevent the vermin burrowing under them. The celebrated Mr. Bakewell made uſe of ſtands of this kind with much advantage ; and other farmers, in the ſame diſtrict, probably employed them before his time.

Several different forms of ſtands of this ſort are employed on the farms of the duke of Bedford, at Woburn, and in other places. See Stack.

Stand, *Hay*, may be formed in ſomewhat the ſame manner as that for grain or corn, only it is ſeldom neceſſary to have it made of ſuch expenſive materials. A ſimple frame of wood is moſtly ſufficient, with proper bearers laid acroſs for the ſupport of the ſtack. See Stack and Stacking *of Hay*.

STANDARD, in *Commerce*, is a weight, meaſure, or coin, of acknowledged authority, by which others of the ſame denomination are ſized, compared, or adjuſted. (See Coin, Measure, and Weight.) We ſhall begin this important article with *Meaſures*, and conclude with *Coins*, including the new ſtandard weight for ſilver, of 1816.

When a ſtandard for linear meaſure is once eſtabliſhed, that for meaſures of capacity is eaſily deduced, by determining their cubic or ſolid contents ; and from the latter, ſtandard weights may be derived, as a veſſel of any certain dimenſions filled with pure water, at a given temperature, will always weigh the ſame in the ſame latitude.

It is, however, to be remarked, that this ſyſtematic mode of obtaining ſtandards has been ſeldom adopted, as they ſeem to have been generally eſtabliſhed at the will of individuals, or by the agreement of governments. Such are therefore called *arbitrary ſtandards*, to diſtinguiſh them from *invariable ſtandards from nature ;* that is, meaſures obtained from ſome unalterable property of nature ; as the dimenſions of the earth, the motions of the heavenly bodies, or the laws of gravitation. Theſe ſtandards have been anxiouſly ſought after by the firſt mathematicians of modern times ; but before their labours and reſearches are deſcribed, it will be proper to give an account of the paſt and preſent ſtate of arbitrary ſtandards, which are thoſe univerſally adopted, except in France.

The ſtandard meaſures of linear extenſion of all countries appear, from their names, to have been originally taken from ſome part of the human body, as the foot, the fathom, &c. But as ſuch muſt conſtantly vary with the different ſizes of men, ſtandards of ſome durable ſubſtance became neceſſary ; and it may be obſerved, that in country places where ſuch are not at hand, natural meaſures are ſtill occaſionally uſed, as the arm, the pace, &c. Hence ſome account of their proportions to each other cannot be unintereſting or foreign to our ſubject. The fathom is reckoned to equal the height or ſtature of a well-proportioned man : the pace is ſuppoſed to equal half of the ſtature, the cubit one-fourth, the foot one-ſixth, and the ſpan one-eighth. The breadth of the hand is reckoned one-third of the foot, that of the thumb one-twelfth, and of the finger one-eighteenth. Other proportions are occaſionally uſed, which, however, are not conſidered ſo regular as the above ; ſuch are the head, the arm, and the girth, &c. The head is particularly noticed by painters and ſtatuaries, who reckon the ſymmetry good when the whole height equals ſeven heads : but it has been made to equal more than ſeven and a half heads in ancient figures intended to repreſent dignity or ſtrength. The proportion, however, varies conſiderably among different races of men, and in different countries. The average of the European ſtature is from ſix to ſeven heads ; but that of the Kalmucks, Samoyedes, Laplanders, &c. is ſeldom more than five heads, and frequently leſs.

From ſuch an extraordinary variety may be traced the diverſity of ſtandard meaſures throughout the world. It has, however, been the endeavour of all regular governments to correct this inconvenience ; and hence eſtabliſhed ſtandards have been, from the earlieſt period of hiſtory, objects of peculiar care. They have been depoſited in the ſanctuary of the Jews, the temples of the heathens, and the churches of the primitive Chriſtians ; and diſtinguiſhed officers were always appointed to diſtribute copies of the ſame, to examine thoſe in uſe, and to correct or condemn ſuch as were found erroneous.

The Jews called their original ſtandard *ſcahac*, and thoſe copied from it, *meſſurah haddin*, or judged meaſures. We frequently read in ſcripture of "the weight of the ſanctuary," "the meaſure of the ſanctuary," and "the ſhekel of the ſanctuary." Numerous texts and precepts likewiſe occur in the ſacred volume to command uniformity.

The Greeks called their ſtandards *archetype*, *prototype*, and *metreon tropos ;* and it is ſaid, that at a very remote period they had but two ſtandards, namely, the *Pythic* and the *Olympic* meaſures. At Athens, fifteen officers were conſtantly employed for the regulation of their ſtandards. The ancient Romans likewiſe paid ſtrict attention to the ſame object, and are ſaid to have eſtabliſhed one ſtandard, called *menſura*, in every city throughout their vaſt dominions ; and each of thoſe meaſures was an accurate copy of the original, kept in the temple of Jupiter in the Capitol, which ſtandard was therefore called *capitolina*.

It is ſtated by ſeveral good authorities, that the Egyptians gave ſtandards at a very early period to the neighbouring countries of Aſia and Greece, from meaſurements made of an arc of the meridian. It is obſerved by Paucton, in his "Metrologie," that the baſe of their largeſt pyramid was made the principal ſtandard, which was the 500dth part of a degree of the meridian, previouſly meaſured for that purpoſe ; and Bailly, in his "Aſtronomie Ancienne," aſſerts that the Egyptian computation of the degree nearly correſponds with the modern meaſurement of the ſame arc. However this may be, there is little doubt but that uniformity of ſtandard meaſures was more ſtrictly eſtabliſhed among the ancients than among the moderns. The extenſive and arbitrary power poſſeſſed by many ancient ſovereigns muſt have greatly contributed to this. Even the Chriſtian emperors were very ſtrict in promoting uniformity, inſomuch that in the time of Charlemagne there was but one weight and one meaſure throughout his empire. In ſucceeding ages, however, a great diverſity was introduced in France by the abuſes of manorial rights and feudal tenures ; and to ſimilar cauſes may be aſcribed much of that variety which ſtill prevails in the different ſtates of Italy, Germany, Spain, and moſt other countries of Europe.

Theſe remarks naturally lead us to the conſideration of the ſtandards of our own country.

Standards of Engliſh Weights and Meaſures.—The ſtandards of Engliſh weights and meaſures are ſuppoſed to be chiefly of Saxon origin, but their early hiſtory is very imperfectly known.

Biſhop Fleetwood obſerves, in his "Chronicum Precioſum," that "there were good laws made on the ſtandards of weights and meaſures before the Conqueſt, by Edgar and Canute, but that they were never well obſerved." The ſame remark will indeed apply to many laws on the ſubject ſubſequent to that period.

Henry I. is ſaid to have paid much attention to the regulation of weights and meaſures, and to have adjuſted the Saxon *gyrd*, or girth, the modern yard, to the length of his arm. This ſtandard he depoſited in the Exchequer at Weſtminſter, where it is ſtill preſerved. As to the ſtandards of weights, they have undergone ſeveral alterations ſince that time. The troy weight, which is ſuppoſed to have taken its name from Troyes, in France, was introduced by the Normans, and contained at firſt 7680 grains, but was afterwards reduced to its preſent weight of 5760 grains. Before the reign of Henry VIII., the Tower or moneyer's pound was moſtly uſed for the precious metals, and was 15 dwt. leſs than the troy pound. About the ſame period the avoirdupois weight was eſtabliſhed for heavy goods, in the room of the old commercial weight, which latter is ſtill retained in Scotland under the name of the *Amſterdam weight;* and it is worthy of remark, that the aſſize of bread in England has been conſtantly fixed according to this ancient weight by the magiſtrates; the peck loaf newly baked being 16 lb. Amſterdam weight, which anſwers to 17 lb. 6 oz. avoirdupois.

Several ſtandards of weights and meaſures were anciently kept at Wincheſter, from whence our corn-buſhel derives its name; but in later times they have been chiefly kept in the Exchequer, at Guildhall, and at the Tower.

Preſent State of Engliſh Standards.—In the year 1758, the houſe of commons appointed a ſelect committee to enquire into the original ſtandards of weights and meaſures, and to report accordingly. They were aſſiſted in their reſearches by ſeveral eminent mathematicians and mechaniſts, who purſued the enquiry with great ſyſtem and ability. Their report, which is very elaborate, contains the reſults of numerous trials and compariſons made on the ſeveral ſtandards kept at the Exchequer and at Guildhall, which reſults were by no means ſatisfactory, particularly with regard to meaſures of capacity. Their labours, however, were not merely confined to compariſons and reſearches; they adjuſted with great accuracy two ſtandards, namely, the yard, and the pound troy, which are ſtill carefully preſerved, and conſidered of the firſt authority. The methods taken for preparing theſe ſtandards are detailed at conſiderable length in their report, and are well worthy of attention. On the queſtion, whether the troy or the avoirdupois pound ſhould be the ſtandard, they determined on the former, for the following reaſons. "Becauſe troy weight is beſt known to our law; that which hath been longeſt in uſe; that which is beſt known to the reſt of the world; that to which our learned countrymen have referred, in comparing ancient and modern weights; and the weight which hath been ſubdivided into the ſmalleſt parts. On the other hand, the avoirdupois weight is of doubtful authority; and though unfit to be made a ſtandard, yet the frequent uſe of it renders it neceſſary to aſcertain how many ounces, pennyweights, and grains troy, the pound avoirdupois ought to weigh."

The committee therefore obtained, with the utmoſt exactneſs, ſtandard weights of the ſeveral parts of the pound troy, which were made by Mr. Harris, the king's aſſay-maſter, with great ſkill, and proved by a very curious apparatus, contrived by Mr. Bird, the celebrated optician, which was adapted to five different beams, and which aſcertained the weights, from twelve ounces down to one grain incluſive, and that with ſo much correctneſs, as to diſcern any error in the pound to the 230,400dth of the weight, and to the 2000dth part of a ſingle grain. By this apparatus the ſeveral parts of the ſtandard pound were examined and adjuſted, in every progreſſive combination neceſſary to diſcover their proportions to each other; and upon all theſe trials the ſeveral weights appeared ſo exact, that, to uſe the words of the committee, "no greater degree of correctneſs could in the nature of things be expected."

A copy of this ſtandard pound was delivered to the houſe of commons, and another depoſited in the Mint, where it is ſtill preſerved, and alſo Mr. Bird's apparatus. With theſe ſome very accurate trials have been lately made by Mr. Bingley, the preſent aſſay-maſter. "One of thoſe trials deſerves particular notice, as tending to confirm the proportion between troy and avoirdupois weight, which has been differently ſtated in works of high authority, varying from 6998 to 7010 grains troy to the pound avoirdupois. It was, however, found by the trial above-mentioned, that the avoirdupois ſtandard pound kept in the Mint weighs exactly 7000 grains troy; and it was further aſcertained, that this pound of the Mint perfectly agrees with the bell ſtandard pound at Guildhall, and alſo with that, of 1588, kept at the Exchequer; and the agreement was the more curious, as the Mint ſtandard pound had always been kept carefully packed up in paper, while the other two were conſtantly in uſe, and expoſed to the atmoſphere." Univerſal Cambiſt, vol. i. p. xv.

The ſtandard yard of 1758 is ſtill carefully preſerved, and was compared with ſeveral others by profeſſor Pictet, in the year 1802. Theſe trials were made in the temperature of 62°, by means of the microſcopic beam-compaſs, conſtructed by Mr. Troughton, capable of aſcertaining differences to the 10,000dth part of an inch; and the following were the reſults, as compared with the ſtandard yard made by the ſame ingenious artiſt, and agreed upon by the Royal Society as the moſt accurate in its diviſions and the beſt medium of compariſon.

	Inches.
Taking Mr. Troughton's ſtandard at -	36.00000
The parliamentary ſtandard of 1758, made by Mr. Bird, was found to be - -	36.00023
Royal Society's ſtandard, made by Mr. Bird	35·99955
Royal Society's ſtandard, made by Mr. Graham	36.00130
Exchequer ſtandard - - -	35·99330
Tower ſtandard - - - -	36.00400
General Roy's ſtandard for the Trigonom. Survey	36.00036

From the foregoing view it appears, that the preſent ſtandards of weights and linear meaſures are in a reſpectable ſtate of correctneſs; but it is to be obſerved, that meaſures of capacity are not ſo accurate, eſpecially in their ſubdiviſions; and the variations are greatly increaſed by local cuſtoms, particularly in corn meaſures; an evil which the power of parliament has been hitherto unable to correct, notwithſtanding the ſevere penalties which have been enacted at different periods to enforce uniformity. The committee of 1758 ſeemed to deſpair of ſucceſs in this reſpect, by the remark in their report, p. 460, "that the repeated endeavours of the legiſlature, ever ſince Magna Charta, to compel one weight and one meaſure throughout the realm, never having proved effectual, there ſeems little to be expected from reviving means which experience has ſhewn to be inadequate, and yet it was difficult to deviſe any thing entirely unattempted by former parliaments."

Since the above period, ſeveral publications have appeared on the ſubject of ſtandards, among which the communications

munications of ſir George Shuckburgh Evelyn, in the Philoſophical Tranſactions, deſerve particular notice, as very ſcientific and accurate. Plans too have been propoſed in parliament, and though not adopted, are well worthy of being recorded, as ſuch may prove uſeful on future occaſions.

In 1789, ſir John Riggs Miller moved for a committee of the houſe of commons "to inveſtigate and report on the beſt means of adopting an uniformity of weights and meaſures." He ſuggeſted the propriety of adopting the pendulum as the ſtandard of linear extenſion; but the ſubject was not reſumed the next ſeſſion. The plan, however, was ſtrongly recommended by a publication of the Rev. George Skene Keith, who propoſed the decimal ſyſtem, which was ſoon after eſtabliſhed in France.

In 1814, ſir George Clerk moved for a ſelect committee of the houſe of commons "to enquire into the original ſtandards of weights and meaſures, &c." And, in order to obtain information as to what were the beſt means of comparing linear meaſures with ſome invariable natural ſtandard, the committee examined profeſſor Playfair and Dr. W. Hyde Wollaſton. Their report on the occaſion contains much uſeful and important information; and a bill founded on it was brought into parliament. The plan was well received, and in the beginning of the preſent year, (1816,) the bill paſſed the houſe of commons without oppoſition, but was loſt on the ſecond reading in the houſe of lords.

The chief object of this bill was to aboliſh all the preſent meaſures of capacity, except coal meaſure, and to adopt one only in their ſtead. The propoſed ſtandard gallon was to be aſcertained by weight; that is, when filled with pure water at a temperature of 62°, it was to weigh 10 lb. avoirdupois, and this ſtandard was deduced from the weight of a cubic foot of pure water, which had been found to weigh, at the ſame temperature, 1000 ounces avoirdupois. Hence the propoſed gallon was to meaſure 276.48 cubic inches. It was likewiſe propoſed to make the avoirdupois, inſtead of troy weight, the ſtandard for regulating weights; and to adjuſt the long meaſures by the length of the pendulum. (Other particulars of this bill, as well as the report of the committee, may be ſeen in the Appendix to Kelly's Metrology.)

The committee, not ſeeming ſatisfied with the experiments hitherto made on the pendulum, referred the conſideration of the ſubject to the Royal Society, who have ordered a new meaſurement of it to be made. This operation is now in progreſs, under the direction of a committee, who have ſelected three members for the performance: namely, Dr. Young, Dr. Wollaſton, and Mr. Troughton. Since theſe experiments have commenced, the earl Stanhope has moved in the houſe of lords, that an addreſs ſhould be preſented to the Prince Regent to appoint a committee of ſcientific men, to be ſelected from the univerſities and mathematical inſtitutions, to determine on the beſt ſtandards for an improved ſyſtem of weights and meaſures.

From ſuch a co-operation much may be expected, and we hope to have an opportunity of ſtating important reſults in our article Weight. At preſent, we ſhall proceed to ſhew what has been hitherto effected in ſeeking invariable ſtandards from nature, and as the purpoſe of thoſe reſearches is of a popular nature, we ſhall endeavour to be as elementary and minute as the ſubject will admit.

Invariable Standards from Nature.—If arbitrary ſtandards could be preſerved uniform, they would anſwer all the uſeful purpoſes for which they are intended; but as all material ſubſtances are liable to decay, methods have been propoſed for obtaining ſtandards from ſome unalterable property of nature, by which loſt meaſures might be reſtored, or new ſyſtems eſtabliſhed: but it is remarkable that, in deducing ſtandards from nature, nature oppoſes many obſtacles difficult to be ſurmounted. Among the different methods that have been ſuggeſted, two only have been purſued with any degree of ſucceſs, namely, the length of a pendulum that vibrates ſeconds of mean time; and the length of an arc or portion of the meridian. If the earth had been a perfect ſphere, thoſe meaſures might be obtained without much difficulty; but it is a kind of oblate ſpheroid, having its equatorial diameter longer than its axis or polar diameter. Hence the gravity of bodies varies on its ſurface, in proportion to their diſtance from the centre of the earth; and, therefore, a pendulum muſt be longer at the poles than on the equator, in order to vibrate equal portions of time. From the ſpheroidical figure of the earth, too, the degrees of the meridian vary, increaſing in length, like the pendulum, from the equator to the pole. In order to aſcertain theſe variations, many calculations and meaſurements have been made by the greateſt mathematicians; and yet, with all their accumulated labours, up to the preſent time, the ſolutions are unſatisfactory. "It appears," ſays Laplace, in his Syſtème du Monde, "that the earth differs ſenſibly from an ellipſoid: there is alſo reaſon to believe that its two hemiſpheres are not equal on each ſide of the equator." Doubts are likewiſe entertained of the uniformity of gravitation in different longitudes, though in the ſame latitude; and alſo of the equality of degrees of the meridian in thoſe ſituations. The ratio, therefore, of any portion of the meridian to the whole circle is uncertain.

According to ſir Iſaac Newton's theory, the equatorial diameter is to the polar as 230 to 229; or, in other words, the earth's ellipticity is $\frac{1}{230}$. This computation was made on the hypotheſis, that the earth is an homogeneous ellipſoid; but on the ſuppoſition that it is heterogeneous, the ellipticity or oblateneſs is found to be leſs, as may be ſeen by the tables contained in this article.

The meaſurement of a degree of the meridian was attempted at a very remote period by the Egyptians, as already noticed; but from the rude and imperfect ſtate of the mechanical arts in ancient times, great doubts muſt be entertained of the accuracy of ſuch operations. With reſpect to the pendulum, it was not known to the ancients; but it has greatly engaged the attention of modern aſtronomers and mechaniſts, as well as the meaſurement of the meridian. For a particular account of both, ſee our articles Degree, Earth, and Pendulum.

Huygens was the firſt who propoſed the pendulum as the ſtandard for linear meaſure; that is, its length from the point of ſuſpenſion to the centre of oſcillation. The third part of this diſtance he termed the horary foot, which he recommended to be the univerſal ſtandard: but the variations of its length in different latitudes, as well as the great difficulty of obtaining the exact meaſurement, above ſtated, ſeemed to condemn this plan as wholly impracticable. The ſame ingenious philoſopher propoſed the method of obtaining the length of the pendulum by means of a rectangular cone; which when ſuſpended by its vertex, and made to vibrate, the centre of its baſe he demonſtrated to be the centre of oſcillation, and reciprocally, if ſuſpended by the centre of its baſe, its vertex would be the centre of oſcillation, ſuppoſing, in both caſes, that the length of the iſochronous ſimple pendulum was equal to the altitude of the cone, or the ſemidiameter of the baſe. He likewiſe ſuggeſted, as an invariable ſtandard of length, the ſpace that a heavy body would fall through in a ſecond of time; but this, like the pendulum, muſt vary in different latitudes, and is, moreover, affected by the reſiſtance of the atmoſphere. The operation is, in many other reſpects, very difficult to be performed with any degree of accuracy.

About the year 1778, the public attention was particularly excited and directed to the ſubject of ſtandards from nature, by the Society for the Encouragement of Arts, Manufactures, and Commerce, in London, who advertiſed a premium of 100 guineas, or a gold medal, as a reward to any perſon who would propoſe an improved means "for obtaining invariable ſtandards for weights and meaſures, communicable at all times, and to all nations." Among the candidates for this reward was Mr. Hatton, who propoſed the application of a moveable point of ſuſpenſion to one and the ſame pendulum, by which he intended to accompliſh the full effect of two pendulums; and the difference of their lengths was to be the required meaſure. Mr. Whitehurſt improved upon his plan by means of two pendulums, the vibrations of which were in a ratio of two to one. By this method it was generally admitted, that the difference between the rods of two pendulums, whoſe vibrations are known, is a datum from which may be derived an invariable ſtandard meaſure, as well as many other uſeful problems relative to gravitation, to falling bodies, and to the figure of the earth. By theſe experiments it was aſcertained, that the length of a ſeconds' pendulum in the latitude of London, vibrating in a circular arc of 3° 8′, is very nearly 39.119 inches, but performing the ſame motion in the arc of a cycloid, the reſult would be 39.136.

Experiments, which were ſuppoſed to be ſtill more accurate, were afterwards made by Mr. Graham; and a plan was propoſed to parliament, as before noticed, for adopting the pendulum as the ſtandard of length; but it was more warmly taken up in other countries. M. Talleyrand, then biſhop of Autun, and Mr. Jefferſon, the ſecretary of ſtate in America, turned their thoughts very earneſtly to the ſubject. Mr. Jefferſon propoſed, in the houſe of repreſentatives, that the length of a pendulum in lat. 38°, which he reckoned the medium of the United States, ſhould be adopted as a ſtandard on which to found a new ſyſtem of weights and meaſures, and his plans were approved, but never carried into effect.

It was firſt propoſed in France, that the length of the pendulum ſhould be made the ſtandard, taken in the latitude of Paris (48° 50′); but the latitude 45° was afterwards preferred, as moſt likely to be univerſally received, being the medium between the equator and the poles. A report to this effect was made to the National Aſſembly, in which it was agreed, that the meaſurement ſhould be entruſted to a committee of ſix members of the Academy of Sciences in Paris, and to ſix members of the Royal Society of London. But this plan was afterwards rejected by the academicians Lagrange, Laplace, Lalande, Borda, Monge, and Condorcet, who recommended a ſtandard from the meaſurement of an arc of the meridian. As this ſeems the moſt ſcientific operation, and important change that has ever been made in any ſyſtem of weights and meaſures, we ſhall give a full account of it here, extracted from their conſtitutional code.

Extract from the conſtitutional laws of the new ſyſtem of meaſures in France.

"By a decree of the 8th of May, 1790, ſanctioned the 22d of Auguſt, the conſtituent aſſembly deſiring that all France ſhould enjoy for ever the advantage that muſt reſult from an uniformity of weights and meaſures, commiſſioned the Academy of Sciences to determine the length of the pendulum, and thence to deduce an invariable ſtandard for all weights and meaſures.

"The length of the pendulum, at firſt, appeared proper for the baſis of the ſyſtem of meaſures, being eaſy to determine, and conſequently to verify, if it ſhould be neceſſary by any accidents happening to the ſtandards; but it was obſerved, that to take, as was propoſed, for the unit of meaſures, the length of the ſimple pendulum vibrating ſeconds, was to employ, in order to determine a meaſure of length, not only an heterogeneous element,—time, but alſo an arbitrary diviſion,—the 86,400dth part of the day. A meaſure of length was therefore preferred that did not depend on any other quantity; and it will be ſeen afterwards (*Précis des Experiences*, &c.) that obſervations of the pendulum can nevertheleſs be employed as a means of verifying, and even of finding that unit of meaſure, although they have not ſerved as the baſis of its determination. An unit of meaſure, taken on the earth even, has the advantage of being perfectly analogous to moſt of the meaſures that are likewiſe taken on the earth, as the diſtances between points of its ſurface, or the extent of portions of this ſame ſurface: it is, in fact, more natural to compare the diſtance of one place to another to the quadrant of one of the terreſtrial circles, than to the length of the pendulum. In ſhort, it was obſerved, that as the 10,000,000th part of the quarter of the meridian, or the metre, differed only from the pendulum vibrating ſeconds at Paris about ſix millimetres, both units would have led to reſults almoſt exactly ſimilar."

A ſecond decree of the ſame day commiſſions the Academy to appoint the moſt convenient ſcale of diviſion for weights and meaſures, and alſo for monies.

The decree of the 26th of March, 1791, ſanctioned on the 30th, to fix an unit of meaſure, natural and invariable, and which, in its determination, contains nothing arbitrary or peculiar to the ſituation of any people on earth, adopted, according to the advice of the Academy of the 19th of the ſame month, the dimenſions of the quadrant of the terreſtrial meridian as the baſis of the new ſyſtem of meaſures.

"The quadrant of the meridian ſhould be preferred to the quadrant of the equator, on account of the great difficulties that the neceſſary operations to determine this laſt element would have preſented, and their verification, if it were ever wiſhed to have recourſe to it. The regularity of this circle is not better aſcertained, than the ſimilitude or regularity of meridians. The ſize of the celeſtial arc anſwering to the portion of the equator that would have been meaſured, is leſs ſuſceptible of being determined with preciſion: in ſhort, every nation belongs to one of the meridians of the earth; one part only is placed under the equator."

The new ſyſtem of weights and meaſures, founded on the meaſure of the meridian of the earth, and on the decimal diviſion, was adopted by the law of the 1ſt of Auguſt 1793, under a nomenclature and on a baſis, both of which have ſince experienced changes.

"This nomenclature, modified by the law of the 30th Nivoſe an. 2, did not admit the decimal multiples *deca*, *hecto*, *kilo*, and *myria*, but only the ſub-multiples *deci* and *centi*. In order to make up for this, ſeveral denominations in each claſs of meaſures had been adopted. Thus, the *miliare* expreſſed 1000 metres; the *grade*, 100,000; the *cadil* correſponded with the litre, the *cade* to the kilolitre, the *gravet* to the gramme, the *grave* to the kilogramme, the *bar* to 1000 kilogrammes; and the words *decicadil*, *centricadil*, *decicade*, *centicade*, *decigravet*, *centigravet*, *decibar*, and *centibar*, expreſſed the tenth and hundredth parts of theſe different units. The name *are* was given to the meaſure at preſent called *hectare*: the *franc* ſhould be of the weight of 10 gravets, that is to ſay, double what it now is." According to this ſimple ſketch, it will be readily confeſſed that the nomenclature adopted by the law of 1795, is more methodical, more conformable to the principles of common numeration, and therefore more ſuſceptible of all applications of the decimal calculation.

Some laws applied alſo the decimal ſcale to the diviſion of the day and of the year, which did not require ſuch a change; they have been ſucceſſively repealed.

Extract from the law of the 18th Germinal, 1795, relative to weights and meaſures.

Art. II. There ſhall be but one ſtandard of weights and meaſures,—it ſhall be a rod of platina, on which the metre, the fundamental unit of the whole ſyſtem of meaſures, ſhall be traced.

The ſecond article of the law of the 19th Frimaire, 1800, acknowledges alſo the kilogramme for the ſtandard.

Art. V. Their nomenclature is definitively adopted as follows:

Metre, the meaſure of length, equal to the 10,000,000th part of the arc of the terreſtrial meridian, contained between the north pole and the equator.

Are, the meaſure of ſuperficies for land, equal to a ſquare of ten metres each ſide.

Stère, the meaſure particularly intended for fire-wood, and which ſhall be equal to the cubic metre.

Litre, the meaſure of capacity, both for liquids and dry goods, the contents of which ſhall be equal to the cubic metre.

Gramme, the abſolute weight of a volume of pure water, equal to the cube of the hundredth part of the metre, of the temperature of melted ice.

The unit of monies ſhall be called *franc*, to replace the name *livre*, uſed hitherto.

Art. VI. The tenth part of the metre ſhall be called *decimetre*, and its 100dth part *centimetre;* what ſhall be called *decametre* is a meaſure equal to 10 metres, which ſupplies a convenient meaſure for ſurveying. *Hectometre* ſhall ſignify the length of 100 metres. *Kilometre* and *myriametre* ſhall be lengths of 1000 and 10,000 metres, and ſhall deſignate principally itinerary diſtances.

Art. VII. The denominations of the meaſures of other kinds ſhall be determined according to the ſame principles as thoſe of the preceding article.

Thus, *decilitre* ſhall be a meaſure of capacity ten times ſmaller than the *litre; centigramme* ſhall be the 100dth part of the weight of a gramme.

Decalitre ſhall likewiſe be uſed to deſignate a meaſure containing 10 litres; *hectolitre* for a meaſure equal to 100 litres; a *kilogramme* ſhall be a weight of 1000 grammes.

In a ſimilar manner the names of all other meaſures ſhall be compoſed.

For a compariſon of the French and Engliſh weights and meaſures, ſee our articles MEASURE and WEIGHT.

Preſent State of Standards of Weights and Meaſures in France,—The ſucceſs of the metrical ſyſtem adopted in France is a ſubject of intereſting and important inquiry. The plan was originally conſidered ſo excellent, that hopes were entertained of other nations following the example. This expectation, however, has not been realized, nor has that beautiful and ſcientific theory been found unexceptionable in practice. On the contrary, it met with ſuch oppoſition on account of the Greek and Latin terms, and the decimal diviſions, that in 1801 the government allowed the people to uſe, for a limited time, their ancient vocabulary of names, applying them to the new ſtandards, which are ſtill retained. And in 1812, a further conceſſion was made, by the imperial government, to the prejudices and habits of the people. They were allowed to continue the ancient vocabulary applied to the new ſtandards, with the word *uſuel* added to each: thus, two metres are the *toiſe uſuelle;* half a kilogramme, the *livre uſuelle*, &c.: and theſe units are not divided decimally, but into halves, quarters, and eighths: the long meaſures are alſo divided duodecimally.

Beſides the binary diviſions of weights, the *livre uſuelle* is divided into ounces, gros, and grains, like the ancient livre, *poids de marc*. Hence, the new ounce and its diviſions depart ſo widely from the gramme, that the proportion cannot be aſcertained without a troubleſome calculation.

Thus, after more than twenty years of troubleſome experiment and trial of the metrical ſyſtem, the only advantage that has been gained is that of eſtabliſhing one common ſtandard, the *metre;* but uniformity might as well have been obtained by making their ancient toiſe, (ſo univerſally known,) their ſtandard. The chief recommendation of the metre, as ſtated in the foregoing decree, as well as by the authors on the metrical ſyſtem, Brillat, Briſſon, and Tarbé, is, that ſhould it be ever altered or loſt, it may be eaſily reſtored, not by a ſecond meaſurement of the meridian, but by a compariſon with the pendulum. Thus they allow the pendulum to be the regulator of linear meaſure as well as of time, and, in ſhort, the ultimate criterion, and of courſe the principal ſtandard.

The following tables ſhew at one view the labours of the greateſt mathematicians and philoſophers to determine the figure of the earth, and thence to deduce ſtandard meaſures. But it may be proper firſt to premiſe, in addition to our account of experiments on the pendulum by the Engliſh and French aſtronomers, what thoſe of Spain have recently done in different parts of the globe, in purſuit of the ſame important object.

About the year 1789, the Spaniſh government ſent out an expedition of two frigates, the Deſcubierta and the Atrevida, under the command of Alexander Malaſpina, in order to make experiments with the pendulum in different parts of the world, and particularly with a view to aſcertain if the ſouthern hemiſphere differed from the northern, as was ſuppoſed, and indeed warranted, by the few meaſurements antecedently made on the ſouth ſide of the equator by La Caille and Bouguer.

The new experiments were made with a deal rod pendulum, and other neceſſary apparatus, under the direction and management of M. Ciſcar, who appears to have been well qualified for the undertaking. The particulars of his important labours are detailed by M. Mathieu, in the "Connoiſſance des Tems" of the preſent year (1816), who ſtates that M. Ciſcar made ſixteen experiments, from N. lat. $59\frac{1}{2}°$ to S. lat. $51\frac{1}{2}°$, and in very different longitudes; and compared them with the theory which Laplace eſtabliſhed in his "Mecanique Celeſte," on fifteen meaſurements of the pendulum, which led, by one method of calculation to make the earth's ellipticity $\frac{1}{321}$, and by another $\frac{1}{336}$. The reſults deduced from M. Ciſcar's experiments do not determine which is correct, but they tend to ſhew that the two hemiſpheres are nearly alike, as may be ſeen by the following table of ellipticities.

As to the lengths of the pendulum, they do not differ materially from thoſe already computed, making allowance for its being lengthened, in order to make the ſame number of vibrations in a vacuum as it did in the air. The calculations given of theſe alterations, according to the variable ſtate of the atmoſphere, are very curious, and well worthy the attention of philoſophers engaged in experiments on the pendulum.

Length of a Degree of the Meridian in different Latitudes.

Countries.	Mean Latitude.		Length of Degree.	Meaſurers.	Dates.
	°	′	Eng. Miles.		
Peru	0	0	68.751	Juan	1744
Peru	0	0	68.732	Bouguer	1744
Peru	0	0	68.713	Condamine	1744
India	12	32 N.	68.743	Lambton	1803
Cape of Good Hope	33	18 S.	69.076	La Caille	1752
America	39	12 N.	68.895	Maſon and Dixon	1768
Italy	43	00	68.998	Boſcovich	1755
Italy	44	44	69.061	Beccaria	1764
France	44	52	68.769	Biot and Arago	1808
France	45	00	69.092	La Caille	1740
France	46	12	69.052	Delambre and Maupertuis	1793
Germany	47	40	69.142	Leiſganig	1766
France	49	20	68.763	Fernel	1525
France	49	22	68.945	Picard	1669
France	49	22	69.119	Caſſini	1718
France	49	22	69.121	Caſſini	1740
France	49	23	69.114	Academicians	1744
England	51	30	69.146	Mudge	1802
England	52	2	69.133	Mudge	1802
Holland	52	4	66.91	Snell	1620
Lapland	66	20	69.403	Maupertuis	1737
Lapland	66	20	69.292	Swanberg	1803

Length of a Pendulum vibrating Seconds in different Latitudes.

Names of Places.	Mean Latitude.		Length of Pendulum.	Names of Obſervers.
	°	′	Eng. Inches.	
Equator	0	0	38.989	Bouguer.
Porto Bello	9	34 N.	38.997	Bouguer.
Pondicherry	11	55	39.005	Le Gentil.
Madras	13	04	39.026	Sir J. Warren.
Jamaica	18	00	39.019	Campbell.
St. Domingo	18	27	39.017	Bouguer.
Cape of Good Hope	33	25 S.	39.083	Bouguer.
Cape of Good Hope	33	25 S.	39.070	La Caille.
Toulouſe	43	36 N.	39.099	Darquier.
Geneva	46	12	39.092	Mallet.
Vienna	48	12	39.113	Leiſganig.
Paris	48	50	39.119	Bouguer.
Paris	48	50	39.123	Mairan.
Paris	48	50	39.134	Borda.
Gotha	50	57	39.121	Zach.
London	51	32	39.121	Emerſon.
London	51	32	39.128	Deſaguliers.
London	51	32	39.119	Whitehurſt.
London	51	32	39.136	Dr. Rotheram, in a cycloid.
London	51	32	39.126	Graham.
London	51	32	39.200	Sir Jonas Moore.
Leyden	52	09	39.140	Luloffs.
Arenſburg	58	14	39.147	Greſchow.
Peterſburgh	59	56	39.163	Mallet.
Pillau	66	48	39.181	Maupertuis.
Lapland	66	48	39.172	Academicians.
Lapland	67	04	39.181	Mallet.

TABLE of the Ellipticities of the Earth, found by different Modes of Meaſurement and Calculation.

Authors.	Ellipticities.	Principles.
Huygens -	$\frac{1}{579}$	Theory of gravity.
Newton -	$\frac{1}{230}$	
Maupertuis, &c.	$\frac{1}{314}$ $\frac{1}{129}$ $\frac{1}{213}$	Menſuration of arcs.
Swanberg	$\frac{1}{323}$	
Clairaut -	$\frac{1}{111.5}$ $\frac{1}{337}$	Rotatory motion. Vibration of pendulum.
Treiſnecker -	$\frac{1}{329}$	Occultation of ſtars.
Laplace -	$\frac{1}{320}$ $\frac{1}{305}$ $\frac{1}{336}$ $\frac{1}{321}$	Preceſſion and nutation. Theory of the moon Pendulum from fifteen experiments. From the ſame, by a different calculation.
Delambre -	$\frac{1}{305.5}$	Compariſon of meridians meaſured in different places.
Ciſcar -	$\frac{1}{3[illegible]5}$ $\frac{1}{311.[illegible]}$ $\frac{1}{31[illegible]}$	Pendulum in N. lat. Pendulum in S. lat.

We have purſued this article to conſiderable length, as well on account of its general importance, as its peculiar intereſt at the preſent time, when plans are ſet on foot for eſtabliſhing new ſtandards, and improving the Britiſh ſyſtem of weights and meaſures.

From the foregoing view of the ſubject it appears, that, however profound and accurate the labours of the learned have been in ſearch of invariable ſtandards from nature, weights and meaſures have hitherto derived but little practical advantage from their reſearches, except indeed what has been effected in France; and the utility of the alterations there is queſtionable, when balanced againſt the great inconvenience that has been experienced, and which is likely long to continue.

The chief uſe of ſtandards from nature is to reſtore eſtabliſhed meaſures, ſhould they be ever loſt; a ſuppoſition highly improbable, and of which there are few examples. In ſhort, ſtandards from nature can be only known by compariſon with a ſcale of eſtabliſhed arbitrary meaſures. The reſearches of the learned, however, ſhould be encouraged, as they may likewiſe lead to other uſeful and important diſcoveries in arts and ſciences.

The plan of aſſimilating the ſtandards of different nations has been at all times a favourite ſubject with philoſophers and ſtateſmen. Such was the benevolent but Utopian wiſh of Budeus, an eminent author of the twelfth century, who thus expreſſes himſelf in his work, entitled "De Re Nummaria."

> "Una fides, pondus, menſura, moneta ſit una,
> Et ſtatus illæſus totius orbis erit."

> "One faith, one weight, one meaſure, and one coin,
> Would ſoon the jarring world in friendſhip join."

"Experience, indeed, ſhews (ſays a late writer on Metrology), that plans for aſſimilating the ſtandards of different countries, are as impracticable and viſionary as propoſals for eſtabliſhing an univerſal language. Hiſtory likewiſe ſhews, that while governments change with great facility their money ſyſtems, their conſtitution, and even their religion, weights and meaſures ſeem immoveable. They are indeed ſo mixed, and, as it were, matted with every concern of property, that they cannot be eſſentially altered without violence and confuſion; nor are thoſe evils of a temporary nature. The habits, cuſtoms, and prejudices of the multitude are not to be ſpeedily changed. It was computed in France, that in three generations their metrical ſyſtem would be fully eſtabliſhed; but now it ſeems to require more. In England, the conſtant vigilance of the legiſlature for 500 years has been employed in correcting abuſes rather than in improving the ſyſtem. In ſhort it appears, that nothing has a greater tendency to grow worſe, or more obſtinately reſiſts improvement, than weights and meaſures."

Standard of Bullion and Coins.—The ſtandard for bullion is a certain proportion fixed by law between the weight of pure gold or ſilver in any quantity, and the weight of alloy, which proportion is called the *fineneſs*. Thus, the ſtandard fineneſs of gold coins in England is 22 carats, or $\frac{22}{24} = \frac{11}{12}$; and the ſtandard fineneſs of ſilver coins is 11 oz. 2 dwt., or $\frac{37}{40}$. See our articles ASSAY, BULLION, and COIN.

Wrought gold, however, has two legal ſtandards; the one 22 carats, as above, and the other 18 carats; the latter began in 1798, and is chiefly uſed for watch-caſes and rings.

Wrought ſilver has likewiſe two legal ſtandards; the one 11 oz. 2 dwt., as above, and the other 8 dwt. better; that is, 11 oz. 10 dwt. The latter, which is called new ſterling, is of ancient ſtanding, but ſeldom uſed.

Standard of Coins.—Beſides the legal fineneſs for coins, there is alſo a ſtandard weight fixed by law. Thus in England, a pound troy of ſtandard gold is coined into 44½ guineas, and of ſtandard ſilver into 62*s*. A law, however, has been recently enacted (June 1816), by which the ſtandard weight of ſilver is altered, but the fineneſs both of this metal and of gold remains unchanged.

The new ſtandard Weight of Engliſh ſilver coin is, that one pound troy of ſtandard fineneſs ſhall be coined into 66*s*. Thus the weight of the new ſhilling is to be 3 dwt. $13\frac{3}{11}$gr. and the other new ſilver coins in proportion.

No alteration is to take place in the gold coins; but gold pounds are to be coined in proportion to the guinea. Each will therefore be $\frac{20}{21}$ of a guinea, and muſt weigh 5 dwt. $3\frac{171}{623}$ gr. of ſtandard gold, and 113 gr. of pure gold, without any allowance for remedy. But according to the regulation which allows a guinea of 5 dwt. 8 gr. to be a legal tender, the gold pound weighing 5 dwt. $1\frac{39}{21}$ gr. will be alſo legal.

By the new law of 1816, gold is declared to be the ſtandard of value, or the meaſure of property, by which the par of exchange, and the value of ſilver and all other commodities, ſhould be eſtimated.

It has been long a queſtion of doubt, whether gold or ſilver ſhould be the ſtandard of value. Locke and other authorities ſtate it to be ſilver; but lord Liverpool, in his "Letter to the King on the Coins of the Realm," obſerves, that "coins, which are the principal meaſures of property, ſhould be compoſed of one metal only, and that this ſhould be gold."

By a law of 1799, the queſtion was ſettled with reſpect to large payments, as it was then declared that ſilver ſhould not be a legal tender for any ſum above 25*l.*; but by the law of 1816, gold is the only legal tender that can be made for any ſum exceeding 42 ſhillings.

Standarding Bullion and Coins.—The precious metals in England, whether in bullion or foreign coins, are generally bought and ſold at ſo much *per* ounce ſtandard, which is calculated from the aſſay-maſter's report of weight and fineneſs.

The following are the characters generally uſed in thoſe reports.

j	is	1	dwt. or oz.
ij	—	2	ditto.
𝒬	—	5	ditto.
ℭ	—	10	ditto.
ℭ𝒬	—	15	ditto.
ℭ𝒬iij	—	18	ditto.
ℭ/ℭ	—	19	ditto.
ob.	(obolus)	½	ditto.

Rules for ſtandarding Bullion and Coins.—The common method of finding the value of ſmall quantities of gold and ſilver is by allowing, from the aſſay-maſter's report, at the rate of 4*s. per* carat, B. or W., in every ounce weight of gold; and at the rate of 6*d. per* ounce, B. or W., in every ounce weight of ſilver. But when ſilver is more than 10 dwt. worſe, an allowance of 2*d. per* ounce muſt be made for refining.

The following are the ſcales of allowance.

Scale for Gold.	*Scale for Silver.*
1 car. (4*s.*	1 oz. (6*d.*
1 gr. (1*s.*	15 dwt. (4½*d.*
½ gr. (6*d.*	10 dwt. (3*d.*
¼ gr. (3*d.*	5 dwt. (1½*d.*
	2½ dwt. (¾*d.*

Thus, to find the value of 2 oz. of gold B. 1 car. 1 gr. at 4*l. per* oz. To 8*l.* (for 2 oz.) add 10*s.* for better, which gives the value 8*l.* 10*s.* And to find the value of 12 oz. of ſilver, W. 10 dwt. at 5*s.* 6*d. per* oz. From 3*l.* 6*s.* (for 12 oz.) ſubtract 3*s.* for worſe, which gives the value 3*l.* 3*s.*

Rules for ſtandarding Gold.—As 22 carats are to the aſſay or report of fineneſs, ſo is the groſs weight to the quantity that is to be added or ſubtracted from this groſs weight, according as the report is *better* or *worſe.* If better, the additional quantity is called (by the trade) *betterneſs,* and if worſe, the ſubtractional quantity is called *worſeneſs.*

Example.—How much ſtandard gold is there in an ingot of the following report, B. 1 car. 3½ gr. weight, 67 oz. 15 dwt. 8 gr.?

```
                   oz. dwt. gr.
As 22  :  1 3½  ::  67  15  8
    4     4              20
   ——    ——         ————
   88     7           1355
    4     4             24
  ———    ——        —————                  gr.      oz. dwt. gr.
  352    30        32528 × 30 ÷ 352 = 2772  =   5  15  12

              oz.  dwt.  gr.
         To   67   15     8  groſs weight
        Add    5   15    12  betterneſs.
              ——————————————
              73   10    20  ſtandard.
              ——————————————
```

The following method for ſtandarding gold may be generally uſed with advantage.

```
                oz. dwt. gr.
                67  15   8  groſs weight, B. or W. 1 car. 3½ gr.
2 gr  =  ½      33  17  16
1     =  ½      16  18  20
½     =  ½       8   9  10
             ——————————————
             2)127   1   6 ⎫
             ——————————————⎬ divided by 22.
            11)63   10  15 ⎭
             ——————————————
                 5  15  12  betterneſs or worſeneſs, as above.
               ————————————
```

Rules for ſtandarding Silver.—As 11 oz. 2 dwt. are to the aſſay, ſo is the groſs weight to the quantity that is to be added or ſubtracted.

Example.—In 287 oz. of ſilver, W. 12½ dwt., how much ſtandard?

```
As 11   2 : 12½  ::  287
    20                20
   ———               ————
   222               2840
                        12½
                   ——————— dwt. gr.    oz. dwt. gr.
             222)71750(323   4   =  16   3   4

                   oz. dwt. gr.
      From         287   0   0  groſs weight
      Subtract      16   3   4  worſeneſs.
                   ————————————
                   270  16  20  ſtandard.
                   ————————————
```

From the laſt example, the reaſon of the following rule for ſtandarding ſilver is obvious, *viz.*

Multiply half the weight in ounces by the aſſay in pennyweights, and divide the product by 111, the quotient will be the betterneſs or worſeneſs in ounces.

Example.—How much ſtandard ſilver in 160 ounces of B. 18½ dwt.?

```
Half weight 80
            18½
         ——————
   111)1480(13 oz. 6 dwt. 16 gr.
       111
       ———                 oz. dwt. gr.
        370        To      160  0   0  groſs
        333        Add      13  6  16  betterneſs.
        ———                ——————————
         37                173  6  16  ſtandard.
          20 &c.           ——————————
         ——
```

It ſhould be obſerved, that there are tables conſtructed, and ſometimes uſed, for ſtandarding gold and ſilver, as may be ſeen in Poſtlethwayt's Dictionary of Commerce, vol. i. p. 388—398. But from the ſimplicity and conciſeneſs of the foregoing examples, it is manifeſt that ſuch tables cannot much ſhorten the operation, though they may ſerve to check or prove the calculation. Univerſal Cambiſt, vol. ii. p. 193.

Standard, in *Botany* and *Vegetable Phyſiology*, *Vexillum*, is the ſolitary ſuperior petal of papilionaceous flowers, generally of a larger ſize, and more conſpicuous colour, than the other petals. See Papilionaceous.

Standard, in *War*, a ſort of banner or flags borne as a ſignal for joining together of the ſeveral troops belonging to the ſame body. See FLAG, &c

The ſtandards were originally large flags, fixed on the tops of towers or other elevated places; and from their being ſtationary, were called ſtandards: though this term was afterwards given to moveable enſigns, as at preſent to thoſe borne by the cavalry.

Du-Cange derives the word from *ſtandarum* or *ſtantarum*, *ſtandardum* or *ſtandale*, words uſed, in the corrupt Latin, to ſignify the principal flag of an army. Menage derives it from the German, *ſtander*, or the Engliſh, *ſtand*.

The ſtandard is uſually a piece of ſilk, a foot and a half ſquare, on which are embroidered the arms, device, or cypher of the prince, or of the colonel. It is fixed on a lance, eight or nine feet long, and is carried in the centre of the firſt rank of a ſquadron of horſe by the cornet.

The ſtandard is uſed for any martial enſign of horſe; but more particularly for that of the general; or the royal ſtandard. Thoſe borne by the foot are rather called colours.

The ancient kings of France bore St. Martin's hood for their ſtandard. The Turks preſerve a green ſtandard, borne by Mahomet, with a great deal of devotion, as believing it to have been brought down by the angel Gabriel. Every time it is diſplayed, all who profeſs the Mahometan faith are obliged to take arms; thoſe who refuſe are to be deemed as infidels.

STANDARD-*Guard*. See GUARD.

STANDARDS, for the *Roman*, ſee SIGNA.

STANDARD, *Royal*, in *Sea Language*, is a flag in which the imperial enſigns of Great Britain, and the arms of France and Ireland, together with the armorial bearings of Hanover, are united and quartered. This is never hoiſted unleſs when the ſovereign is aboard, and then it is diſplayed at the main-top-maſt-head.

STANDARDS, in *Ship-Building*, large knees of oak or iron, fayed on the deck and againſt the ſide. The arm upon the deck ſtands upon a ſole, and is bolted through the beams, and clenched underneath; and the other arm through the ſhip's ſide. There is alſo a ſtandard fayed on the gun-deck, againſt the apron forward, and another againſt the tranſoms abaft; alſo one againſt each riding-bitt, and one in head upon the knee, when the piece againſt the ſtem does not run high enough for the hole of the main-ſtay collar. Standards are alſo large poles, ſet up endways, about ten feet aſunder, round the edges of ſlips, to which the ſpars are hung to ſupport the ſtaging. They have cleats nailed up their foremoſt and after ſides, at about two feet diſtance.

STANDARD *Trees*, in *Planting*, are all ſuch as ſtand ſingly, with an upright ſtem, without being trained to any wall or other ſupport. In *Gardening*, they are moſtly diſtinguiſhed into three ſorts; as *full ſtandards*, *half ſtandards*, and *dwarf ſtandards*, from their being occaſionally trained in all theſe ways; but foreſt and tall ornamental trees rarely in any other than full ſtandards; though in the ſhrub tribe they are occaſionally formed into both half and dwarf ſtandards, according to their natural growths.

Full ſtandards are ſuch trees as are trained with tall, ſtraight, clean ſtems, ſix or ſeven feet high, or more, then ſuffered to branch out at that height all around, to form a head, as in common ſtandard apple and pear-trees, ſome foreſt-trees, &c. Theſe ſhould be trained accordingly in their minor growth, by trimming off all the lower lateral branches gradually, as the ſtem advances in height; ſuffering the leader always to remain entire, eſpecially in all foreſt-trees; or, if it ſhould happen to fork, taking off the worſt, and leaving the ſtraighteſt ſhoot to run up, to continue the prolongation of the ſtem to the height above-mentioned. In fruit-trees, the ſtem is often cut or topped at the height of ſix or ſeven feet, to force out a ſet of laterals in that part, ſo as to form a regular ſpreading head of a moderate height, for the greater convenience of gathering the fruit; but for all kinds of foreſt-tree ſtandards, the tops ſhould never be reduced, but the leaders be permitted to remain entire to run up in height; as the beauty and worth of ſuch trees conſiſt in their lofty growth.

Moſt ſorts of fruit-trees may be trained for full ſtandards, except vines; though ſome of them will not ripen their fruit effectually in this way, as peaches, nectarines, and figs: but, on the other hand, all ſorts of apples, pears, plums, and cherries, ripen their fruit freely on ſtandards of this kind.

And all ſorts of fruit-trees for this purpoſe are moſtly raiſed by grafting, &c. on the freeſt ſtrong-ſhooting ſtocks, and trained with ſtraight clean ſtems full five or ſix feet high, as above, either the ſtock trained up to that height, and then grafted or budded, the graft or bud branching out forming the head; or the ſtock grafted near the ground, and the firſt ſhoot from the graft or bud trained up for a ſtem to the proper height, then ſuffered to ſend forth branches: in either method, it is next to be conſidered whether it be intended the tree ſhall form a ſpreading open head, or aſſume a more erect and aſpiring growth: in the former caſe, if the leading ſhoot of the graft or bud be topped at ſix or ſeven feet from the ground, it will force out lateral ſhoots at that height, and commence a ſpreading head, open in the middle, ſuffering, however, the whole afterwards to take their own growth; and in the latter, by permitting the leading ſhoot to remain entire, it will aſpire in height, and the whole head will aſſume a more upright and lofty growth: in both methods the heads will afterwards naturally branch out abundantly, and furniſh themſelves ſufficiently with bearing wood, producing fruit, in ſome ſorts, in two or three years from the grafting and budding, as in cherries, apples, &c. but pears are ſometimes four, five, or ſix years before they bear. See GRAFTING.

It is expedient to train moſt of the principal hardy fruit-trees as full ſtandards, that, when planted in continued rows, either in gardens or orchards, by having tall ſtems, they may admit the influence of the ſun and air more freely to the heads, and permit the obtaining crops of eſculent plants, graſs, &c. from the ground under them, over which their ſpreading branches extend.

In reſpect to the management of full ſtandard fruit-trees, little is required, after the firſt training, to form the ſtem to the proper height, and the firſt ſhoots are advanced at top, to give the head its firſt formation; being allowed to advance nearly in their natural order, except reducing any very irregular growths, permitting the whole to ſhoot in length, and branch laterally in their own way; by which they naturally form fruit-ſpurs along their ſides upwards for bearing. The irregular branches muſt, however, be removed, and the heads kept properly thinned, as well as the ſuckers rubbed off from the ſtems or other parts, and the dead wood be wholly taken away. See PRUNING.

Standard fruit-trees with high ſtems are ſometimes planted againſt walls, and trained as wall-trees: this is practiſed for high walls, ſo as immediately to cover the upper parts of them, whilſt dwarfs and half ſtandards cover the bottom and middle parts, and thus every part of the wall is fully occupied at once: but in theſe caſes the dwarf-trees are to remain, the others being wholly deſtroyed after a time. See Wall-*Trees*.

Theſe ſorts of high ſtandards are likewiſe occaſionally placed againſt the ends of buildings; ſome choice ſorts of pears in particular: alſo apricots in a ſoutherly aſpect, and other fruit-trees of the ſame kind.

Half ſtandards are trained with ſtems only three or four feet high, and then ſuffered to branch out to form heads. It is a method of training practiſed for many ſorts of fruit-trees, both as detached ſtandards for variety, and the convenience of gathering the fruit, and with fanned ſpreading heads, as wall-trees for high walls, in order to cover certain parts of them.

The method of raiſing theſe is nearly the ſame as for full ſtandards, only they are grafted or budded upon lower ſtocks, training them with upright ſingle ſtems only three or four feet high, by the ſtocks on which they are grafted being trained up to that height for a ſtem; or by being grafted or budded low in the ſtock, and the firſt main ſhoot of the graft, &c. led up for a ſtem, and topped at that height to force out branches to form the head; ſuffering the heads, in thoſe deſigned as detached ſtandards, to branch out all around, and run up to a full ſpread, nearly according to their natural mode of growth, except juſt reforming any ill-growing branch, as ſhortening the branches ſhould be ſparingly practiſed, as it would force out numerous uſeleſs ſhoots, and prevent the formation of bearing wood, eſpecially in the apple, pear, plum, and cherry kinds.

But when half ſtandards are intended for walls, they ſhould have the head trained in a ſomewhat fanned manner, to ſpread to the wall like a common wall-tree. And when it is neceſſary to have them to form heads of as moderate growth as poſſible, eſpecially in the detached half ſtandards for ſmall compartments, they ſhould be grafted or budded upon the more dwarfiſh ſort of ſtocks, as apples upon codlins, and pears upon quinces, &c.; in which caſe the heads will always ſhoot moderately, and never ramble wide or grow high. See Stocks.

But though a few of this ſort of trees may be eligible as detached half ſtandards for variety, they are not proper for the open quarters of the garden; as the branches coming out low may impede the growth of under-crops. A few might, however, be thinly ranged and planted along the ſides or boundary parts of large wide compartments, particularly of thoſe ſorts that are wrought on dwarf-ſtocks, which commonly branch more moderately, and in a leſs ſpreading manner: as a good portion of the common codlin-kind, which naturally ſhoot moderately, and are good bearers; the heads in which being, for the moſt part, ſuffered to run in their natural way of growth, except juſt a little occaſional regulation and pruning of their branches, as ſuggeſted for full ſtandards. For walls, however, that are eight or nine feet high, they are proper to plant between the dwarfs or principal reſidents, to cover the middle, or upper half of the wall, whilſt the dwarfs occupy the lower ſpace. See Wall-*Trees*.

Half-ſtandard cherries, apricots. &c. are alſo proper to plant in forcing-frames, to produce early fruit. See Forcing-*Frames*.

The after-management of detached trees of this ſort, in reſpect to pruning, is nearly the ſame as that of the full ſtandards; as, after having ſhot out at top to form the head, they ſhould be permitted to branch both in length and laterally nearly in their own way, except juſt pruning to order any conſiderable irregularity, crowding branches in the middle, or long ramblers, and detaching all ſuckers from the root, ſtem, and head, and cutting out caſual dead wood; and thus the regular branches remaining, at length will emit fruit-ſpurs abundantly in every part for bearing. And the half ſtandards againſt walls are to be pruned and managed as other wall-trees, each according to its nature and habits of growth.

Foreſt-trees, and the taller ſorts of the ornamental tree kinds, are ſeldom or ever trained as half ſtandards, but moſtly ſuffered to run up in height to their full growths, unleſs ſome particular ſort may be required to have the form of a buſhy half ſtandard for ſome ſpecial uſe or purpoſe.

Several plants of the ſhrub kind, in their natural growth, aſſume ſomething of the appearance of half ſtandards, though, in moſt inſtances, they are branchy to the bottom, or riſe with different ſtems; but they might be moſtly trained with a ſingle clear ſtem to the height of three or four feet, and be then ſuffered to branch out into full heads, like half ſtandards.

Dwarf Standards.—Theſe are trained with low ſtems, only one or two feet high, and then topped, to force out branches to form the head. There are ſeveral ſorts of choice fruit-trees which are trained as dwarf ſtandards, with ſtems not more than one foot high, branching out at that height, forming proportionably low heads; they being occaſionally planted round the borders of the kitchen or pleaſure-garden, &c. inſtead of eſpaliers, and the heads either kept down low by cloſe pruning, or ſuffered to branch upward nearly in their natural growth. Theſe are raiſed by grafting, &c. upon the moſt dwarfiſh ſtocks, ſuch as apples on codlin or paradiſe-ſtocks, and pears on quinces, &c. in order to dwarf them as much as poſſible in their growth; and as they ſhoot in height, each year's ſhoots either pruned ſhort, to keep the head down, and confine it within a ſmall compaſs; or the branches permitted to ſhoot in length, except juſt reducing caſual ramblers and diſorderly growers. But by too ſevere pruning, too many uſeleſs ſhoots are forced out annually, and a ſufficiency of bearing wood ſeldom produced, ſo that it rarely anſwers well, while by ſlight pruning, the trees moſtly ſhoot more moderately, and ſooner form themſelves into plentiful bearers in better perfection. Theſe kinds of dwarf ſtandards are not ſo generally introduced now, ſince eſpalier fruit-trees have been brought to a proper degree of perfection in training and bearing. They might, however, be ſparingly admitted, where neceſſary, in their different ſorts, under proper moderate pruning, according to their nature.

Some have dwarf ſtandard fruit-trees in pots, for the purpoſe of forcing in hot-houſes, forcing-frames, hot-beds, &c. particularly early May and May-duke cherries, plums, peaches, nectarines, apricots, figs, vines, gooſeberries, currants, &c. which being placed as above, in January, or early in February, often ripen a few fruit very early in tolerable perfection, ſome of which might be brought to table growing on the trees in the pots. Dwarf ſtandard fruit-trees are alſo proper to plant out fully in the borders, in forcing-frames and houſes. See Forcing-*Frame* and Dwarf-*Trees*.

Alſo the different varieties of currants and gooſeberries may be trained with a ſingle ſtem a foot or more high, and then permitted to branch out into a regular head, keeping the internal part always tolerably open, and the branches moderately thin; and ſhortening them but ſparingly, particularly the gooſeberry, by which dwarf ſhrubby plants are formed, and which become very productive.

There are different ſhrubby plants of the evergreen and flowering upright one-ſtemmed kinds, too, which may be trained as dwarf ſtandards, though the greateſt number of plants of the ſhrubby ſort are the moſt ornamental when they riſe in a buſhy manner, with many ſtems from the bottom. Theſe plants, when neceſſary, are to be trained with one ſtem, which is readily accompliſhed by retrenching and removing the ſuperfluous parts, and trimming away all low ſtraggling branches, ſo as to form a clear ſingle ſtem for a ſmall ſpace at the bottom parts, as the nature of their growth may require, then ſuffering them to branch out into full heads.

Some of the low ſhrubs of the above ſorts are ſuppoſed by ſome to appear to the beſt advantage when trained in this manner.

General Culture.—In regard to the management of ſtandard trees of the fruit kind, when they are planted out in an irregular manner throughout the whole garden ground, which is never, or very rarely, an eligible practice, little is to be done in the way of ſuiting them to the nature and cultivation of the ground or ſoil, as they muſt neceſſarily give way in theſe reſpects to the ſorts of crops which are to be raiſed upon the different quarters or parts of the ground. Mr. Loudon has, however, ſuggeſted, that the beſt way of employing ſtandard fruit-trees and ſhrubs in gardens, or all which are unfaſtened, is either in rows, in the manner in which gooſeberry plants or buſhes are uſually ſet along the ſides of the beds or borders, in particular quarters of the ground by themſelves; or in orchard-grounds. Standard trees of theſe kinds, for the borders in kitchen-gardens, ſhould always, it is ſaid, be kept low, in order that they may ſhade the crops on the different ſides as little as poſſible. But it is thought to be perhaps the beſt way to have ſeparate diſtinct quarters or parts for ſtandards of theſe kinds; to have thoſe of the apple and pear ſorts grafted on paradiſe or quince-ſtocks, by which means they come ſooner into a fruiting ſtate; and by the time thoſe in the orchards or on the walls are in a full bearing condition, ſuch quarters are fit to be thrown out: and, if neceſſary, other quarters might be planted to ſucceed them. In this manner, when a new garden was wanted to be made, a tolerable ſupply of fruit might be had every year after the third; it being well known, it is ſaid, that apple-trees raiſed on paradiſe-ſtocks, and pears on quince-ſtocks, will frequently bear the ſecond year after grafting, and very generally the third: and as thoſe to be planted in the quarters would be three or four years old before they were removed from the nurſery, they would commence bearing immediately.

Standard apple-trees for orchards ſhould generally be of the tall or high kind, and always grafted upon crab-ſtocks. See ORCHARD and STOCKS.

In ſtandard ſmall fruit-ſhrubs, as the different currant kinds, a great deal depends upon their being properly cut in, as they ſhould be permitted only to produce from ſtuds or ſpurs, and from theſe, after the ſhrubby buſhes are four years old, the young wood being wholly cut away during winter. This method is, however, only neceſſary and applicable to ſtandard currant-ſhrubs, where large fruit is wanted; as when currant-trees are grown againſt walls, and the deſign is to preſerve fruit upon the trees from the period of the currant ſeaſon until the middle of winter, as is the practice in ſome caſes, the mode is to have the fruit rather ſmaller, and the tree larger, and ſo much covered with fruit as to allow of but few ſhoots. Theſe purpoſes are excellently accompliſhed in this way in many places.

Standard foreſt-trees of all ſorts, and deciduous and evergreen ſtandard ſhrubs, ſhould moſtly, when for ornament, be planted out ſingly, or among clumps or groups of low plants, ſo as to produce the beſt and moſt ſuitable effects, according to the nature of the ſituation or place, and the kind of tree or ſhrub which is employed for the purpoſe.

STANDARD *Timber-Trees*, all ſuch deciduous and other trees as are raiſed in woods and other places, trained and left for the purpoſe of forming timber. See TIMBER.

STANDENHEIM, in *Geography*, a town of France, in the department of the Rhine and Moſelle; 9 miles W.S.W. of Creutznach.

STANDIA, called alſo *Dia*, an iſland of the Mediterranean ſea, ſituated three leagues N.E. by E. of Candia. It is about four miles long by two broad; its circumference is irregular; in its ſouth parts are three natural harbours, where ſhips of burden, bound to Candia, caſt anchor and unload a part of their cargo, becauſe the harbour of that town is not deep enough to receive them when they are fully laden. On their departure they alſo go and wait at Dia till boats bring them commodities for completing their lading. The middle harbour, called "Porto della Madona," is the beſt of the three; a veſſel may caſt anchor there in from ſix or eight fathoms water up to a conſiderable depth. On doubling the E. point a fourth harbour occurs, by no means ſafe, rather ſhallow and open to the E. wind, but ſheltered from the S.W. and N.W. Here a merchant veſſel, caught in a gale of wind, might take refuge. This iſland is lofty, rugged, and entirely calcareous. The rock is naked, except towards the ſummit, where the ſoil ſeems to be fit for the culture of the vine and the olive-tree. In various places a whitiſh marble is found; and here are alſo veins, ſeveral feet thick, of ſtreaked alabaſter, which is thought to be of the greateſt beauty. Rabbits are numerous in this iſland; and it has ſome wild goats, in places that are inacceſſible, and alſo ſeveral cats of different colours, that probably belonged to veſſels which have been caſt away. N. lat. 35° 26′. E. long. 25° 9′. Olivier.

STANDIA, a town of European Turkey, in Macedonia, in a ſmall bay of the gulf of Saloniki; 13 miles N. of Lariſſa.—Alſo, a town of Aſiatic Turkey, in Natolia, on the W. coaſt. N. lat. 36° 54′. E. long. 27° 18′.

STANDING, in *Navigation*, denotes the movement by which a ſhip advances towards a certain object, or departs from it: as the enemy ſtands in ſhore, the Engliſh fleet are ſtanding-off, &c.

STANDING, in *Ship-Building*, a term applied to a bevelling that is obtuſe-angled, or without a ſquare.

STANDING *Army*. See ARMY.

STANDING *Coins*. See COINS.

STANDING *of Colours*, is uſed by painters for their durableneſs, in oppoſition to *flying*.

STANDING *Fold*, in *Agriculture*, a term applied to that ſort of fold, made for containing and protecting ſheep, which is of the fixed and immoveable kind, in contradiſtinction to thoſe which are of a moveable nature on land of the arable or graſs kind. See FOLDING *of Sheep*, and SHEEP-*Fold*.

In Suſſex, the ſtanding fold of the late general Murray is ſtated to have been well contrived and formed. It compriſed an incloſed area of fifty-ſeven yards in length, and twenty in breadth, containing one thouſand one hundred and forty ſquare yards: more than ſeven hundred ewes were uſually folded in it during the night, and for that number, it afforded a ſpace of more than a yard and a half for each ſheep. It had all around it a ſhed, nine or ten feet wide, and likewiſe acroſs the middle part, which latter was open on both ſides. There was alſo a rack for hay put up againſt the wall, which was boarded, and ſurrounded the whole of the fold: and another, which was double, to be eaten out of on both ſides, was placed and ſtood all along the central ſhed; under which was a ſmall trough or manger, in which the fine ſorts of food given to the ſheep were put. This was, of courſe, a moſt complete and perfect ſtanding fold for managing and protecting theſe animals, the plan of which may probably in ſome meaſure be imitated by other ſheep-farmers with conſiderable utility and benefit.

STANDING *Marriage*, in the *Law* of Scotland, is uſed to expreſs one actually ſubſiſting, though perhaps reducible for adultery, or liable to be declared void for impotency, or contingency of blood; that is, conſanguinity. Bayne's Crim. Law.

STANDING *Part of the Sheat*, in a *Ship*, that part of it which is made faſt to a ring at the ſhip's quarter. When they ſay, *over-hale the ſheat*, they mean, *hale upon the ſtanding part;* but when they ſay *hale the ſheat* barely, they intend only of the running part.

STANDING *Part of a Tackle*, is the end of the rope where the block is ſeized or faſtened; as the other which is haled is called *fall*.

STANDING *Rigging*, are thoſe ropes which do not run in any block, but are ſet taught, or let ſlack occaſionally, as the ſhrouds, ſtays, back-ſtays, &c.

STANDING *Ropes*. See *Standing* ROPES.

STANDISH, in *Geography*, a poſt-town of America, in the diſtrict of Maine, on the W. line of Cumberland county, between Preſumſcut and Saco rivers; incorporated in 1785, and containing 1378 inhabitants; 18 miles N.W. of Portland.

STANDON, STANTON, or *Stanelow*, is a ſmall market-town and pariſh in the hundred of Braughin, county of Hertford, England, at the diſtance of one mile S.E. from Puckeridge, and 26 N.N.E. from London. It is mentioned by Ingulphus as having been granted to Croyland abbey in the early part of the ninth century; and as the place where abbot Brithmere, about the year 1030, built a ſpacious houſe for the accommodation of himſelf and his retinue, during his journies to London. In this pariſh alſo was a preceptory of knights hoſpitallers, built on lands given with the church to that order by Gilbert de Clare, in the reign of king Stephen: the houſe was deſigned for the reſidence of ſome of the ſiſters of that order, till they were all placed together at Buckland, in Somerſetſhire. The ſcite, and ſome remains of the preceptory, are now connected with a farm-houſe called Friars. The manor, rectory, and advowſon of the vicarage, as parcel of the poſſeſſions of St. John of Jeruſalem, were granted 36 Henry VIII. to ſir Ralph Sadler. A hermitage was founded at Standon by William, an Anchorite, temp. Henry I.; which Richard de Clare, earl of Hertford, gave to the monks of Stoke by Clare, in Suffolk, who are ſaid to have had a cell here, which in after-times appears to have become a free ſecular chapel, and to have been the ſame with the chapel at Salburn in this pariſh. Standon church contains many monuments and ſepulchral memorials. In the eaſtern part of the chancel are the tombs of ſir Ralph Sadler and family: on ſir Ralph's is his effigy in armour lying beneath a canopy, with his children kneeling below. He died in 1587, aged 80. The pariſh of Standon, according to the population return in 1811, contained 1889 inhabitants; the number of houſes being 254. A fair is held annually, and a market weekly, on Fridays.

On Haven-End, an eminence in Standon lordſhip, are two large barrows, ſuppoſed by Salmon to have been raiſed by the Danes. In the neighbouring pariſh of Widford are two other barrows, which give name to the eſtate on which they are raiſed. Beauties of England and Wales, vol. vii. Hertfordſhire, by E. W. Brayley.

STANDS, in *Rural Economy*, a word applied to ſuch young timber-trees as are under ſix inches timber girth, or twenty-four inches in circumference. Theſe are moſtly reſerved in cutting over young timber and other woods.

STANERN, or STANAROW, in *Geography*, a town of Moravia, in the circle of Iglau; 10 miles S. of Iglau.

STANES. See STAINES.

STANESBY, THOMAS, in *Biography*, father and ſon, two ingenious and eminent flute-makers in London during the early part of the laſt century. The flute à bec, or common flute, was ſo much in faſhion during the life-time of the eldeſt Staneſby, who died about the year 1734, that no ſingle ſong was printed without being tranſpoſed into C, or F♮, for the flute, at the bottom of the page. The younger Staneſby, who died in 1754, lived long enough to ſee the common flute totally thrown aſide, in favour of the German flute, a concert inſtrument, an honour which never had been conferred on the common flute, except now and then in the accompaniments of a ſong, ſuch as, "Huſh ye little warbling choir," on the octave flute, and perhaps two or three more may be found in Handel's works.

Staneſby, however, conformed to the taſte of the times, and furniſhed practicians on the flute traverſiere, or German flute, with inſtruments, for which the ſcholars of Weidiman and Ballicourt, the two firſt public players on the German flute in our capital, frequently and loudly called.

Poor Staneſby did not enrich himſelf like Theodorus, a flute-maker at Athens, father of the orator Iſocrates, who acquired wealth ſufficient by his employment, not only to educate his children in a liberal manner, but alſo to bear one of the heavieſt public burdens to which an Athenian citizen was liable, that of furniſhing a choir or chorus for his tribe, or ward, at feſtivals and religious ceremonies.

The ſecond Staneſby was buried in the church-yard of St. Pancras, near London, and on his grave-ſtone there is a very honourable record of the virtues of his private character; a circumſtance which biographers ſhould never neglect to mention, as monumental praiſe is ſeldom laviſhed on perſons of low ſtation: "Why ſhould the poor be flattered?"

STANFALIA, in *Geography*. See STAMPALIA.

STANFORD, or STAMFORD, is an ancient market and borough-town, ſituated at the ſouth-weſtern angle of the county of Lincoln, England, on the banks of the river Welland. One pariſh of the town is in the county of Northampton; but the chief portion of it is built on the ſide of a hill in Lincolnſhire, and when approached from the ſouth, preſents an intereſting and picturеſque appearance. Several old buildings, with towers and ſteeples, are ſeen grouped together. The name of the town is ſuppoſed to be derived from the Saxon *Staen*, and *ford*. According to ſome antiquaries, Stanford was a place of note in the time of Bladud, a Britiſh king, many centuries before the Chriſtian era. The earlieſt authority upon which we can depend, is that of Henry of Huntingdon, a writer of the twelfth century; who relates, that the ancient enemies of England, the Picts and Scots, having ravaged the country as far as Stanford to the ſouth, were there met and defeated by the Saxons under the command of Hengiſt; and that king Vortigern, for ſuch valour, gave to the Saxon leader certain portions of land in the county of Lincoln. Wulphere, king of Mercia, who finiſhed the monaſtery of Medes-hamſted, now Peterborough, in a charter of lands to that abbey in the year 664, aſſigned Stanford as one of its boundaries; and as it roſe progreſſively in importance, ſo in the year 972, in another charter to the ſame houſe by Edgar, it appears to have been more conſiderable than Peterborough. At that period it was a market-town, and is noticed by Leland as afterwards becoming a royal borough: under the Daniſh monarchy it appears ſtill to have maintained the rank which it originally claimed. That it was encircled by walls, and ſecured by gates at an early period, is evident from the Saxon annals terming it Byꞃıᵹh; Florence of Worceſter, Arx; and by Speed's plan, where each is named and delineated. A caſtle was probably erected here by the Danes, as the above-mentioned hiſtorian, Henry of Huntingdon, notices their loſs of it in the year 942 to Edmund Ironſide, and remarks, that it had then been a conſiderable time in their poſſeſſion. Leland, who, on the other hand, adheres to Matthew of Weſtminſter, ſtates that it was rebuilt by Elfreda, ſiſter of Edward the Elder, on the northern bank of the Welland, A.D. 914. Again being poſſeſſed by the Danes, they held it till the deceaſe of their laſt Anglo monarch, A.D. 1041, when the Britons once more became its owners, till William the Norman overcoming the kingdom, in 1066, it devolved to the new monarch and his retainers. The Domeſday ſurvey informs us, that it contained one hundred and forty-one manſions, and twelve lagemen, or civil magiſtrates, who received the forfeitures ariſing from crimes, and held their powers within certain limits. The caſtle, in the time of king Stephen, was beſieged by Henry of Anjou, afterwards the ſecond monarch of that name, who upon taking it beſtowed that and the town, with certain feudal reſervations, on one of his followers, called Richard Humetz, to hold from the crown by homage, tenure, and other ſervices. King John paſſed them to William, earl of Warren, in a ſimilar manner: at his death they were granted by John, who was alſo earl, to Edward I., and paſſed by him again to that nobleman, to revert on his deceaſe once more to the crown. Thus, after many grants and reverſions through forfeiture or failure of male iſſue, it was given by queen Elizabeth to William Cecil, firſt lord Burleigh. Through the marriage of his coheireſs and granddaughter, Anne, with William, earl of Exeter, it paſſed to Henry Grey, firſt lord Stamford, and after continuing in that family ſeveral deſcents, was ſold again to the houſe of Cecil. In Richard III.'s time the caſtle was entirely demoliſhed; and the hill, which was artificially formed by horizontal layers of earth, with the ſlight fragments of a ſtone wall, are all the veſtiges that are now viſible.

In William the Conqueror's reign, Stanford was governed by the lagemen, or aldermen. Edward IV. gave it a privilege it ſtill retains, of ſending two members to parliament, and a charter was granted in the firſt year of that king's reign, when its civic officers were incorporated under the names of the "aldermen and comburgeſſes of the firſt and ſecond bench." Other charters conferred different privileges in ſucceeding reigns, till Charles II. recalling the royal charters throughout the kingdom, gave a new one to Stanford, which was afterwards confirmed by James II. Again incorporated by that deed, it was made to conſiſt of a mayor, thirteen aldermen, and twenty-four capital burgeſſes, by the name of the "mayor, aldermen, and capital burgeſſes, of the town or borough of Stamford."

For parochial and municipal purpoſes, Stanford appears to have been divided, at a remote period, into fourteen wards, or pariſhes; but in 1461, ſome of the churches and houſes were conſumed by fire, by the northern ſoldiers; and the religious edifices were not afterwards re-erected. In 1547, an act of parliament was obtained to divide the northern part of the town into five pariſhes, St. Martin's, or Stanford-Baron, being a diſtinct pariſh. According to the population report of 1811, the borough contained 832 houſes, and 4582 inhabitants; and the pariſh of St. Martin's 163 houſes, and 937 inhabitants.

St. Michael's church, which ſtands near the centre of the town, is ſuppoſed to be the moſt ancient erection, part of it having exiſted antecedent to the year 1230. It has a nave and choir, with north and ſouth aiſles, and chancels which extend beyond the aiſles. The eaſtern end of the choir, which had much decayed, was, about 1705, taken down and rebuilt by the pariſhioners: in the wall were diſcovered various ſculptured ſtones, the remains of ſome more ancient religious building. At the weſtern end of the nave was a wooden tower, which was taken down and replaced by another of ſtone in 1761. The windows of this building were decorated with figures and heraldic ornaments, but it is much to be regretted that they are in a lamentable ſtate of mutilation.

The church of St. Mary appears to have been built towards the latter end of the thirteenth century, and poſſibly upon the ſcite of one much earlier. The upper part of the chancel contains a monument without armorial enſigns, device, or inſcription, but ſimply conſiſting of a ſtatue in armour, lying by the ſide of a female figure. This was erected to the memory of ſir David Phillips, who bravely diſtinguiſhed himſelf in the battle of Boſworth Field.

St. George's church, a large plain building, conſiſting of a chancel, nave, north and ſouth aiſles, with a ſquare embattled tower at the weſt end, was rebuilt, in 1450, by William Bruges, the firſt garter king of arms, who bequeathed many valuable preſents to this building. The remains of David Cecil, high ſheriff of Northamptonſhire in 1542, grandfather of the firſt lord Burleigh, are here entombed.

All-Saints church is a ſtructure well proportioned, and of large dimenſions: it conſiſts of a nave, two aiſles, and chancels; one at the end of the ſouth aiſle, and the other at the eaſt end of the nave. At the weſt end of the north aiſle riſes the ſteeple, a lofty, handſome ſtructure, embattled, with octagonal turrets at the corners, and ſurmounted by a ſpire of a ſimilar form, crocketted at the angles from the baſe to the ſummit. This church was built at the expence of a Mr. John Brown, merchant of the Staple at Calais, who, with his wife, are buried at the upper end of the north aiſle. In the ſame church, where the altar formerly ſtood, are the effigies of William Browne and his wife, who built and endowed the bead-houſe in this town. Againſt the eaſt window, a white marble monument preſerves the memory of Mr. Thomas Trueſdale, who lived in the ſame dwelling with Mr. Brown, and emulated his example, by founding another alms-houſe.

The church of St. John the Baptiſt was rebuilt about 1452, the thirtieth year of the unfortunate Henry VI. It has a nave, and two aiſles, with a chancel at the eaſt end of the firſt, and ſeparated from it by elegant ſcreen-work. The roof has been highly decorated with figures carved both in wood and ſtone; and the windows contained ſome admirable ſpecimens of ſtained glaſs.

Stanford formerly contained ſeveral monaſtic eſtabliſhments; and it is traditionally related that it was, at one time, the ſeat of an univerſity. Hardinge, in his Poetical Chronicles, and in "The Mirror of Magiſtrates," relates the latter circumſtance; but this is not authenticated by better hiſtorians. The only circumſtances which appear to ſupport the idea of an univerſity are, that in the year 1109, Joffrid, abbot of Croyland, deputed three monks from his monaſtery for that purpoſe. Camden remarks, that a violent diſpute aroſe between the northern and ſouthern ſcholars at Oxford, in 1333, when many of the maſters and ſtudents retired to Stanford. Several of theſe, however, ſoon returned to Oxford; and ſome time afterwards, Edward III. iſſued a writ to the ſheriff of Lincolnſhire, commanding him to proclaim at Stanford a prohibition for any perſon to ſtudy or perform ſcholaſtic exerciſes, elſewhere than in the univerſities, on pain of certain forfeitures.

In the reign of Henry III. the Carmelites had a monaſtery here, and gave public lectures on divinity and the liberal arts, with diſputations againſt the Judaic faith. Many of the clergy and higher orders of the people ſent their ſons here for education; and from this poſſibly aroſe a cuſtom, which in ſucceeding centuries was greatly followed. Other religious houſes alſo became ſchools of literature; and by theſe means Stanford became celebrated for liberal inſtruction. The other public inſtitutions of learning, which were ſuppoſed to conſtitute part of the above-mentioned univerſity, were the following: — Brazen-noſe college or ſchool, from which the college at Oxford is ſuppoſed to have derived its name, was built at a remote period, and certainly exiſted early in the reign of Edward III. In 1668 it was taken down, and a charity-ſchool erected on the ſame ſpot:—Sempringham-hall, ſuppoſed to have been founded by Robert Luttrell, in 1262:—Black-hall was of great antiquity, and was taken down ſoon after 1705.

Of Peterborough-hall, Vaudey-hall, the free-ſchool, and other buildings of the ſame nature, but ſlight information can now be gained, excepting that the former was taken down about 1705, and ſtood near All-Saints church; and that the latter was founded in the year 1548, by Mr. William Radcliffe.

The ſchools at preſent ſupported at this place are, the one laſt mentioned, now called Radcliffe's; another inſtituted by Edward Wells, in 1604, denominated Wells's or the petty ſchool; and the blue-coat ſchool.

The ancient and modern inſtitutions for the ſupport of the poor are many in number: the moſt prominent, is one founded by William Browne in the reign of Richard III., already mentioned, which has a chapel at the eaſtern end, conſecrated in 1494; the revenues of which have, of late years, greatly increaſed. Another was erected by the will of Mr. Thomas Trueſdale, in 1700, with endowments bequeathed to it for ever. And, in addition to theſe, are certain charities denominated calliſes; with various other foundations of the like nature.

The principal public building is the town-hall, where the civil buſineſs is tranſacted. It was built by truſtees, under an act paſſed in 1776, near St. Mary's church, when the old hall was taken down. It conſiſts of two handſome fronts, containing twenty apartments, a guard-room, houſe of correction, and a gaol. A ſmall theatre, in St. Mary's ſtreet, was built here in 1768.

The river Welland, which runs to the ſouth of the town, and parts it from Stanford-Baron, is navigable for boats and barges from the ſea to this place. Stanford has a market on Monday and Friday, and ſeven annual fairs.

Stanford-Baron, already named, is ſeparated from the town only by a ſtone bridge, yet it is both a diſtinct pariſh and liberty in the county of Northampton: hence its original name of Stanford beyond the bridge. In 1455 it was held by the abbot of Peterborough, *per baroniam*, and was then firſt denominated Stanford-Baron. In the reign of Athelſtan it had the privilege of a mint, and ſucceeding kings alſo greatly favoured it. Although it cannot now be diſcovered that this pariſh was ever walled, yet it appears to have been defended by five gates and a caſtle, which ſtood on that part of the Roman road now called the nun's farm. This place is deſignated in the Domeſday-book as being the ſixth ward belonging to Stanford, ſituate in Hantuneſcire. In the reign of Henry II. it contained a Benedictine nunnery, dedicated to God and St. Michael, by William, abbot of Peterborough: the annual revenues of this houſe were 72*l*. 18*s*. 10½*d*.

By a deed of the reign of Richard I. notice is taken of an hoſpital for lepers, under the patronage of St. Egidius; and a houſe for knights hoſpitallers: but their founders are now wholly unknown. Where the alms-houſe is now erected, an hoſpital formerly ſtood, dedicated to St. John the Baptiſt. The preſent church is a large, handſome building, dedicated to St. Martin, and founded by biſhop Ruſſell in the reign of Edward IV. It conſiſts of a nave, two chancels, north and ſouth aiſles, and a ſquare pinnacled tower at the weſt end of the former. At the upper end of the north chancel are depoſited the remains of Richard Cecil and his wife, the immediate progenitors of the firſt lord Burleigh; as alſo thoſe of William Cecil, baron of Burleigh, with his effigy in armour on a highly ornamented altar-tomb. In the north chancel is a ſtately and large marble monument, with ſtatues, &c. to the memory of John, earl of Exeter, and his lady, both of whom died in the year 1709.

According to Camden, the cuſtom of borough Engliſh prevails in this manor; by which the younger ſon inherits the lands and tenements poſſeſſed by the parent, when the latter dies inteſtate. Another more ſingular cuſtom, characteriſtic of feudal and ſemi-barbarous times, is ſtill continued at Stanford. On a certain day, annually, about ſix weeks before Chriſtmas, a bull is provided, and deſtined to be hunted by dogs and the loweſt claſs of perſons through the ſtreets of the town. On ſuch occaſions a vaſt concourſe of people is aſſembled, many dogs are brought to the place, and the moſt cruel and wanton acts are reſorted to, in order to irritate the poor animal, and thereby produce what is mis-termed ſport. The bull-running, as it is called, commences early in the morning, after a proclamation is made to guard doors and windows, and warn travellers who are paſſing through the town. The animal is let looſe in the ſtreets, when dogs, men, women, and even children, commence a boiſterous and irritating purſuit. This is ſometimes continued for hours, till the bull is provoked to madneſs. At length he is killed, and the fleſh ſold. It is traditionally related, that this cuſtom originated in the reign of king John, by the order of William, the fifth earl of Warren, who, having obſerved a bull worried through the town by dogs, was ſo much diverted, that he gave a meadow to the butchers of Stanford, on condition that they would provide a bull annually for the ſame purpoſe. A cuſtom ſomewhat reſembling this prevails at Tutbury, in Staffordſhire. See TUTBURY.

About one mile ſouth-eaſt of Stanford is Burleigh or Burghley-houſe, the magnificent ſeat of the Cecil family, and now the property of the marquis of Exeter. The park was incloſed and houſe chiefly built by lord-treaſurer Burleigh, who, in a letter dated 1585, ſays, the "houſe is of my mother's inheritance; and for the building there, I have ſet my walls on the old foundations." On different parts of the edifice are the dates of 1577, 1585, and 1587, pointing out the times when ſuch portions of the houſe were raiſed; but many additions and alterations have been made at ſubſequent periods. The whole preſents a palace-like appearance, and may be ſaid to conſiſt of a maſs of building ſurrounding a ſquare court 110 by 70 feet. In various rooms is preſerved a large collection of pictures by different old maſters, with ſome few paintings by modern artiſts.

The park is of great extent, of varied ſurface, is adorned with much fine timber, a large piece of water near the ſouth front of the houſe; and at the weſtern extremity, adjoining the great North road, is a ſtately lodge of entrance, which was erected in 1801, from the deſigns of Mr. Legg, architect. An intereſting account of this ſeat, with a particular catalogue of the pictures, was publiſhed at Stanford, in 1815, entitled "A Guide to Burghley-Houſe," &c.—Survey of the Town of Stanford, by Butcher, 8vo. 1717. An Eſſay on the ancient and preſent State of Stanford, by Howgrave, 4to. 1720. Antiquarian Annals of Stanford, by Peck, folio, 1727. The Antiquities of Stanford and St. Martin's, by W. Harrod, 2 vols. 12mo. 1785. An Account of the public Schools, Hoſpitals, and other charitable Foundations, in the Borough of Stanford, by Thomas Blore, 8vo. 1813. This is a very intereſting and uſeful work, as calculated to preſerve and give publicity to thoſe benevolent inſtitutions, which were originally intended to afford ſupport to the aged poor, and inſtruction to the lower claſſes of youth.

Stanford, a poſt-townſhip of Ducheſs county, New York, about 18 miles N.E. of Poughkeepſie; incorporated in 1793, and containing 2335 inhabitants. This townſhip is well watered and cultivated; has many able farmers, ſeveral mills, three houſes for worſhip, *viz.* for Quakers, Baptiſts, and Methodiſts. In 1810, its houſehold looms produced 12,680 yards of cloth. Its ſheep were 5564, horſes 811, and cattle 2898.—Alſo, the capital of Lincoln county, Kentucky; ſituated on a fertile plain, about 10 miles S.S.E. of Danville, containing a ſtone court-houſe, a gaol, and about 40 houſes.

STANG, a river of Sweden, which runs into lake Roxan, near Linkioping.—Alſo, a town of Norway; 24 miles N. of Berga.

Stang, in *Rural Economy*, a word provincially ſignifying a long pole, or other piece of wood in the ſame form. Stangs are uſeful for a variety of different purpoſes in the practice of farming.

Stang-*Cart*, in *Agriculture*, that ſort of ſtang which conſtitutes the ſhafts of a cart, or the poles between which the horſe draws. See Cart.

STANGENBERG, in *Geography*, a town of Pruſſia, in Pomerelia; 15 miles S.E. of Marienburg.

STANGENGRUN, a town of Saxony, in the circle of Erzgebirg; 9 miles S.W. of Zwickau.

STANGENROD, a town of Weſtphalia, in the county of Mansfeld; 13 miles N.N.W. of Eiſzleben.

STANGSKAR, a ſmall iſland in the gulf of Finland. N. lat. 59° 45′. E. long. 26° 15′.

STANGWYK, a town of Norway, in the province of Drontheim; 80 miles S.W. of Drontheim.

STANHOPE, George, in *Biography*, an eminent divine of the church of England, was born at Hartſhorn, in Derbyſhire, in 1660. He was educated at Eton, and King's college, Cambridge; and after taking his degrees, and bearing ſome offices in the univerſity, he was preſented by lord Dartmouth, in whoſe family he had been chaplain and tutor, to the rectory of Lewiſham, in Kent. He was appointed one of the chaplains to king William and queen Mary, and retained the ſame office in the following reign. In 1697 he proceeded doctor in divinity, and being at the ſame time diſtinguiſhed for his pulpit eloquence, he was choſen, in 1701, to preach Boyle's lecture; and in 1703 he was promoted to the deanery of Canterbury. He ſometimes preached the lecture at St. Laurence Jewry, in which he attained to great eminence, though he followed many perſons of much celebrity. In 1705 he preached the Latin ſermon before the convocation, of which body he was thrice choſen prolocutor. He died in 1728, at the age of 68. Of the publications of this learned divine, ſome were tranſlations: theſe were "Thomas à Kempis de Imitatione Chriſti;" "Charron de la Sageſſe;" "The Meditations of Marcus Antoninus;" "Epictetus, with the Commentary of Simplicius;" "Rochefoucault's Maxims;" "St. Auguſtine's Meditations." His moſt conſiderable original work was "A Paraphraſe on the Epiſtles and Goſpels," 4 vols. 8vo. ſeveral times reprinted. He alſo publiſhed three ſets of "Sermons on ſeveral Occaſions;" beſides "Sixteen Sermons preached at Boyle's Lectures."

Stanhope, Philip Dormer, earl of Cheſterfield, a nobleman celebrated as a great wit, ſtateſman, and a man of letters, was the eldeſt ſon of Philip, third earl of Cheſterfield, by lady Elizabeth Saville, daughter of George, marquis of Halifax. He was born in London, in September, 1694. He had the misfortune to loſe his mother while he was very young, and being neglected by his father, he was educated under the care of his grandmother, lady Halifax, who proved herſelf quite adequate to the taſk. His elementary inſtructions were received at home from able maſters, who had the advantage of finding in their pupil admirable qualities, and an ardent deſire of excelling in whatever he undertook, and a reſolution to perſevere in the tract in which he entered, without any regard to the obſtacles that might oppoſe themſelves to his progreſs. It is ſaid that lord Galway, diſcerning in him, when very young, a ſtrong inclination for political diſtinction, and at the ſame time a great love of pleaſure, with a propenſity to ſauntering, gave him a friendly leſſon on the abſolute neceſſity of riſing early, in order that he might become a man of buſineſs. The admonition produced ſuch an effect on his mind, that he immediately adopted the practice recommended, and adhered to it during the whole of his life. He was afterwards, by a trifling incident, permanently cured of an impatience of temper, which he was ſenſible would diſqualify him for the character and duties of a ſtateſman. In his 18th year he was entered of Trinity-hall, Cambridge, where he applied himſelf with great aſſiduity to the ſtudies purſued in that ſeat of learning. He was particularly attentive to eloquence, which he was aware was a principal requiſite in a free ſenate; and with the view of becoming a good and a forcible ſpeaker, he marked down all the fineſt ſpeeches of the ancients that came in his way, in the courſe of his reading, and formed his own ſtyle and manner by tranſlating them; a practice which cannot be too warmly recommended to young men likely to come into public life. On quitting the univerſity, this young nobleman made the uſual tour of Europe; and it was at the Hague that he firſt began the cultivation of that enlarged acquaintance with mankind, which has been denominated ſeeing and knowing the world; but with this knowledge he acquired certain pernicious propenſities, which adhered to him through life: among others was that of gaming. A viſit of ſome length to Paris further contributed to faſhion his manners, and to render him at length that model of true politeneſs, which he exhibited in after-life to his admiring countrymen. This was about the time of the demiſe of queen Anne, and he did himſelf high honour by the aſſertion of thoſe principles of freedom which effected the ſucceſſion of the houſe of Hanover, and which, during the whole of his political life, he ſteadily maintained. On his return to England in 1715, he was preſented to the new ſovereign, and appointed one of the gentlemen of the bed-chamber to the prince of Wales. He was elected member of parliament for one of the Corniſh boroughs, in the firſt parliament of George I., and commenced a ſpeaker in the debate reſpecting the impeachment of the perſons concerned in the peace of Utrecht. Upon this occaſion he manifeſted a juvenile violence, which produced an intimation from the oppoſite ſide, that advantage would be taken of his being under the lawful age for ſitting in parliament. Upon this hint he immediately quitted the houſe, and ſet off for Paris. On his return, he was ſometimes the defender and ſometimes the opponent of miniſterial meaſures; but his talents, at this time, do not appear to have made much impreſſion on the houſe or the country. In reward, however, for his ſupport of a motion for the augmentation of the army, he was, in 1723, made captain of the yeomen of the guards; and it was a proof of his diſintereſtedneſs, that when adviſed by his predeceſſor, lord Townſend, to make the poſt more profitable than he had done, by the ſale of ſubordinate places, he replied, "I rather wiſh, in this inſtance, to follow your lordſhip's example than your advice." He was diſmiſſed from this office in 1725; and in the following year, on the death of his father, with whom he had never been on terms of cordiality, he entered the houſe of lords, and joined the oppoſition. To this aſſembly his talents were better adapted than to the houſe of commons. His eloquence, the fruits of much ſtudy, was leſs characterized by force and compaſs than by elegance and perſpicuity, and eſpecially by good taſte, and a vein of delicate irony, which, while it ſometimes inflicted ſevere ſtrokes, never paſſed the limits of decency and propriety. "It was that of a man, who, in the union of wit and good ſenſe with politeneſs, had not a competitor." Theſe qualities were matured by the advantage of a familiar acquaintance with almoſt all the eminent wits and writers of his time; many of whom had been the ornaments of the preceding age of literature, while others were deſtined to become thoſe of a later period. He knew how to appreciate genius and talents, and was the friend of Pope, and received him in almoſt all his ſelect parties at Twickenham, where he met the firſt nobility in aſſociation with the moſt diſtinguiſhed votaries of the muſes.

Soon after the acceſſion of George II. lord Cheſterfield was nominated ambaſſador at the Hague. Scarcely was any man ever better adapted than his lordſhip to fill a diplomatic ſituation, as well on account of his natural acuteneſs, and of his conciliating manners, as his familiarity with the modes and uſages of general ſociety. He was, however, at this time but little acquainted with public buſineſs; but poſſeſſing the laudable ambition of rendering himſelf fully maſter of whatever he undertook, he ſpared no pains to acquire the knowledge for the poſt in which he was placed, and which at that time was a very important one; the Hague being, in fact, the centre of the principal political negociations carrying on throughout Europe. In the year 1730 he was appointed high ſteward of the houſehold, and he was, at the ſame time, decorated with the order of the garter. He now returned to Holland, and was inſtrumental in forming an important treaty between the courts of London and Vienna, and the States-general. In 1732 he obtained his recall; and on his return, he ſupported the plans of the prime miniſter, though there does not appear to have been any cordiality between them; and when ſir Robert Walpole introduced his famous exciſe meaſure, the earl ſpoke againſt him with all his force, and thereby gave ſo much offence that he was deprived of his offices, and he again joined the party in oppoſition. He married, in 1733, the counteſs of Walſingham, niece or probably daughter to the ducheſs of Kendal, who had been miſtreſs to George I. She was a lady of great merit and accompliſhments, and by her prudence contributed very much to retrieve the deranged affairs of her lord. The noble earl did not neglect to pay his court to the prince of Wales, who attached himſelf to the oppoſers of his father's government. Of his oratorical exertions, none was more generally admired than his ſpeech againſt the bill for granting to the lord chamberlain the power of licenſing dramatic performances. In 1741, his health being much impaired, he was adviſed to make the tour of the continent. In his way to the Spa, he ſaw, at Bruſſels, Voltaire, with whom he had contracted a friendſhip in England. At Spa his reputation, and the urbanity of his manners, drew upon him much flattering notice from perſons of diſtinction; and the manner in which he ſpoke of the riſing Frederick of Pruſſia to the envoy of that monarch, procured for him a preſſing invitation to the court of Berlin, which he would gladly have accepted, had he not been prevented by other engagements. A ſhort ſtay at Paris introduced him to the moſt diſtinguiſhed of both ſexes for rank and talents in that capital, where he was equally gratified and admired.

His ſtay in the ſouth of France was ſhortened by the ſtate of political affairs at home. The attempts of France to ruin the houſe of Auſtria were threatening deſtruction to what was denominated the balance of power in Europe; and the miſcarriages of the Engliſh miniſters in their political meaſures ſpread diſcontent through the nation. This at length produced the fall of that ſtateſman, who had ſo long ruled the public councils; and a new adminiſtration was formed, in which lord Cheſterfield had no place. This omiſſion was probably owing, in great part, to the perſonal diſlike of the king, who could not forget the ſevere things he had ſaid with reſpect to the royal partiality to the intereſts of Hanover, and the ſacrifices made of the intereſts of Great Britain to thoſe of the electorate. He took an active and moſt decided part in oppoſition to the meaſures of the miniſtry, and was ſaid to be particularly happy in his ſpeech againſt the gin-licence bill, and againſt that for continuing attainders upon the poſterity of perſons convicted of high treaſon. This laſt bill was introduced in conſequence of the proſpect of a new rebellion, promoted by France, and which ſoon after took place. This event produced a change in the miniſtry, and lord Cheſterfield was ſent out as ambaſſador to the United Provinces; a ſtation which he had before occupied with much reputation. He effected the purpoſe for which he was ſent, *viz.* that of engaging the Dutch to concur in earneſt in the war againſt France; and returned in 1745, at the time of the breaking out of the rebellion in Scotland. He was immediately nominated to the high ſtation of lord lieutenant of Ireland; an office of great importance at this period, when there was cauſe of apprehenſion from the prevalence of the Roman Catholic religion in that iſland. He ſet off for his government in the end of Auguſt, taking with him a ſecretary, who had not enjoyed any advantage from experience, and to whom he ſaid in a tone of deciſion, "Sir, you will receive the emoluments of your place, but I will do the buſineſs myſelf, being determined to have no firſt miniſter." In a ſimilar ſpirit he openly declared, that if any one, during his ſtay in Ireland, ſhould make a ſucceſsful application for a place in the king's gift through any channel but his own, he would immediately throw up the lieutenancy. With theſe reſolutions he began his adminiſtration; and by vigour on the one hand, and conciliation on the other, by ſtrict integrity, and a frank undiſguiſed ſyſtem of policy, he kept every thing quiet in that kingdom, while the ſiſter iſland was over-run with terror and commotion. Inſtead of abridging the Catholics of their religious liberty, he favoured and augmented it; wiſely judging, that the more openly they ſhewed themſelves in attendance at their own places of worſhip, the leſs their ſecret machinations were to be regarded. He, however, kept a vigilant eye upon all their proceedings, but diſcouraged idle ſuſpicions and malicious informations. A zealous Proteſtant once came, very officiouſly, as the noble lord thought, to inform him that one of his coachmen went privately to maſs. “Does he?” ſaid the lord lieutenant: “I will take care that he never drives me thither.” Such, ſays his biographer, was lord Cheſterfield's conduct in his vice-royalty, that he quitted it with the regret of all parties; and that, to this day, the ſpirit of his adminiſtration is regarded as a model for all who are entruſted with that important ſtation. He returned to England in April, 1746, when the rebellion was terminated by the victory gained at the battle of Culloden.

He now accepted the office of ſecretary of ſtate, with the duke of Newcaſtle as his colleague. Never approving, in his own mind, of the war in which the nation was engaged, and conſtantly wiſhing for peace upon reaſonable terms, he was nevertheleſs carried away, by a ſuperior influence in the cabinet, to concur in the meaſures of the court, till their ill ſucceſs induced him to draw up a ſtrong memorial, which being diſregarded, he reſigned his place in February, 1748, and never afterwards joined in any adminiſtration. From this period till his death he lived as a private nobleman, attached to the arts and to letters, and was looked up to throughout Europe as inferior to none of his high rank for brilliancy of wit, and the poliſh of cultivated ſociety. Being ſeized with a deafneſs in 1752, that incapacitated him, in a meaſure, for the pleaſures of ſociety, he led a retired life, amuſing himſelf with his books and his pen. He engaged rather largely as a volunteer in a periodical work, entitled “The World,” in which his contributions have a diſtinguiſhed degree of excellence. His lordſhip maintained a character for wit and talents that has few equals. He rendered himſelf illuſtrious, as we have ſeen, by his eloquence in parliament, on many important occaſions, of which there is a characteriſtic inſtance of his own relating. He was an active promoter of the bill for altering the ſtyle; on which occaſion, as he himſelf relates in one of his letters to his ſon, he made ſo eloquent a ſpeech in the houſe, that every one was pleaſed, and ſaid he had made the whole very clear to them; “which,” ſays he, “God knows, I never attempted. I could juſt as ſoon have talked Celtic or Sclavonian to them as aſtronomy, and they would have underſtood me juſt as well.” The high character which lord Cheſterfield had ſupported through life received no ſmall injury, ſoon after his death, from a full diſplay of it by his own hand. He left no iſſue by his lady, but had a natural ſon, named Philip Stanhope, whoſe education was, for many years, a cloſe object of his attention; and who was afterwards envoy extraordinary at the court of Dreſden, but who died before his father. After the death of the earl of Cheſterfield, Mr. Stanhope's widow publiſhed a courſe of letters, written by the father to the ſon, filled with inſtructions ſuitable to the different gradations of the young man's life to whom they were particularly addreſſed. Theſe letters have been highly applauded, and as loudly condemned. They contain many admirable obſervations on mankind, and rules of conduct; but the author lays a greater ſtreſs on exterior accompliſhments and addreſs than on intellectual qualifications and ſincerity, and allows a much greater latitude to faſhionable pleaſures than ſound morality will admit. It has been urged in excuſe for the author, that he never intended theſe letters for publication: they contained inſtructions for a particular individual, and they do not pretend to touch upon the more weighty points of morals, theſe being left to the inculcation of a ſelected tutor: nevertheleſs, there is ſome occaſional advice coming under this head, contained in the later letters, when the ſon was already launched upon the world, which have juſtly ſubjected the writer to ſevere animadverſion. Of theſe, ſuch as relate to truth in the commerce of ſociety, under the diſtinctions ſimulation and diſſimulation, have been defended and juſtified by politicians, as abſolutely neceſſary for one who was to be trained to diplomatic habits. But the ſame apology cannot be made for a father's attempts to faſhion his ſon to politeneſs, by recommending connections with married women, which, however lightly regarded in the licentious courts and capitals at which he himſelf had been a viſitor and reſident, muſt ever be conſidered as a moſt ſerious violation, not only of the laws of God, but of private friendſhip, and of the moſt ſacred bond of ſocial life. Theſe obnoxious parts would, in all probability, have been ſuppreſſed, had the author reviſed and publiſhed his own letters. On the other hand, there are, in the courſe of the volumes and the other works of lord Cheſterfield, many examples of his uſeful and efficacious endeavours to ſerve the cauſe of morality. His lordſhip died in March, 1773, in the 79th year of his age. He had for ſome time been extremely infirm, and having outlived moſt of his friends and contemporaries, he was in fact reduced to a ſtate in which he rather patiently endured life than enjoyed it. “It is unneceſſary,” ſays his biographer, “to add any thing to the view already given of his moral character: if it was very far from faultleſs, it certainly exhibited many excellencies, which enabled him to perform important ſervices to his friends and country. In his literary capacity, he poſſeſſed wit, good ſenſe, and a fine taſte, in an uncommon degree. His ſtyle is of the pureſt Engliſh.” Of his works, which, beſides thoſe already referred to, contain papers in ſome of the political journals of the day, ſpeeches, ſtate papers, and letters, French and Engliſh, a Collection, in 2 vols. 4to. with memoirs of his life, by Dr. Maty, was publiſhed in the year 1777, to which the reader is referred for more minute information relating to the character, exertions, and works of the earl of Cheſterfield.

STANHOPE, JAMES, earl, a celebrated Engliſh nobleman, ſtateſman, and general, deſcended from a very ancient family in the county of Nottingham, eldeſt ſon of Alexander Stanhope, only ſon of Philip, the firſt earl of Cheſterfield, was born in the year 1673. He entered at a very early period into the army, and ſerved under king William in the war againſt France, during which, and particularly at the ſiege of Namur, he diſtinguiſhed himſelf ſo much to the king's ſatisfaction, as to receive from his majeſty a company of foot, and ſoon after a commiſſion as colonel of the 33d regiment. In the war which was undertaken for the purpoſe of placing Charles II., ſon of the emperor Leopold, on the throne of Spain, colonel Stanhope, while commanding a regiment of foot, in 1704, at Porta Legra, in Portugal, was ſurrounded by king Philip's army, and he and his whole regiment were made priſoners of war. Being exchanged, he was in the following year promoted to the rank of brigadier-general, and in the next campaign he gained very conſiderable reputation at the ſiege of Barcelona, under the command of lord Peterborough. General Stanhope planned and completed the conqueſt of the iſland of Minorca. Having landed about ten miles from St. Philip's fort, on the 26th of Auguſt, with 3000 men, the general cauſed batteries to be erected, and ordered a number of arrows to be ſhot into the place, in which papers were ſtuck, written in the Spaniſh and French languages, containing threats that the whole garriſon ſhould be ſent to the mines, if they did not immediately ſurrender. The garriſon conſiſted of 1600 men, commanded by colonel La Jonquiere. So artfully had general Stanhope drawn up his men, as to impreſs the minds of the enemy with the idea, that they were beſieged by an army of at leaſt 10,000 ſoldiers. The ſtratagem had the deſired effect. On the third day the garriſon capitulated; and ſo completely mortified was the Spaniſh governor when he learned the real number of the beſiegers, that he threw himſelf out of a window in deſpair, and was killed on the ſpot. La Jonquiere was impriſoned for life, and the other French officers incurred their monarch's diſpleaſure. In 1710, general Stanhope headed the allied troops, killed the Spaniſh commander with his own hand, and placed the victorious banners of England upon the walls of Madrid; but before the end of the year the general experienced a reverſe of fortune, and he, with 2000 choice Britiſh troops, were made priſoners of war at the town of Brihuega. On this account he incurred the cenſure of the houſe of lords. Soon after the arrival of king George I. general Stanhope was appointed one of the principal ſecretaries of ſtate, and a member of the privy council. He was alſo employed in ſeveral highly important negociations. In the year 1717 he was appointed firſt lord of the treaſury, and chancellor of the exchequer; and in a very ſhort time afterwards, he was raiſed to the peerage of Great Britain. On the 13th of December, 1718, earl Stanhope brought into the houſe of peers a bill for the repeal of ſome clauſes in the Corporation and Teſt acts, which, after a violent oppoſition, was carried through both houſes, and received the royal ſanction. This nobleman, diſtinguiſhed in the ſeveral capacities of general, ſtateſman, and ſenator, died in the year 1721, deeply regretted by the king, whoſe favourite miniſter he had been, and greatly reſpected by the nation at large, for whoſe intereſts he had ever manifeſted an unwearied and truly diſintereſted zeal.

Stanhope, Philip, brother of the foregoing, was brought up to the ſea-ſervice, and in 1704 was promoted to the command of the Haſtings frigate, as ſucceſſor to captain Charles Parſons. After this he was appointed captain of the Milford, in which ſhip he was ſerving under ſir Staford Fairborne at the ſiege of Oſtend, and choſen by that commander to bear to England the news of its ſurrender. Not long after he was ſent to the Mediterranean, where he was employed under the command of captain Coney. He continued in the ſame command during the remainder of his life; which, ſays his biographer, exceſſive gallantry, added to a degree of fraternal love almoſt unequalled, rendered, alas! too ſhort. Frequent mention is made of him in hiſtory, and the private journals of officers more particularly connected with him in ſervice and command, as an active, diligent, and intelligent officer. In Auguſt, 1708, being left under the command of captain Hubbard, it was determined at a council of war, held on board the Elizabeth at the requeſt of the king of Spain, that the York and Milford ſhould aſſiſt in conveying the tranſports, which had on board lieutenant-general Stanhope and a ſtrong body of troops, from Catalonia to Minorca. The reduction of this iſland was not only become a very favourite object with the king of Spain, but was regarded as likely to be extremely conducive to the ſucceſs of the allied cauſe. General Stanhope, who commanded the land forces deſtined for this expedition, was, as has been intimated, the elder brother of this gentleman, and the ties of conſanguinity appeared to increaſe the thirſt of glory, and ſtimulated the latter to ſhare with the former in danger, as, though a younger, he appeared a ſcarcely leſs ambitious candidate for fame and military glory. Attending the land-forces as a volunteer at the aſſault of the Spaniſh lines at Fort Mahon, he there fell in the moment of victory, on the 17th of September, 1708. Campbell's Admirals.

Stanhope, Philip, earl, ſon of the foregoing, born the 15th of Auguſt, 1714, ſucceeded to his father's titles when he was only ſeven years old. He was, by the will of his father, confided to the guardianſhip of Philip Dormer, the celebrated earl of Cheſterfield, of whom we have already ſpoken. This nobleman, as we have ſeen, was ſo ſtrongly attached to the ſtudy of the belles-lettres and claſſical purſuits, as to hold very cheap every other ſpecies of learning; and in conformity with this diſpoſition, he abſolutely prohibited his young relation and ward from mathematical ſtudies, for which he manifeſted, while very young, a natural and ſtrong attachment. Notwithſtanding this injunction, the young lord, when advanced to more mature years, applied himſelf to his favourite ſtudy with ſo much avidity, as to become one of the firſt mathematicians of the age. His predilection, however, for the ſciences, properly ſo called, did not prevent him from attaining the moſt profound and extenſive knowledge of the ancient claſſics. At no very advanced period of his life, he was a complete maſter of the Latin and Greek languages, and could, without the ſmalleſt heſitation, repeat the whole of the Iliad, and the Odyſſey of Homer, in the original language. He diligently cultivated an acquaintance with the poets and hiſtorians of antiquity through the whole of his life, ſpending ſeveral hours of each day either in claſſical reading, or in the inveſtigation of theorems in the higher and more ſublime branches of geometry. Earl Stanhope acquired, likewiſe, a complete knowledge of many modern languages, in which he could maintain a converſation with as much fluency, as if they had been his vernacular tongue.

A perſon ſo formed for the purſuits of literature and ſcience in all its various branches, would, it may be eaſily conceived, have no great ambition to be diſtinguiſhed as a politician and ſtateſman. He was, in truth, a man of the moſt undeviating integrity, and his principles could in no inſtance be brought to bend to circumſtances, nor be ſwayed by any motives from the ſtrict line of rectitude. In the year 1742 we find him in his place in the ſenate, when the ſeveral eſtimates of the expence occaſioned by foreign troops in the pay of Great Britain were taken into conſideration. His lordſhip then, at the cloſe of an excellent and pathetic ſpeech, moved for an addreſs to adviſe and beſeech his majeſty, "that, in compaſſion to his people, already loaded with ſuch numerous and heavy taxes, ſuch large and growing debts, and greater annual expences than the nation at any time before had ever ſuſtained, he would exonerate his ſubjects of the charge and burthen of thoſe mercenaries, who were taken into the ſervice laſt year without the advice or conſent of parliament."

Earl Stanhope's name is likewiſe enrolled among thoſe of many other patriotic noblemen in ſeveral proteſts againſt meaſures, which appeared to his mind hoſtile to the conſtitution of his country, and the real intereſts of public liberty. It was either in the earlier attempts made by the miniſters of his preſent majeſty to ſubjugate America, or on the queſtion of the Middleſex election, that this nobleman travelled from Geneva, where he reſided ſeveral years, to give his vote againſt the meaſure, and finding his exertion of no avail, he ſoon after returned to the continent, to enjoy domeſtic privacy among his family and his books. At this period his lordſhip, whoſe dreſs always correſponded to the ſimplicity of his manners, was once rather rudely prevented from going into the houſe of peers by a door-keeper, who was unacquainted with his perſon. Lord

Stanhope perſiſted in endeavouring to get into the houſe, without ſtopping to explain who he was: and the door-keeper, determined alſo on his part, made uſe of theſe words: "*Honeſt man*, you have no buſineſs here:—— *Honeſt man*, you *can* have no buſineſs in this place."

In 1774, earl Stanhope took his leave of Geneva, where he had ſpent about ten years, greatly reſpected and beloved by all the reſpectable people of that city. His lordſhip's extenſive hoſpitality and beneficence are ſtill remembered with affection and gratitude by many of the inhabitants of that ſmall republic. From this period his lordſhip took but a very ſmall ſhare in the public tranſactions of the country. He divided his time between his town reſidence and his ſeat at Chevening, in Kent, devoting himſelf cloſely for ſeveral hours in the day to claſſical and mathematical ſtudies, which had long become his habitual amuſement.

It is to be deeply regretted, that learning ſo profound and talents ſo rare ſhould have been applied almoſt entirely to his own gratification, and that he had not conſecrated part of his time to the publication of the reſult of thoſe reſearches, which engaged his attention for more than half a century. To his lordſhip's munificence, however, the public are indebted for the poſthumous works of Dr. Robert Simſon (ſee his article); which were printed at his own expence, and a copy or copies of which were ſent to every learned ſociety in Europe, and alſo to many of the moſt diſtinguiſhed mathematicians both of his own and foreign countries. It appears, likewiſe, that Dr. Simſon was indebted to this nobleman for the ninety-eighth propoſition of Euclid's data. To him alſo the public are under conſiderable obligations for the moſt complete and magnificent edition of the works of the illuſtrious Archimedes, which was prepared for the preſs by the learned Joſeph Torelli of Verona, and which was printed in 1792, at the Clarendon preſs, Oxford.

From the circumſtance of many valuable works of ſcience being dedicated to earl Stanhope, the ſubject of this article, among which were Dodſon's Logarithms, and the third volume of Dr. Prieſtley's Experiments on Air, and other branches of Natural Philoſophy, we may infer that he was the patron of ſeveral learned men. His lordſhip died the 7th of March, 1786, leaving behind him a ſon, the preſent earl, well known in the political as well as the ſcientific world, and a widow, with whom he had lived forty-one years. This lady, who ſurvived the earl twenty-three years, was Grizel, the daughter of viſcount Binning, ſiſter of the late, and aunt to the preſent earl of Haddington. She was endowed with a fine underſtanding, which ſhe had cultivated and improved by the conſtant peruſal of the beſt authors in the Engliſh and French languages. She died, in the full poſſeſſion of her faculties, at the advanced age of ninety-ſix. It is a remarkable fact, that a year or two previous to her deceaſe, ſhe cut a ſet of new teeth, and had her hair renewed. She devoted much of her long life to acts of benevolence. The writer of this article was honoured with her acquaintance, and he hopes he may add with her friendſhip, during ten years of his life, and he will never ceaſe, while in poſſeſſion of his mental faculties, to reverence her memory, and to hold in high eſtimation her talents and virtues.

STANHOPE, in *Geography*, a market-town and extenſive pariſh in the N.W. diviſion of Darlington ward, in the county palatine of Durham, England, is ſituated on the northern banks of the river Wear, 21 miles W. from Durham, and 264 N.N.W. from London. The privilege of a market was granted by cardinal Langley in the year 1421, and having fallen into diſuſe, was revived by letters patent in 1669, through the influence of Dr. Baſire, the then rector, and is now held on Fridays. Here were two annual fairs, but they are diſcontinued. The church is an ancient, plain ſtructure, ſtanding on a riſing ground to the north of the town. The rectory is worth about 2000*l. per annum.* On the weſt ſide of the town is an eminence, called Caſtle-Hill, which riſes from the Wear to the height of 108 feet. The ſummit is of an oblong figure, thirty paces in width, divided by a ditch: another ditch defends the acclivity to the north and eaſt, where the aſcent is eaſieſt. It is traditionally ſaid to have been a fortreſs of remote origin, demoliſhed during the incurſions of the Scots. The pariſh of Stanhope, beſides the town, includes the diſtricts of Stanhope-Foreſt Quarter, and Stanhope-Park Quarter, as alſo the townſhip of Newlandſide. The whole, according to the population returns of the year 1811, contained 1011 houſes, occupied by 6376 perſons, moſt of whom are employed in the neighbouring lead-mines. Near the town, on the north, is a cavern, extending under ground nearly a mile, and ſaid to abound with ſtalactites.

At a ſhort diſtance weſt of the town is a ſpacious old fabric, called Stanhope Hall, formerly the manor-houſe of the ancient family of Featherſtonehaugh, the laſt of whom was ſlain at the battle of Hockſtet.

Stanhope park, a large tract of elevated land, about twelve miles in circumference, is an appendage to the ſee of Durham, where the biſhop anciently held his great foreſt-hunts, and had his maſter of the foreſt, his bow-bearer, and other ſubordinate officers. Leland mentions this park as being "rudely incloſed with ſtone."

St. John's Weardale is only a chapelry to Stanhope, but has the privilege of a market, eſtabliſhed for the benefit of the workmen employed in the lead-mines. It is ſeated in a narrow part of the vale, on the ſouth of the Wear. Beauties of England and Wales, vol. v. by John Britton, F.S.A. and E. W. Brayley.

STANHOPE *Preſs*. See PRINTING.

STANIHURST, RICHARD, in *Biography*, a divine and hiſtorian, was born at Dublin about the year 1545, of which city his father was recorder. He was educated at the Univerſity college, Oxford, after which he came to London, and ſtudied the law in Furnival's Inn, and then at Lincoln's Inn. Returning to Ireland, he practiſed ſome time at the bar; but having abandoned the Proteſtant for the Roman Catholic religion, he thought it neceſſary to remove to the continent, for the purpoſe of obtaining a freer exerciſe of the duties which he owed to his Maker. After this he entered into orders, and became chaplain at Bruſſels to Albert, archduke of Auſtria. He died in 1618, having obtained a very high reputation for learning. His writings are enumerated as follow: "Harmonia, ſeu Catena dialectica in Porphyrium;" "Deſcriptio Hibernicæ," inſerted in Holingſhed's Chronicle; "De Rebus in Hibernia geſtis. Lib. IV." In this work we are told he took Giraldus Cambrenſis for his guide, and he is ſaid to have adopted freely the erroneous ſtatements of that writer, though in ſome places he has corrected him from other writers. He publiſhed likewiſe "A Life of St. Patrick," and ſeveral Catholic works: of theſe, one was entitled "Brevis Præmonitio pro futura Concertatione cum Jacobo Uſſerio." This was occaſioned by a work of Dr. Uſher, afterwards the celebrated primate of Ireland, who was a nephew of Stanihurſt: our author did not, however, live to finiſh the reply thus announced. Mr. Stanihurſt tried his powers as a poet, by a verſion of the four firſt books of Virgil's Æneid in Engliſh hexameters. It is remarkable for the uncouthneſs of its diction and verſion. It is mentioned by Warton, who acknowledges that Mr. Stanihurſt, with all his fooliſh pedantry, was certainly a ſcholar. He had a ſon, who became a Jeſuit, and wrote various moral and religious works.

STANISLAUS I., Leizinski, king of Poland, born at Leopold in 1677, was ſon of a diſtinguiſhed Poliſh noble, who, after occupying ſeveral important poſts, was raiſed to that of grand treaſurer of the crown. His ſon, the ſubject of this article, diſplayed at a very early period talents and diſpoſitions which announced a character equally amiable and eſtimable. "His countenance," ſays his biographer, "expreſſed courage joined with ſweetneſs, together with that air of openneſs and ſincerity which is more perſuaſive than eloquence itſelf. He was brave, and enured to hardſhip and fatigue. He ſlept on a ſtraw matraſs, required ſcarcely any perſonal ſervices from his domeſtics, was temperate, economical, adored by his vaſſals, and beloved by his friends." When Charles XII. of Sweden entered Poland, for the purpoſe of dethroning Auguſtus, Staniſlaus, then palatine of Pomerania, was deputed to that prince from the confederation of Warſaw. In the conference with the monarch, he appeared to him in ſo favourable a light, that the Swede immediately took the reſolution of raiſing him to the crown of Poland, which was effected at an election held July 12, 1704, when Staniſlaus was in his twenty-ſeventh year. The unexpected entrance of Auguſtus into Warſaw, when the king of Sweden was at a diſtance with his army, obliged Staniſlaus to make a precipitate retreat: but by another change he was brought back, and crowned at Warſaw with his wife, in October 1705, and by a treaty in the following year, Auguſtus was compelled ſolemnly to abdicate the crown of Poland in favour of his rival. Staniſlaus remained poſſeſſor of the kingdom till the fatal defeat of his patron Charles, at Pultowa, in July 1709. Being now unable to maintain himſelf in Poland, he withdrew with the Swedes into Pomerania, and thence croſſed into Sweden, where he paſſed ſome time in retirement, while negociations were carrying on to reſtore the peace of the north. As his abdication of the Poliſh crown ſeemed a neceſſary preliminary, he readily ſignified his own concurrence, and wrote to Charles at Bender to obtain his conſent. Not being able, by letter, to perſuade him, he reſolved to try the effect of a perſonal conference; and accordingly aſſumed a feigned name, and, accompanied by two officers, proceeded for the frontiers of Turkey. On his arrival in Moldavia he was arreſted, and brought before Hoſpodar, who diſcovered his true perſon, and ſent him to Bender, where he was detained as a priſoner, but was extremely well treated. He was ſuffered to depart in 1714, when he went to Deux Ponts, where he was joined by his family. A Saxon officer made an attempt to aſſaſſinate him, but the deſign was diſcovered before it could be put into execution, and he pardoned and diſmiſſed the conſpirators. In 1719 he received intelligence of the death of Charles XII., and feeling himſelf now deprived of his protector, he applied to the court of France, which gave him a retreat in Alſace. Here he lived in a ſtate of great obſcurity, until his daughter, the princeſs Mary, was unexpectedly choſen as queen to Lewis XV. This was in the year 1725, when Staniſlaus removed to the caſtle of Chambord. On the death of Auguſtus in 1733, an attempt was made by the French monarch to replace Staniſlaus on the Poliſh throne, and he repaired to Dantzic, in order to ſupport the party which actually proclaimed him; but his competitor, the ſon of Auguſtus, and elector of Saxony, favoured by Auſtria and Ruſſia, was more ſucceſſful, and Staniſlaus was obliged to quit Dantzic in diſguiſe, and through many dangers eſcaped to Konigſberg. He ſupported this reverſe of fortune with philoſophical reſignation, and at the peace of 1736 he formally abdicated all claim and pretenſions to the kingdom, on condition of retaining the title, and being put into poſſeſſion for life of the duchies of Lorraine and Bar. Thenceforth he lived as the ſovereign of a ſmall country, which he rendered happy by the exerciſe of virtues, that cauſed him to be named by the general voice of his ſubjects, "Staniſlaus the Beneficent." Inſtead of impoſing new and oppreſſive taxes, he relieved his people from the preſſure of many which they had heretofore borne; yet he was able, by a prudent economy, to found many uſeful and charitable eſtabliſhments, and to patronize the arts and ſciences. He was himſelf attached to literature, and wrote various treatiſes on moral, philoſophical, and political topics, which were publiſhed under the title of "Œuvres du Philoſophe Bienfaiſant," 4 vols. 8vo. Theſe volumes were publiſhed in 1765, and the royal author of them died in the following year, univerſally lamented.

Stanislaus-Augustus, Poniatowski, king of Poland, was the ſon of count Poniatowſki, a Lithuanian, who, after being in the ſervice of Charles XII. of Sweden, and of Auguſtus, king of Poland, married the princeſs Czartorinſka, a deſcendant of the great family of the Jagellons. Staniſlaus poſſeſſed a fine perſon, and a graceful demeanour, and was well received in the various parts of Europe which he viſited while he was young. From England he accompanied the ambaſſador to Ruſſia, where he acquired the particular favour of Catharine, then grand ducheſs. When ſhe came to the crown, ſhe exhibited her attachment by reſolving to raiſe him to the throne of Poland on the death of Auguſtus III., and by means of a body of Ruſſian troops, his election was carried in the plain of Vola, on the 7th day of September, 1764, when Staniſlaus was in his thirty-ſecond year. His talents and excellent diſpoſition gave promiſe of a reign happy to himſelf and proſperous to his country; but the overbearing influence by which he had been elected, and the radical vices of the Poliſh conſtitution, acted as perpetual cauſes of tumult and diſſention, and thwarted all the expectations and hopes that had been formed of the government of Staniſlaus. The firſt diſorders in this reign aroſe from religious differences. The non-catholics, compriſed under the general name of Diſſidents, had been conſtantly oppoſed in their claims of equal civil rights by the Romaniſts, and had been obliged to apply for protection to the Proteſtant powers and the court of Ruſſia, who were guarantees of the treaty of Olivia, by which their privileges had been ratified. In 1766, at a diet, the miniſters of theſe powers had preſented memoirs in favour of the Diſſidents, and the king ſeemed inclined to ſupport their cauſe, while the Catholic prelates and nobles violently oppoſed them. The empreſs of Ruſſia interfered effectually by ſending troops into Poland, which advanced to the gates of Warſaw. Confederacies ſtarted up to reſiſt them, and the country was plunged into civil war. The king was quite unable to quell theſe diſorders, being regarded as having been impoſed on the nation by a Ruſſian force, and in 1771 an extraordinary attempt was made on his perſon, of which a very intereſting account is given in the firſt volume of Coxe's Travels into Poland, which is thus concluded: "So extraordinary an eſcape is ſcarcely to be paralleled in hiſtory, and affords ample matter of wonder and ſurpriſe. Scarcely could the nobility or people at Warſaw credit the evidence of their ſenſes, when they ſaw him return. Certainly neither the eſcape of the king of France from Damien, nor of the king of Portugal from the conſpiracy of the duke d'Aveiro, were equally amazing or improbable as that of the king of Poland."

This attempt on the life of his majeſty was planned by a

Poliſh nobleman named Pulaſki, who engaged three other chiefs by a ſolemn oath, either to place the king alive in his hands, or to kill him in caſe of reſiſtance. Theſe perſons, at the head of forty dragoons, entered Warſaw in diſguiſe, attacked and ſeized the king, and after having wounded him in the head with a ſabre, dragged him through the ſtreets, and carried him out of the city. After a while the conſpirators were alarmed at what they had done, and they all, except one, took advantage of the darkneſs of night to make their eſcape, and at day-break the king found himſelf alone with a perſon named Koſiuſki, and both of them on foot. Taking advantage of the perplexity in which he ſaw this man was involved, the king repreſented to him in ſuch colours the atrocity of the attempt, to which he added the promiſes of pardon and even reward, that he entirely gained him over, and they proceeded together to a mill. From thence the king wrote the following letter. "Par une eſpèce de miracle je ſuis ſauvé des mains des aſſaſſins. Je ſuis ici au petit moulin de Mariemont. Venez au plutôt me tirer d'ici. Je ſuis bleſſé, mais pas fort." He was accordingly conducted back to Warſaw, and received amidſt the joyful acclamations of the people.

Staniſlaus, though retaining his crown, was unable to quiet or direct the diſtractions of the country: nor could he make any effectual oppoſition to that truly infamous partition of a large portion of Poland between the plunderers of Ruſſia, Pruſſia, and Auſtria, which took place in 1773, and which may be regarded as the firſt act of thoſe open violations of every principle of national juſtice, which have ſo peculiarly ſtigmatized the times in which we live. The ſame powers enforced alterations in the Poliſh conſtitution, calculated to perpetuate its weakneſs, and which were in vain oppoſed by Staniſlaus and the beſt patriots of the country. In 1789 he had an interview with Catharine, who deluded him with hopes of advantages for the Poles, which, of courſe, were never realized: and in 1792, the armies of Ruſſia and Pruſſia entered Poland, deſtroyed the conſtitution which had been formed by the people, and completed that diviſion of its territories which expunged its name from the map of Europe. In 1795 Staniſlaus was obliged, by order of the empreſs Catharine, to reſign, and abdicate the crown which ſhe had hitherto allowed him to wear, and he retired to Grodno, contented to live a penſioner on her bounty. On the acceſſion of Paul, Staniſlaus was treated with great reſpect. He died at Peterſburg in 1798, beloved and eſteemed for his qualities in private ſociety.

Stanislaus, *Order of St.*, was inſtituted by Staniſlaus, king of Poland, in the year 1765. The badge of the order is a gold croſs, enamelled red; on the centre a medallion; on this the image of St. Staniſlaus, enamelled in proper colours; on the reverſe, the letters SS in a cypher. It is worn ſcarfwiſe, pendent to a broad watered ribband, edged with white. The ſtar of the order is ſilver, in the centre of which is a cypher of three letters, *viz.* S.A.R. ſignifying Staniſlaus Auguſtus Rex; within, the following motto, Præmiando incitat.

STANISLOW, in *Geography*, a town of Auſtrian Poland, in Galicia; 66 miles S.S.E. of Lemberg.

STANITZ, a town of Bohemia, in the circle of Chrudim; 13 miles N. of Chrudim.—Alſo, a town of Moravia, in the circle of Brunn; 18 miles S.E. of Brunn.

STANK, is a dam made with pile-planks, or otherwiſe, to pen water.

STANKAU, in *Geography*, a town of Bohemia, in the circle of Pilſen; 9 miles N.N.E. of Pilſen.

STANLEY, Thomas, in *Biography*, born at Cumberlow-Green, in Hertfordſhire, was the ſon of ſir Thomas Stanley, knight. He received his early education at home, under Edward Fairfax, the tranſlator of Taſſo's Jeruſalem, and was admitted a gentleman-commoner of Pembroke-hall, Cambridge, in 1639. Having taken his degree of M.A. at that univerſity, he went abroad, but returning during the civil war, he took up his reſidence in the Middle Temple. He there purſued his ſtudies with much eagerneſs, and in 1651 publiſhed a volume of original poems, and a number of tranſlations in verſe from the ancient and modern languages. Turning his attention to graver topics, in 1655 he publiſhed the firſt volume of the work by which he is chiefly known, "The Hiſtory of Philoſophy; containing the Lives, Opinions, Actions, and Diſcourſes of the Philoſophers of every Sect." This was followed by three other volumes; they were afterwards republiſhed in one volume folio; and in 1743, a quarto edition was given to the public. After the favourable reception which this work met with, the author publiſhed an edition of Æſchylus, which was publiſhed in London in 1663, the text of which was copied into De Pauw's edition of 1745. He died in London, April 12, 1678, leaving behind him farther monuments of his induſtry and erudition, in manuſcript, conſiſting of "Commentaries on Æſchylus," in 8 vols. fol.: "Adverſaria; or Remarks on Paſſages in various ancient Authors:" "Prelections on the Characters of Theophraſtus:" and a Latin treatiſe on the firſt-fruits and tenths of the ſpoils mentioned in the Epiſtle to the Hebrews. He had been married to a Northamptonſhire lady, co-heireſs to a good eſtate, and he left a ſon, who publiſhed, at an early age, a tranſlation of Ælian's "Various Hiſtories."

Stanley, John, bachelor in muſic, was born in 1713. At two years old he totally loſt his ſight, by falling on a marble hearth with a china baſon in his hand. At the age of ſeven he firſt began to learn muſic, as an art that was likely to amuſe him, but without his friends ſuppoſing it poſſible for him, circumſtanced as he was, to make it his profeſſion. His firſt maſter was Reading, a ſcholar of Dr. Blow, and organiſt of Hackney. But his father finding that he not only received great pleaſure from muſic, but had made a rapid progreſs, placed him with Dr. Greene, under whom he ſtudied with great diligence, and a ſucceſs that was aſtoniſhing. At eleven years of age he obtained the place of organiſt of All-hallows, Bread-ſtreet, and in 1726, at the age of thirteen, was elected organiſt of St. Andrew's, Holborn, in preference to a great number of candidates. In 1734, the benchers of the honourable ſociety of the Inner Temple elected him one of their organiſts. Theſe two places he retained till the time of his death. Few profeſſors have ſpent a more active life in every branch of his art than this extraordinary muſician; having been not only a moſt neat, pleaſing, and accurate performer, but a natural and agreeable compoſer, and an intelligent inſtructor. He was the conductor and ſoul of the Swan and Caſtle concerts in the city, as long as they ſubſiſted. Upon the death of Handel, he and Mr. Smith undertook to ſuperintend the performance of oratorios during Lent; and after Mr. Smith retired, he carried them on, in conjunction with Mr. Linley, till within two years of his death, in 1786. This ingenious and worthy profeſſor, whoſe blindneſs excited the pity, and performance the admiration, of the public for ſo many years, will be long lamented by his ſurviving friends; for they have loſt in him, excluſive of his muſical talents, a moſt intelligent and agreeable companion, who contributed to the pleaſures of ſociety as much by his converſation in private, as by his profeſſional merit in public. He was ſucceeded in his office as maſter of the king's band, by Mr., afterwards ſir William Parſons. See Paradis, *Mademoiſelle.*

STANLEY, in *Geography*, a townſhip in the pariſh of Wakefield, Yorkſhire. See WAKEFIELD.

STANMORE, GREAT, a pariſh in the hundred of Gore, and county of Middleſex, England, is 10 miles N.W. from London. It compriſes 1400 acres of land, the greater part of which is occupied as meadow and paſture, but about 250 acres ſtill remain in common. From the number of Roman antiquities found within this pariſh, it is conjectured by Camden, Stukeley, and Reynolds, that the ſtation called Sulloniacæ was at Brockley-hill. During the Anglo-Roman dynaſty, this part of Middleſex, and a great part of Hertfordſhire, were covered with woods: indeed, at the time of compiling the Domeſday ſurvey, it appears to have been chiefly foreſt. Fitz-Stevens, who wrote about 1170, ſays that an immenſe foreſt extends itſelf to the north of London, "and is full of the lairs and coverts of beaſts and game." The village of Stanmore is of conſiderable extent, and conſiſts chiefly of houſes erected on the ſides of the great road from London to St. Albans. There are ſome handſome manſions and villas within the pariſh; the chief of which is Stanmore-houſe, the elegant ſeat of the counteſs of Aylesford. The houſe is ſeated in an extenſive park, diſtinguiſhed for its varied ſurface and fine woods. A villa called the Grove, the reſidence of Charles Poole, eſq. was poſſeſſed by Aaron Capadoce in 1802, who died here in that year, at the age of 105.

The preſent church of Stanmore was completed in 1632, at the ſole expence of ſir John Wolſtenholme, knt. It is built of brick, and among other monuments is one by Nicholas Stone, commemorating the builder of the church. It contains a ſtatue of the deceaſed, finely executed, and coſt 200*l.* (See Walpole's Anecdotes of Painting.) In the pariſh of Stanmore-Parva is Canons, an ancient and celebrated ſeat of the Brydges family. This eſtate was rendered noted by James Brydges, duke of Chandos, who was paymaſter of the forces to queen Anne, and who, having accumulated great wealth, reſolved to build two magnificent houſes, to ſurpaſs any of the ducal reſidences in England. One was commenced in Cavendiſh-ſquare, London, but never finiſhed; the other at Canons. Three architects were employed, Gibbs, James, and Shepherd; and Vertue deſcribes the houſe as "a noble ſquare pile, all of ſtone;" ornamented with ſtatues, buſts, paintings, &c. Italian artiſts were employed to ſtucco and paint the walls and cielings, and a profuſion of marble was uſed in pillars, floors, &c. In the erection and decoration of this noble manſion, and in planting the ground, it is related that not leſs than 250,000*l.* were expended. Correſponding with the building were the domeſtic eſtabliſhment and ſtyle of living within the houſe: all was grandeur and oſtentation. The duke dined in public, and was attended by a band of muſic and a military guard. This parade excited the envy and ſatirical animadverſions of Pope and ſome other poets. In Pope's ſatire on Falſe Taſte, the character of Timon is ſuppoſed to be intended for the duke. The ſplendid manſion juſt mentioned was taken down, and the materials ſold by auction, in 1747; and a ſmall but neat villa was afterwards built by Mr. Hallet, and which is now the property and reſidence of ſir Thomas Plumer. Beauties of England, vol. x. pt. 4. Middleſex. By J. N. Brewer, 1816.

STANNARIES, STANNARIA, the mines and works where tin is dug and purified: as in Cornwall, Devonſhire, &c. There are four courts of the ſtannaries in Devonſhire, and as many in Cornwall, for the adminiſtration of juſtice among the tinners. See *Stannary*-COURTS.

STANNEL, in *Ornithology*, an Engliſh name of a ſpecies of hawk, more commonly known by the names of the *keſtrel*, or the *windhover*; and called by Latin authors *tinnunculus* and *cenchris*.

STANNER-WORT, in *Agriculture*, the common name of a troubleſome weed in arable as well as graſs-lands. See RAG-WORT.

STANNUM, TIN. See TIN.

STANOVAIA, in *Geography*, a fortreſs of Ruſſia, in the government of Toboliſk; 8 miles S.W. of Iſchim.

STANOVITZKOI, a town of Ruſſia, in the government of Novgorod; 48 miles N.W. of Tcherapovetz.

STANSTEAD, a townſhip of Lower Canada, bounded W. by lake Memphramagog, and S. by Vermont: ſettled by about 750 inhabitants, a promiſcuous emigration from various parts of the United States.

STANSTED, a town of Virginia; 5 miles N. of Falmouth.

STANTONS, a town of North Carolina; 8 miles W. of Guildford.

STANTZ, a town of Switzerland, in the canton of Unterwalden, of which it was formerly the capital, on the lake of Lucerne; 8 miles S.E. of Lucerne. N. lat. 46° 51′. E. long. 8° 10′.—Alſo, a river of Stiria, which runs into the Muehr, 20 miles E.S.E. of Luttenberg.

STANZA, in *Poetry*, a certain ſtated number of grave verſes, containing ſome perfect ſenſe, terminated with a reſt or pauſe.

The word is Italian, and literally ſignifies a ſtand or ſtation, becauſe of the pauſe to be made at the end of each ſtanza, or complete ſenſe.

What the *couplet* is in ſongs, and the *ſtrophe* in odes, the *ſtanza* is in the great and graver pieces, as epic poems, &c. Indeed, the Italians ſcarcely write any poems but they divide them into ſtanzas. There are ſtanzas of four, ſix, eight, ten, twelve, and fourteen verſes, and ſometimes of an uneven number of verſes, as five, ſeven, &c. But theſe laſt are ſomewhat more difficult to execute, by reaſon of the three verſes to one rhyme. The French lay it down as a rule, that if the firſt ſtanza begin with a maſculine or feminine verſe, the ſecond is to begin and end with the ſame.

Every ſtanza ought not only to contain a perfect ſenſe, but to be terminated with ſome lively and ingenious thought, or ſome juſt and pertinent reflection.

Stanzas were firſt introduced from the Italian into the French poetry about the year 1580, and thence they were transferred into the Engliſh.

The uſe of ſtanzas in tragedy, or comedy, is condemned by all the beſt critics; for though we ſpeak verſe on the ſtage, it is ſtill preſumed we are ſpeaking proſe. Stanzas ſhew a degree of ingenuity on the part of the poet, which has nothing of nature in it on the part of the actor. Add to this, that ſtanzas are not fit to expreſs every thing: wrath, threatening, &c. ſit very ill on a regular ſtanza; though irreſolution, reveries, and every thing that leads the actor to think on what he is to reſolve, agree well enough with the unequal cadence of the ſtanza.

STANZIONE, CAVALIERE MASSIMO, in *Biography*, was born at Naples in 1585, and was a diſciple of G.B. Caraciolo: he alſo received inſtructions in freſco painting from Beliſario Coſenzio, one of the moſt eminent artiſts of his time, and indeed ſeems to have been exceedingly ſtudious of the works of all the great painters of his day. He viſited Rome, and in ſtudying the works of Annibal Caracci, became intimate with Guido Rheni, into whoſe ſtyle he fell with ſo much ſucceſs, that he obtained the name of *Il Guido Rheni di Napoli*.

It was in his native city that he principally exerted his ability in original productions, and was ranked among its ableſt artiſts. Spagnoletto became jealous of him, and is ſaid by Lanzi to have been guilty of a groſs piece of perfidy to deſtroy the picture he had painted in competition with his Deſcent from the Croſs, for the Certoſa. The ſubject of his picture was Chriſt with the Maries, which having ſomewhat changed in tone, and become darker, Spagnoletto perſuaded the monks to permit him to clean it; when he uſed ſome noxious preparation, which nearly deſtroyed the work. Upon application to Stanzione to remedy the miſchief, he refuſed, declaring it ſhould remain as it was, that the author of ſo diſgraceful a procedure might reap the juſt fruits of his perfidy.

Among the conſiderable works executed by Stanzione at Naples, are the cielings of the churches of St. Paolo and del Geſu Novo, and a large picture at the Certoſa, repreſenting St. Bruno preſenting the regulations of his order to his monks. The ſmall cabinet pictures by him are numerous, and much eſteemed. He died at the age of 71, in the year 1656.

STAPEDIUS, or STAPIDÆUS, or *Stapidis Muſculus*, in *Anatomy*, the ſmalleſt muſcle in the body, ſituated in the tympanum of the ear. See EAR.

STAPELBURG, in *Geography*, a town of Germany, in the county of Wernigerode; 6 miles W. of Wernigerode.

STAPELIA, in *Botany*, an extenſive and very ſingular genus of African plants, ſo named by Linnæus, in honour of Dr. John Bodæus a Stapel, the laborious and learned Dutch editor of Theophraſtus. His edition of this ancient author, publiſhed in folio at Amſterdam, in 1644, is the beſt which has appeared.—Linn. Gen. 121. Schreb. 169. Willd. Sp. Pl. v. 1. 1277. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 84. Brown Tr. of the Wernerian Society, v. 1. 23. Juſſ. 146. Lamarck Illuſtr. t. 178.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juſſ. *Aſclepiadeæ*, Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, ſmall, in five acute ſegments, permanent. *Cor.* of one petal, large, thick, divided more than half way into five broad, flat, pointed ſegments, ſometimes with intermediate teeth. Nectary (or Crown of the ſtamens) double; the outer in five ſegments or leaves, various in different ſpecies; inner of five leaves, alternate with the outer, undivided, ſometimes obſolete; all much ſhorter than the petal. *Stam.* Filaments five, flat, ſhort, more or leſs connected; anthers ſimple at the point; "maſſes of pollen attached by their baſe, cartilaginous and pellucid at one margin." *Br. Piſt.* Germens two, ovate, flat on the inner ſide; ſtyles none; common ſtigma pointleſs. *Peric.* Follicles two, nearly cylindrical, ſmooth, taper-pointed. *Seeds* numerous, imbricated, compreſſed, crowned with fine hairs.

Eſſ. Ch. Corolla of one petal, five-cleft. Nectary a double ſtar, covering the organs of impregnation. Common ſtigma pointleſs. Follicles two, ſmooth. Seeds comoſe.

Such is the Linnæan genus of *Stapelia*, preſerved entire by the late Mr. Dryander, in Ait. Hort. Kew., though Mr. Brown has ſeparated ſome genera from it. (See HUERNIA and PIARANTHUS.) We have already, under thoſe articles, ventured to expreſs an opinion that the original genus, on account of its very diſtinct habit, and the varieties of ſtructure in its nectary or crown, might beſt remain undiſturbed. We ſhall therefore conſider it under that point of view, giving examples of its various ſections. Linnæus has, even in the fourteenth edition of Syſt. Veg., but five *Stapeliæ*; Willdenow has forty-nine, moſtly adopted from Mr. Maſſon's rich and ſplendid illuſtration of this genus, publiſhed in 1796, with forty-one coloured folio plates. As this able collector ſent moſt of his diſcoveries to Kew, forty-four ſpecies appear in Mr. Aiton's work. They are all natives of the deſerts of Southern Africa, except three found by Forſkall in Arabia Felix, and one by Roxburgh in India. Their habit is extremely ſucculent, toothed, angular, and gibbous, without *leaves*. *Flowers* lateral, ſtalked, various in ſize, parti-coloured, generally of a dark and ſpeckled hue, often remarkable for an extraordinary fetor, reſembling carrion, rotten cheeſe, corrupted water, or ſuch delectable odours, and grateful perhaps to the Hottentots, to whoſe country theſe flowers belong. The *Stapeliæ* are eaſily cultivated in pots, in a dry ſtove, with very ſparing ſupplies of water, and as much ſun as our ſkies will afford. They bloſſom pretty freely, at various ſeaſons, and if their odour can be tolerated, their beauty will amply repay the moderate care they require.

Section 1. *Corolla ſimple, five-cleft, its edges hairy.* Twenty ſpecies.

S. *ciliata.* Fringed Buff Stapelia. Willd. n. 1. Ait. n. 1. Maſſon Stap. 9. t. 1. Thunb. Prodr. 46.—Stem procumbent. Teeth of the branches ſpreading. Surface of the corolla papillary; its margin fringed; ſegments ovate, acute.—Native of very dry ſituations at the Cape of Good Hope, below the hill called *Bockland Berg*. It flowers in our gardens from October to December. The *ſtem* is branched, procumbent, taking root here and there, with ſhort, erect *branches*, ſtained with brown, intermixed with a leſs glaucous green than in moſt other ſpecies; its length about a foot. The teeth of the branches are unuſually large and ſpreading, ſomewhat unequal and irregular. *Flowers* ſolitary, near three inches wide, buff-coloured; violet in the centre. Hairs of their fringe minutely club-ſhaped.

S. *hirſuta.* Hairy Stapelia, or Carrion Flower. Linn. Sp. Pl. 316. Willd. n. 3. Ait. n. 3. Jacq. Miſc. v. 1. 28. t. 3. (Aſclepias africana aizoides, flore pulchrè fimbriato; Commel. Rar. 19. t. 19.)—Branches aſcending, quadrangular, with erect teeth; flowering at the baſe. Corolla hairy at the margin and centre; ſegments ovate, acute, tranſverſely corrugated.—Native of the Cape. Introduced very early from thence, by the Dutch, into the gardens of Europe, where it has ever ſince been preſerved. The *flower* is large and handſome, of a dark chocolate crimſon, ſtreaked acroſs with yellow; the marginal fringe reſembling grey fur. Its ſcent is ſo like carrion, that fleſh-flies lay their eggs upon it, and the maggots are ſtarved for want of their proper food. Sir John Hill aſſerted, in an expreſs diſſertation, that theſe flies are a peculiar ſpecies, whoſe maggots feed on the flower. For which falſehood he is ſtigmatized by the great entomologiſt Fabricius, as "*damnandæ memoriæ Johannes Hill.*"

S. *ſororia*, Maſſon, t. 39; *grandiflora*, t. 11; *ambigua*, t. 12; and *Aſterias*, t. 14; are nearly related to *hirſuta*, in the ſize and general aſpect of their flowers, but all ſufficiently diſtinct.

S. *pulvinata.* Cuſhion-flowered Stapelia. Maſſon Stap. 13. t. 13. Willd. n. 7. Ait. n. 6. Curt. Mag. t. 1240.—Stem procumbent. Branches quadrangular, with erect teeth; flowering at the baſe. Corolla hairy at the margin; its rounded ſegments ſhorter than the diameter of the tumid ſhaggy centre.—Native of the Cape, in buſhy places at *Camies berg*. *Maſſon.* The Dutch inhabitants call this ſpecies the Arabian Roſe, notwithſtanding its fetor. For ſize and beauty it is indeed conſpicuous, and though akin to *hirſuta*, and to the other ſpecies we have juſt named, is diſtinguiſhed by the very tumid, ſhaggy, cuſhion-like centre of the *flower*, and the ſhort, rounded ſegments of the limb, each tipped with a ſharp point, of a different colour from its diſk.

S. *divaricata.* Straddling Stapelia. Maſſon Stap. 17. t. 22. Willd. n. 10. Ait. n. 9. Curt. Mag. t. 1007.—Branches bluntly quadrangular, tapering, ſpreading. Corolla very even; its ſegments lanceolate, pointed; revolute and diſtantly fringed at the margin.—Sent by Mr. Maſſon, from the Cape, in 1793. The habit is ſlender, lax, and ſpreading. *Flowers* ſmaller than any of the foregoing, being but two inches wide, of a deep fleſh-colour, poliſhed, peculiarly ſmooth; their ſegments narrow, and ſo much reflexed, that the hairs on their edges may eaſily eſcape notice.

S. *parviflora.* Small-flowered Stapelia. Maſſon Stap. 22. t. 35. Willd. n. 17. Ait. n. 16.—Branches acutely quadrangular, with recurved teeth; flowering in the upper part. Segments of the corolla lanceolate, fringed, ſhorter than the flower-ſtalk.—Native of buſhy parts of Namaqua land. The branched *ſtems* are erect and ſtout, bright green, with large, compreſſed, hooked teeth. *Flowers* not half an inch broad, yellow, hairy, on deflexed purple *ſtalks*, ſcarcely an inch in length.

S. *glanduliflora.* Glandular-flowered Stapelia. Maſſon Stap. 16. t. 19. Ait. n. 18. Sm. Exot. Bot. v. 2. 23. t. 71. (S. glandulifera; Willd. n. 20.)—Branches quadrangular, with upright teeth. Segments of the corolla ovate, acute, covered with club-ſhaped glands, and ſhorter than the flower-ſtalk.—Found in the deſerts about *Nord Olifant's* river, by Mr. Maſſon, who ſent it to Kew in 1795. It flowers there late in autumn. The *ſtems* are green, erect, ſomewhat downy at the edges. *Flowers* above an inch broad, tawny or yellowiſh, clothed with erect club-ſhaped glands, of a very ſingular appearance. Crown of the *ſtamens* orange and black.

Section 2. *Corolla ſimply five-cleft, ſmooth-edged.* Twenty-two ſpecies, to which ſome are added in Hort. Kew. and Curt. Mag.

S. *pedunculata.* Long-ſtalked Stapelia. Maſſon Stap. 17. t. 21. Willd. n. 21. Ait. n. 19. Curt. Mag. t. 793.—Branches bluntly angular, toothed at the top. Segments of the corolla lanceolate, acute, with tufts of pendulous glands at the baſe. Flower-ſtalks twice as long as the branches.—Native of dry places at *Camies berg. Maſſon.* The *branches* are glaucous, tumid, with blunt, often obliterated angles, rather notched than toothed, except at the end. *Flower ſtalks* five or ſix inches long. *Flowers* an inch and half, or two inches, wide, with narrow convex ſegments, of a more or leſs deep or variegated brown, accompanied at the baſe by pendulous tufts of trembling black glands. The centre of the *flower* is alſo black.

S. *Gordoni.* Gordon's Stapelia. Maſſon Stap. 24. t. 40. Willd. n. 23.—Corolla orbicular, very ſlightly five-cleft. Stem branched, round, with copious ſpinous tubercles.—Gathered in *Groot Namaqua Land,* near Orange river, by Mr. Gordon, from whom Mr. Maſſon received a drawing of this very ſingular ſpecies, it being the only one of the genus he had not himſelf ſeen and examined. The *ſtem* is repreſented erect, branched, a foot high, green, very thick and obtuſe, beſet all over with blunt tubercles, each bearing a prominent thorn. *Flowers* above two inches wide, of a pale nearly even brown, very ſmooth, convex, with five very ſhallow acute lobes, and a little blackiſh crown in the middle. The *ſtalk* is hardly an inch long.

S. *pilifera.* Hairy-tubercled Stapelia. Linn. Suppl. 171. Willd. n. 24. Ait. n. 21. Maſſon Stap. 17. t. 23.—Branches erect, round, tumid, with copious tubercles, each tipped with a briſtle. Segments of the corolla ovate, pointed, ſmooth. Flowers ſeſſile, ſcattered.—Native of very dry hills, in the deſerts at the Cape of Good Hope. The Hottentots are ſaid to eat it, knowing it by the name of *Guaap.* The habit of the plant is very like the laſt, only the tubercles are ſmaller in proportion, and bear briſtles inſtead of thorns. The *flowers* are ſmall, half an inch broad, ſmooth, of a dark purpliſh-brown, with a black and yellow crown, ſurrounded by a red circle. This ſpecies confirms the genus of the laſt, if there could be any doubt on that ſubject.

S. *articulata.* Jointed Stapelia. Maſſon Stap. 20. t. 30. Willd. n. 26. Ait. n. 22.—Branches ſpreading, round, teſſellated with pointed tubercles. Flowers nearly ſeſſile; their ſegments triangular, papillary.—Native of the country of *Roggeveldt,* at the Cape of Good Hope. The Hottentots eat it raw; the Dutch ſettlers pickle it with vinegar. This is of a glaucous, often reddiſh, hue, and ſingularly teſſellated, growing in a proliferous ſtraggling form; its ſtructure akin to the two laſt. *Flowers* very ſmall; their parts not clearly intelligible from Maſſon's figure, nor have we ſeen a recent ſpecimen. They are ſcattered about the toothed ſummits of the branches.

S. *mammillaris.* Prickly Stapelia. Linn. Mant. 2. 216. Willd. n. 27. Ait. n. 23. (S. aphyllos, ad nodos mammillaris, floſculo rubello, ſiliquis pendulis; Burm. Afric. 27. t. 11.)—Branches erect, roundiſh, with copious ſpinous tubercles. Flowers ſtalked; their ſegments lanceolate, ſmooth.—Native of the Cape, from whence it was ſent to Kew, by Mr. Maſſon, and having flowered there, proves very diſtinct from the laſt, to which he ſuſpects, in his work, it might belong. The *tubercles* are prominent, and their *ſpines* very ſtout, even more ſo than in *S. Gordoni,* which this ſpecies nearly equals in ſtature. The *flowers* however are much ſmaller, and totally different in the form of their ſegments.

S. *pulla.* Black-flowered Stapelia. Maſſon Stap. 21. t. 31. Willd. n. 30. Ait. n. 26.—Branches imperfectly hexagonal, erect, with ſpreading ſpinous teeth. Segments of the corolla lanceolate, revolute, ſmooth.—Native of the hot ſandy deſerts called *Karròo,* at the Cape of Good Hope. Brought to Kew by Mr. Maſſon, in 1774. This is ſomewhat related to the laſt, being, though leſs tuberculated, and more angular, furniſhed with ſimilar ſpines. The *flowers* alſo ſeem ſimilarly formed. They grow, ſeveral together, on ſhort aggregate ſtalks, and are pale externally, but almoſt black on the upper ſurface of their narrow, taper, almoſt erect, ſegments.

S. *adſcendens.* Eaſt Indian Stapelia. Roxb. Corom. v. 1. 28. t. 30. Willd. n. 31. (Caralluma; Brown Tr. of the Wern. Soc. v. 1. 25.)—Branches quadrangular, aſcending, toothed, flowering about the ſummit. Segments of the corolla ovato-lanceolate, pointed, revolute, ſmooth.—Found among buſhes, on high dry barren ground in the Eaſt Indies, flowering in the wet ſeaſon. The Telingas, according to Dr. Roxburgh, call it *Car-allum,* and eat the young tender branches raw, though they are bitter and ſalt to the taſte. The *ſtems* are perennial, ſlender, a foot or two high, branched, their angles beſet with aſcending teeth. *Flowers* near an inch in diameter, ſcattered, on ſhort ſtalks, towards the ends of the branches. Segments of the *corolla* green in the lower half; dark purple in the other part; pale beneath. We can form no idea of the ſtructure of the *crown,* or neighbouring parts, from the figure, nor has Dr. Roxburgh ventured to explain them. Mr. Brown deſcribes the *crown* as of ten leaflets, in a ſimple ſeries;

five of them oppoſite to the anthers, and undivided; the laſt deeply divided, awl-ſhaped. With much reſpect for his opinion, we think the plant ought not to be ſeparated from *Stapelia*, and therefore we need ſay nothing of his generic name.

S. *incarnata.* Fleſh-coloured Stapelia. Linn. Suppl. 171. Willd. n. 33. Ait. n. 27. Maſſon Stap. 22. t. 34. (Euphorbium erectum, quadrangulare, ſpinoſum, ramis lateralibus rotundis folioſis; Burm. Afric. 15. t. 7. f. 1.)—Branches quadrangular, erect, toothed, flowering about the ſummit. Segments of the corolla lanceolate, flat, pointleſs, ſmooth.—Found by Thunberg and Maſſon, in dry ſandy fields at the Cape. About a foot high, glaucous, much ſtouter than the laſt. *Flowers* numerous, nearly ſeſſile, ſcattered about the upper part of each branch, each half an inch broad, pale pink or white. The Hottentots are ſaid to eat the branches.

S. *punctata.* Purple-dotted Stapelia. Maſſon Stap. 18. t. 24. Willd. n. 34. Ait. n. 28.—Stem proliferous, decumbent, with oblong, ſomewhat quadrangular, toothed joints. Corolla bell-ſhaped, with lanceolate acute ſegments; papillary on the upper ſurface.—Native of the *Namaqua lands*, in Southern Africa. Sent to Kew in 1795, where it flowers moſt part of the autumn. This is one of a tribe, of which Mr. Maſſon has deſcribed ſeveral more ſpecies, whoſe *ſtems* are compoſed of oblong or elliptical, proliferous joints, or branches, and whoſe *flowers*, ſupported by longiſh *ſtalks*, have lanceolate acute ſegments, dotted or glandular all over their upper ſurface. In the preſent inſtance the *corolla*, about an inch in diameter, has a bell-ſhaped tube, externally of a blueiſh-white. The upper ſide is pink, with purple dots. The *flower-ſtalks*, near two inches long, grow three or four together, and are of the ſame pink hue as the corolla

S. *geminata*, Maſſon t. 25, and *decora*, t. 26, are, in habit and general character, allied to the laſt.

S. *picta.* Painted Stapelia. Sims in Curt. Mag. t. 1169. Ait. n. 34. (S. variegata; Jacq. Miſc. v. 1. 27. t. 4.)—Branches ſimple, aſcending, quadrangular, with ſpreading teeth. Segments of the corolla ovate, pointed, corrugated; the annular centre very rugged. Five leaflets of the crown cloven.—Native of the Cape of Good Hope, from whence Meſſrs. Loddiges are ſaid to have introduced it into the Engliſh collections. The ſtructure of the nectary however induces us to believe, with Dr. Sims, it is what Jacquin has figured as *S. variegata* of Linnæus, hereafter mentioned. This belongs, with the real *variegata*, to no leſs diſtinct a tribe of ſpecies than the laſt. Their *ſtems*, compoſed of numerous ſimple erect *branches*, have a tufted habit; their colour is leſs glaucous than in moſt others; the teeth of their branches are numerous, and ſtrongly marked, ſpreading in four rows. *Flowers* about two inches wide, on deflexed ſolitary *ſtalks*, yellow, either tranſverſely ſtreaked or dotted with a chocolate-brown; their ſegments broad, rugged or warty. Crown of the *ſtamens* various in the different ſpecies. The colouring of the preſent flower is darker, and more blotched, than uſual.

S. *verrucoſa.* Warty-flowered Stapelia. Maſſon Stap. 11. t. 8. Willd. n. 39. Ait. n. 35. Curt. Mag. t. 786?—Branches ſimple, aſcending, bluntly quadrangular, with ſpreading teeth. Segments of the corolla ovate, pointed, warty; the centre concave, with a rough pentagonal elevation.—Found in dry ground at the Cape. Akin to the laſt, but the *corolla* is warty, or tuberculated, not tranſverſely corrugated. We cannot but have ſome doubts concerning the ſynonym of the Botanical Magazine, as the repreſentation there of the crown of the *flower* is not reconcileable to Mr. Maſſon's figure. One or the other muſt be incorrect. In the *branches* we ſee no important difference.

S. *irrorata*, Maſſon t. 9, is one of the ſame tribe, and perhaps nearer the plant of the Botanical Magazine.

S. *variegata.* Variegated Stapelia. Linn. Sp. Pl. 316. Willd. n. 42. Ait n. 37. Curt. Mag. t. 26. (Fritillaria craſſa, promontorii Bonæ Spei; Stapel. Theophr. 335.)—Stem branched upwards, quadrangular, with ſpreading teeth. Segments of the corolla ovate, pointed, corrugated; the annular centre concave, rugged. Leaflets of the crown all undivided.—Native of the Cape, from whence it was early brought to Europe. This is moſt akin to *S. picta;* but if the obſervations of our friend Dr. Sims be, as uſual, correct, the leaflets of the *crown*, or *nectary*, being all undivided in the true *variegata*, eſſentially diſtinguiſh it. This *flower* ſmells like rotten cheeſe. It is prettily ſpotted with brown on a yellow ground. We dare not rely on all the old ſynonyms, the crown not being accurately expreſſed; eſpecially as there are ſeveral ſpecies, ſo eaſily to be confounded with the preſent, which may have been cultivated, without being well diſtinguiſhed.

S. *bufonis*, Curt. Mag. t. 1676, is one of theſe uncertain ſpecies, nearly akin to the *picta.* They require to be all compared in a living ſtate, particularly with regard to the ſtructure of the *crown.*

Section 3. *Corolla with five intermediate teeth.* Six ſpecies, to which one is added in Hort. Kew. This ſection comprehends Mr. Brown's genus HUERNIA. See that article.

S. *campanulata.* Bell-ſhaped Stapelia. Maſſon Stap. 11. t. 6. Willd. n. 43. Ait. n. 38. Curt. Mag. t. 1227, and t. 1661!—Corolla bell-ſhaped, with ten teeth, rough; its tube internally bearded. Branches with four compreſſed toothed angles.—Native of dry ground at the Cape, from whence ſeveral collectors have received living plants. The *branches* are thick, aſcending, ſomewhat tufted, with four, or more, very prominent, compreſſed angles, beſet with large, acute, compreſſed, projecting teeth. *Flowers* two inches wide, with a perfectly bell-ſhaped tube, which is lined, and almoſt filled up, with converging, glandular, purple hairs; limb in five pointed ſhallow lobes, with as many very ſmall intermediate ones, its inner ſurface cream-coloured or buff, dotted with purple. We cannot account for this ſpecies being given a ſecond time in the Botanical Magazine without any reference to the former figure, which beſt agrees with Mr. Maſſon's, and with the ſpecimens we have ſeen.

S. *reticulata.* Netted Stapelia. Maſſon Stap. 9. t. 2. Willd. n. 48. Ait. n. 43. Curt. Mag. t. 1662.—Corolla with ten teeth; its tube internally bearded, and ſurrounded with a tumid ring. Branches with five compreſſed angles, beſet with hooked teeth.—Found in hollows of rocks, near north *Olifant's* river, at the Cape. The numerous, rather hooked teeth of the *branches*, differ ſomewhat from the laſt. Maſſon's figure of the *flower* is more ſtriking, and more faithful, than that of the Magazine. The *corolla*, beautifully variegated with crimſon and dark purple, is marked with a kind of net-work. The ring round its mouth, or tube, is ſingularly tumid; the latter is filled with purple hairs, as in *S. campanulata.*

S. *lentiginoſa.* Freckled Stapelia. Sims in Curt. Mag. t. 506. Ait. n. 44.—Corolla with ten teeth; its tube bell-ſhaped, naked, ſurrounded with a tumid ring. Stems branched in the upper part, five-angled, with hooked teeth.

Brought by Mr. Maſſon from the Cape to Kew in 1795, though it does not occur in his work. The *flower* moſt agrees with his *guttata*, but the habit of the plant is very different.

Section 4. *Flowers not yet obſerved.* One ſpecies. *Willdenow.*

S. *clavata.* Club-ſhaped Stapelia. Willd. n. 49.—"Stem ſimple, thick, club-ſhaped, reticulated with obſcure warts, flowering at the ſummit."—Gathered by governor Patterſon, in ſandy fields beyond *Kopperberg*, at the Cape. He has delineated the fruit only in his travels, tab. 8, according to the German edition, cited by Willdenow.

We beg leave to obſerve that the two firſt ſections of the preſent genus are entirely artificial, the fringe of the *corolla* not leading to any natural affinities of ſpecies.

Stapelia, in *Gardening*, contains plants of the ſucculent perennial kind, of which the ſpecies cultivated are, the hairy ſtapelia (S. hirſuta); and the variegated ſtapelia (S. variegata).

Method of Culture.—Theſe ſorts of plants are readily increaſed by cuttings or ſlips of the young branches, which ſhould be expoſed a few days in a dry covered place to heal over the cut part, and be then planted in pots, filled with light, poor, dry, freſh, ſandy earth, with lime rubbiſh, plunging them in the tan-bed of the ſtove, where they ſoon ſtrike root. When they are well rooted, they may be removed into ſeparate pots, replunging them in the bed till freſh rooted, when they may be placed on the tops of the flues, or on the ſhelves in the hot-houſe. They are alſo capable of being preſerved in the greenhouſe. They have a fine effect in their leafleſs, protuberant, warted appearance, and the beauty of their flowers, which are large, ſtellated, variegated, ſpotted, and differently ſtriped.

STAPES, in *Anatomy*, one of the ſmall bones of the ear, exactly reſembling in ſhape the iron part of a ſtirrup. See Ear and Cranium.

STAPHISAGRIA, in *Botany* and *Gardening*. See Delphinium.

Staphisagria, in the *Materia Medica*. See Stavesacre.

STAPHYLÆA, in *Botany*, abridged by Linnæus from *Staphylodendrum* of Tournefort and of ancient authors, derived from σταϐυλη, *a bunch*, or *cluſter*, and δενδρον, *a tree*, becauſe the cluſtered fruit of this ſhrub reſembles a bunch of grapes in its mode of growth.—Linn. Gen. 148. Schreb. 198. Willd. Sp. Pl. v. 1. 1497. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 377. Prodr. Fl. Græc. Sibth. v. 1. 208. Ait. Hort. Kew. v. 2. 171. Purſh v. 1. 129. Juſſ. 377. Tournef. t. 386. Lamarck Dict. v. 7. 391. Illuſtr. t. 210. Gærtn. t. 69.—Claſs and order, *Pentandria Trigynia.* Nat. Ord. *Trihilatæ*, Linn. *Rhamni*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, five-cleft, concave, roundiſh, coloured, the ſize of the corolla. *Cor.* Petals five, oblong, erect, like the ſegments of the calyx. Nectary at the receptacle of the fructification, in the baſe of the flower, concave, urn-ſhaped. *Stam.* Filaments five, oblong, erect, the length of the calyx; anthers ſimple. *Piſt.* Germen ſuperior, thickiſh, three-cleft; ſtyles three, ſimple, a little longer than the ſtamens; ſtigmas obtuſe, contiguous. *Peric.* Capſules three, inflated, flaccid, united longitudinally by a ſuture, pointed at the tip, burſting inwardly. *Seeds* two, bony, globular, with an oblique point, and an orbicular excavation at the ſide of the orifice.

Obſ. In *S. pinnata* the germen, inſtead of being three-cleft, is moſtly bifid, and there are generally but two capſules.

Eſſ. Ch. Calyx inferior, in five ſegments. Petals five. Capſules inflated, joined together. Seeds two, globoſe, with a ſcar on one ſide.

1. S. *occidentalis.* Jamaica Bladder-nut. Willd. n. 1. Swartz Ind. Occ. v. 1. 566. (Arbor jamaicenſis fraxini alatis foliis, floribus pentapetalis corymboſis; Pluk. Alm. 45. t. 269. f. 1.)—Leaves doubly pinnate. Capſules triangular. Seeds ſolitary. Stem arboreous.—Native of fields in the mountainous parts of Jamaica, flowering in the ſpring and autumn. A *tree* from twenty to thirty feet in height, with a ſmooth *trunk*, and round, ſmoothiſh, ſhining *branches*. *Leaves* alternate, ſtalked; leaflets two or three pair, ovate, pointed, ſerrated, ſmooth, ſhining. *Stipulas* two, between each pair of leaflets, ſmall, incurved. *Flowers* in terminal, erect, lax cluſters, white, fragrant, three on each ſtalk. *Capſules* ſcarcely inflated.

2. S. *pinnata.* Bladder-nut Tree. Linn. Sp. Pl. 386. Engl. Bot. t. 1560. "Schmidt. Arb. t. 80."—Leaves pinnated. Styles and capſules but two.—Native of the ſouth of Europe; but of ſuch rare occurrence in this country as to be ſcarcely deemed indigenous, although it is admitted into the Britiſh Flora. It bloſſoms in May or June, and perfects fruit rather late in the autumn. *Stem* ſhrubby, five or ſix feet high, branched, ſmooth. *Leaves* unequally pinnate; leaflets five, oppoſite, ovate, ſerrated, acute. *Stipulas* large, membranous, browniſh. *Flowers* in terminal, compound, drooping cluſters, bell-ſhaped, pale yellow. *Bracteas* ſetaceous, membranous. *Capſules* two, rarely three, membranous, inflated, each containing two large, globular *ſeeds*, which when ripe are hard, light brown, and look as if varniſhed.

The general appearance of this ſhrub ſomewhat reſembles that of the common Aſh.

3. S. *trifolia.* Three-leaved Bladder-nut. Linn. Sp. Pl. 386. "Schmidt. Arb. t. 81."—Leaves ternate.—Native of dry hills, in rocky ſituations from New York to Upper Carolina, flowering in May and June. *Purſh.* *Stem* ſtouter than in the laſt ſpecies; the older *branches* grey; the younger green, ſmooth. *Leaves* three together, ovate, pointed, ſerrated, the terminal one largeſt. *Flowers* produced from the ſides of the branches, in longer cluſters, but on ſhorter ſtalks, of a clearer white, and ſomewhat larger than in the laſt.

Staphylæa, in *Gardening*, contains plants of the hardy, deciduous, flowering, ſhrubby kind, of which the ſpecies cultivated are, the five-leaved bladder-nut (S. pinnata); and the three-leaved bladder-nut (S. trifolia).

Method of Culture.—Theſe plants may be increaſed by ſeeds, ſuckers, layers, and cuttings. The ſeeds ſhould be ſown as ſoon as they become ripe, in the autumn, in a bed of common earth, to the depth of an inch: they ſhould be kept clear from weeds, and refreſhed in dry weather with water frequently. In the following autumn or ſpring, the large plants ſhould be removed into nurſery-rows, at two feet apart, and one foot diſtant in the rows, to remain till of ſufficient growth for the ſhrubbery. The ſuckers may be ſeparated and taken up in autumn, or early in the ſpring, with root-fibres to them, and planted in nurſery lines in the above manner. The layers may be put down from the young branches, being either ſlit or twiſted; and, when properly rooted in the following autumn, be planted out in the nurſery as above. The cuttings ſhould be made from the lower parts of the young ſhoots of the preceding year, planting them in a ſhady border in the autumn, and watering them frequently during the ſpring and ſummer, when the weather is dry; and when well rooted, in the autumn following, planting them out in the nurſery-rows as above, or where they are to remain. They afford ornament and variety in the ſhrubbery parts of pleaſure-grounds, as well as in ſome other parts, by their long pendulous bunches of flowers, and bladder-ſhaped capſules, which have a ſingular appearance and effect in the autumnal ſeaſon.

STAPHYLE, a word uſed by the old Greek writers, ſometimes to expreſs a grape, and ſometimes a diſorder of the uvula, which conſiſts in an extenuation of its ſuperior part, and a tumour of the inferior, whence it hangs down in the ſhape of a grape. The uvula, or gargareon, is alſo thus called by ſome writers.

STAPHYLEPARTES, the name of a chirurgical inſtrument, in uſe among the ancients for elevating the uvula. It is mentioned by Paulus Ægineta.

STAPHYLINUS, in *Anatomy*, the muſcle of the uvula, commonly called azygus. See Deglutition.

Staphylinus, in *Botany*, a name given by ſome authors to the common *daucus ſylveſtris*, wild carrot, or bird's neſt.

Staphylinus, in *Entomology*, a genus of inſects of the order Coleoptera. The generic character is as follows: Antennæ moniliform; four feelers; ſhell half as long as the body; wings folded up under the ſhells; tail not armed with a forceps, furniſhed with two exſertile veſicles. The inſects of this genus are extremely rapacious, devouring not only the inſects of other genera, but frequently each other. Many of them, when attempted to be caught, turn up the tail. The jaws are ſtrong and exſerted, with which they bite and pinch very hard: moſt of them are found in damp moiſt places, among ſubſtances, and a few upon flowers. There are about 180 ſpecies, ſeparated into three ſections, according as their feelers are filiform, hatchet-ſhaped, or clavate. Of theſe we ſhall notice but very few that are not to be found in this country.

Species.

A. *All the Feelers filiform.*

Aureus. Head, thorax, and ſhells, covered with ferruginous down; the abdomen is black, with cinereous bands. It is found in Siam.

* **Hirtus.** Hairy, black; thorax and hind-part of the abdomen yellow. Found in ſandy ſituations, in this country, and other parts of Europe.

* **Murinus.** Pubeſcent, cinereous, clouded; abdomen and legs deep black. It is found in this country, among decayed carcaſes and dung. The ſhells are blue, and poliſhed beneath. The larva is ſix-footed, naked, and of a pale hue. The head and three firſt ſegments of the abdomen cheſnut-brown; tail with two jointed briſtles, and a cylindrical tubercle beneath.

* **Olens.** Black, opaque, immaculate; head broader than the thorax. This is an Engliſh inſect, but found likewiſe in many parts of the European continent.

* **Maxillosus.** Pubeſcent, black, with cinereous bands. The jaws of this inſect are as long as the head; the antennæ are ſtill longer; the ſhell covers one third of the abdomen; the legs end in ſmall tufts of hair.

* **Erythropterus.** Black; ſhells, baſe of the antennæ, and legs, are red; the head and thorax are unpoliſhed, black; ſhells with two triangular ſpots; each ſide is compoſed of a few gilded hairs.

* **Politus.** Black; thorax and ſhells poliſhed; thorax with a line of impreſſed dots. This inſect, when firſt caught, ſcatters a very fragrant odour.

* **Brunnipes.** Black; legs, baſe and tip of the antennæ, ferruginous; the antennæ are black, the firſt and two laſt joints are ferruginous; the eyes are white.

Marginatus. Black; ſides of the thorax and legs are yellow. It is ſomething leſs than the S. politus, and of a gloſſy-black.

Alpinus. Black; baſe of the antennæ, ſhells, and legs, livid. It inhabits the higheſt mountains of Lapland, on the birch. The body of this ſpecies is more depreſſed than is the caſe with regard to others; the antennæ are black, and pale at the baſe; the abdomen is black.

* **Bi-pustulatus.** Black; ſhells with a ferruginous dot behind.

Bi-guttatus. Black; ſhells with a whitiſh dot; the eyes are prominent. It inhabits the ſhores of the Baltic.

* **Fuscipes.** Black; thorax roundiſh; ſhells and legs piceous; the body is ſmall and thick; the edges a little blackiſh.

* **Atricapillus.** Thorax rufous; ſhells brown, with a white dot and hinder margin.

Sanguineus. Gibbous, black; ſhells ſanguineous; antennæ thicker towards the top. This is found chiefly in France. The antennæ are as long as the body; the head is rough; the ſhells are ſtriate at the baſe; legs yellowiſh; thighs brown; body ſometimes cheſnut-brown.

* **Caraboides.** Yellow, immaculate.

* **Rugosus.** Black; thorax and ſhells rugged. It is larger than the next. The head is flat; the thorax depreſſed, with longitudinal wrinkles.

* **Piceus.** Black; thorax depreſſed, with three raiſed lines; the ſhells are piceous.

Flavus. Black; edges of the thorax and ſhells yellow; the latter with a brown fillet and outer margin; antennæ and legs yellow.

Littoreus. Black; ſhells grey on the fore-part; legs rufous. It inhabits the ſea-ſhores.

B. *Hind-feelers hatchet-ſhaped.* Oxyporus.

* **Rufus.** Rufous; head and hind-part of the ſhells and abdomen are black. It is found chiefly on fungi, in this and other European countries.

* **Lunulatus.** Yellow; ſhells black, pale at the baſe and tip. It inhabits Europe, on fungi. Head is black; the tip of the abdomen is marked with a white ring.

* **Merdarius.** Black; thorax and ſhells rufous. It is found in this and other European countries.

* **Chrysomelinus.** Black; thorax rufous; ſhells teſtaceous, the margin at the baſe is black.

* **Rufipes.** Gloſſy-black; legs rufous. It is found in the northern parts of Europe.

* **Hypnorum.** Gloſſy-black; margin of the thorax, ſhells, and legs, teſtaceous; the body is black, glabrous, and poliſhed.

* **Marginellus.** Gloſſy-black; margins of the thorax and ſhells ferruginous. This is a very ſmall inſect.

C. *Fore-feelers clavate.* Pæderus.

* **Riparius.** Rufous; ſhells blue; the head and end of the abdomen are blackiſh. This is figured in Donovan's Engliſh Inſects.

* **Elongatus.** Hind-part of the ſhells and legs fulvous.

Fulgescens. Gloſſy-black; ſhells and ends of the legs teſtaceous; head ſlightly punctured. The head is marked with numerous ſmall impreſſed dots.

STAPHYLIS, a name given by ſome authors to a ſort of cup, or boat, made for feeding young children, and contrived with a ſpout in form of a grape or nipple.

STAPHYLODENDRON. See Staphylæa.

STAPHYLOMA, is the name given, in *Surgery*, to that diſeaſe of the eye, in which the cornea loſes its natural tranſparency, riſes above its proper level, and even projects between the eye-lids, in the form of a whitiſh pearl-coloured tumour, which is attended with total loſs of ſight.

The malady commonly reſults from ſome violent ſpecies of ophthalmy, particularly that which is termed *purulent*, and affects children, and that which is conſequent to the ſmall-pox. As Scarpa obſerves, the ſtaphyloma is one of the moſt ſerious diſeaſes to which the eye-ball is ſubject; for, to the total and irremediable loſs of ſight, are added all the evils which neceſſarily reſult from the protuberance of the cornea in advanced caſes. The inability of cloſing the eye-lids, the expoſure of the eye-ball to the contact of the air and extraneous matter ſuſpended in it, the friction of the eye-laſhes againſt the tumour, the inceſſant flux of tears down the ſubjacent cheek, render the eye painful and inflamed; ſympathetically induce ophthalmy in the ſound one; and cauſe ulceration both on the diſeaſed part of the eye, and on the lower eye-lid and cheek.

The opacity being irremediable, the only ſurgical object is to prevent the inconveniencies ariſing from the protuberance of the diſeaſed cornea. In recent caſes, when the tumour does not project forward, it is beſt to do nothing. In inveterate caſes, the prominent part of the cornea muſt be cut off. Scarpa recommends doing the operation as far from the conjunctiva as the caſe will allow. This eminent ſurgeon introduces a knife, like that uſed in the extraction of the cataract, completely acroſs the ſtaphyloma, at the diſtance of one line and a half, or two lines, from the centre of the tumour.

The lower half of the prominence is to be detached, by puſhing the knife onward, till its edge comes out through the membrane below; then the flap is to be turned up with a pair of forceps, and the inciſion rendered completely circular with the ſame biſtoury. The aqueous humour, cryſtalline lens, and ſome of the vitreous humour, uſually eſcape immediately after the operation, and the eye conſequently becomes ſo diminiſhed as to allow the eye-lids to be ſhut. Ophthalmy and ſuppuration of courſe ſucceed. Emollient poultices are now to be applied, until the violence of the inflammation has abated, the quantity of matter is diminiſhed, and the wound manifeſts a diſpoſition to heal: then they may be left off; and occaſionally touching the ſore with the argentum nitratum, and applying a pledget over the eye, will complete the cicatrization.

Mr. Ware thinks, that the portion of diſeaſed cornea, taken away in the foregoing manner, is too diminutive to allow the cryſtalline lens to eſcape, without bruiſing the iris; and that it ſometimes does not prevent the eye from becoming again diſtended with an aqueous fluid. He has, therefore, adviſed the circular inciſion of the cornea to be made about a quarter of an inch from the junction of that membrane with the ſclerotica. Scarpa ſulle Malattie principali degli Occhi. Ware in Tranſ. of the Med. Society of London, vol. i. art. 6. Cooper's Firſt Lines of Surgery.

STAPHYLOSIS, a protuberance or protruſion of the choroid coat of the eye.

STAPIDACEUS Musculus, in *Anatomy*, a name given by Duverney, Douglas, and many others, to the muſcle of the ſtapes of the ear, called by others *ſtapidis muſculus*, and by Albinus *ſtapidium*. See Stapedius and Ear.

STAPLE, Stapula, primarily ſignifies a public place, or market, whither merchants, &c. are obliged to bring their goods to be bought by the people; as the Greve, or the places along the Seine, for the wines and corns at Paris; whither the merchants of other parts are obliged to bring thoſe commodities.

Voſſius and Menage derive the word from *ſtaplus*, which is found in the Ripuary laws, ſignifying a place where juſtice is adminiſtered. Others derive it from the German *ſtaple*, or Latin *ſtapula*, which Boxhornius derives farther from the German *ſtapelen, to put in a heap*. Others again have obſerved, that the Engliſh word ſtaple is, in the civil law Latin ſtyle of former times, termed *ſtabile emporium*, *i. e.* a fixed port or mart for the importing of merchandize. And hence probably, they ſay, the contracted word *ſtaple* (uſed, with ſome ſmall variation in the orthography, all over Europe) had its derivation.

Staple alſo ſignifies a city or town, where merchants jointly agree to carry certain commodities, as wool, cloth, lead, tin, &c. in order to their being commodiouſly ſold by the great. In England, ſtaples were ſettled and appointed to be conſtantly kept in ſeveral towns, to which places merchants and traders were to carry goods to ſell in thoſe parts. See *Merchants of the* Staple.

The ſtaple commodities of England were chiefly wool, leather, cloth, tin, lead, &c.; though by ſtaple goods are now generally meant any proper ſaleable commodities, not eaſily ſubject to periſh; or ſuch wares and merchandize as are the natural and uſual product or manufacture of any city or country.

The ſtaples in the Levant, called by the French *eſchelles*, *i. e. ſcales*, are ſuch cities where the Engliſh, French, Dutch, Italians, &c. have conſuls, factors, and magazines; and whither they ſend veſſels regularly each year. The principal of theſe are Smyrna, Alexandretta, Aleppo, Seyda, Cyprus, Sallee, Alexandria, Cairo, Tunis, Algiers, Tripoli, the Morea, Candia, and the iſlands of the Archipelago. See Factory.

Staple, *Law of the*. See Law.

Staple, *Merchants of the*, in the *Hiſtory of Engliſh Commerce*, a denomination given to the firſt and moſt ancient commercial ſociety in England, from their exporting the ſtaple wares of the kingdom, which were wool, ſkins, lead, and tin, in their rough ſtate for manufacture. This ſociety is ſaid to have had its riſe in the year 1248; and it appears to have had the legal form of a corporation before the 12th year of Edward II. A.D. 1319; as there are records in the pipe-office of the Exchequer, which mention, that it was actually a corporation, with the title of the mayor and conſtables of the ſtaple of England, who then had their ſtaple at Antwerp, for conducting the ſale of Engliſh ſtaple wares, and the importation of ſuch foreign goods as were wanted at home. However, in 1328, by 2 Edw. III. cap. 9. it was enacted, that the ſtaples, on both ſides of the ſea, ſhould ceaſe, and that all merchant-ſtrangers, &c. might go and come with their merchandize into England, after the tenor of the Great Charter. In 1336 the ſtaple of wool was again fixed in Brabant; in 1341, at Bruges; and in 1348, at Calais; whither, and to no other place, all merchandize exported from England, Wales, and Ireland, either by denizens or aliens, were to be ſhipped from England and there landed. The cuſtoms from this ſtaple are ſaid to have then amounted to upwards of 60,000*l.* ſterling yearly. In 1353, Edward III. removed the ſtaple of wool from Bruges to Weſtminſter, Canterbury, Chicheſter, Exeter, Wincheſter, Briſtol, Lincoln, York, Norwich, Newcaſtle, and Hull, for England; and to Dublin, Cork, Waterford, and Drogheda, for Ireland. And it was enacted by 27 Edward III. called the *ſtatute of the ſtaple*, that all ſtaple wares for exportation ſhould be firſt brought to ſome of theſe places only, where the cuſtom ſhould be paid, and exported by merchant-ſtrangers only, under an oath not to hold any ſtaple thereof beyond ſea; which privilege was extended by 31 Edward III. to denizens alſo. Calais, however, ſtill remained a ſtaple.

In theſe ſtaple-towns, courts of *law-merchant* were eſtabliſhed,

bliſhed, by the ſaid ſtatute, for determining all mercantile affairs, and for puniſhing and amercing offenders. The principal matters under the cognizance of theſe courts were ſuch as pertained to the five ſtaple commodities of England, *viz.* wool and wool-fels or ſheep-ſkins, leather, lead, and tin. From the year 1375, the ſtaple of Weſtminſter ſeems to have been removed to the place called Staple-Inn, in Holborn; when Calais, which had been for many years a principal ſtaple-port for diſperſing, in more early times, the Engliſh wool, lead, and tin, and, in later times, the Engliſh woollen manufactures, under the conduct of the Merchant-Adventurers, into the inland countries of the Netherlands, France, and Germany, was loſt to this country. In 1588, the ſtaple for wool, &c. was eſtabliſhed at Bruges; and queen Elizabeth, in the third year of her reign, granted a new charter of confirmation to the corporation of the mayor and conſtables of the ſtaple of England, of all ſuch privileges as they did, might, or ought to have enjoyed before the loſs of Calais. However, king James I., in 1604, granted a new charter to the Merchant-*Adventurers*, (which ſee,) and in 1617, confirmed all their former powers and privileges for trading to the Netherlands and to Germany, with the woollen manufactures of England, excluſively of all who were not free of their company; in conſequence of which, the merchants of the ſtaple, who had before been declining, by the manufacture and exportation of our woollen cloth, were brought to ruin. And when at length it was judged expedient to enact a total prohibition of the exportation of our wool, it is no wonder that the ſtaplers' company ſhould become extinct. At this day they exiſt only in name; though they maintain the form of a corporation by annually electing the officers of their company, according to the direction of their ancient charters. This nominal corporation is kept up by thoſe who deal in wool (ſtill called wool-ſtaplers), and who, in their corporate capacity, poſſeſs a ſmall ſum in the public funds, the intereſt of which ſerves to defray the expence of their meetings and elections. But they never had a hall, or office of their own, within the city of London, like other trading companies, although the Inn of Chancery in Holborn is ſo denominated from their warehouſes, which were formerly ſituated there; as was alſo an office and warehouſe of theirs, which, ſince the erection of the new bridge at Weſtminſter, has loſt its place, as well as name of wool-ſtaple, at the upper part of Cannon-Row. Anderſon's Hiſt. Com. vol. i. See CUSTOMS.

STAPLE, *Statute.* See STATUTE, and the preceding article.

STAPLE *Articles of Food*, in *Agriculture*, are all thoſe which are of a firm and ſolid nature, texture, and quality, and which afford due ſupport in the feeding and foddering of all ſorts of domeſtic animals of the live-ſtock kind; in contradiſtinction to thoſe which are of a watery and leſs firm ſtructure and conſiſtence, that ſupply nouriſhment and ſupport to ſuch animals in an inferior and leſs perfect manner; as corn, hay, tares, and ſome other ſimilar ſorts of food, in compariſon with thoſe of the more ſucculent root and graſs kinds.

STAPLE *of Land*, a term ſignifying the particular nature and quality of it, in regard to the texture, conſiſtence, and compoſition of its parts as a ſoil. In this way, there are heavy or ſtrong ſtapled lands, thoſe of a medium or middling ſtaple, and light or thin ſtapled lands, according as the particles of the mouldy or powdery materials, of which they are conſtituted, may have more or leſs tenacity, adheſive firmneſs, and ſolidity among themſelves, and more or leſs thickneſs. By this means, the differences in the ſtaples of lands, as ſoils, become of very material importance to the farmer, as they ſhew and teach him not only the nature of the crops that may be grown upon them to the moſt profit and advantage, and with the leaſt danger, or greateſt chance of ſucceſs, but the manner in which they may be the moſt beneficially and effectually cultivated for the raiſing and producing of them. Beſides, the differences in the ſtaples of lands, as ſoils, are the chief or principal means by which the common farmer is able and capable of judging of, and deciding in reſpect to, the qualities of land as farms, as well as of their nature and values in the view of purchaſing them. See SOIL.

STAPLE, *Iron*, in *Rural Economy*, a ſmall piece of iron, in which the outward part is moſtly either of the curved or ſquare form, having two long ſharp ends, points, or prongs, which are driven into wood or any other ſimilar material. Staples of this ſort are very uſeful for many different purpoſes about farms, as faſtening gates, ſecuring doors, and many others of the ſame nature.

STAPLES, or *Keel-Staples*, in *Ship-Building*, are generally made of copper, from ſix to twelve inches long, and about one and a quarter inch broad, with a jagged hook at each end, which are driven into the ſides of the main and falſe keels to faſten them.

STAPLE-*Rope*, a term for ropes made of hemp not inferior to clean Peterſburgh.

STAPLETON, THOMAS, in *Biography*, was born of a good family at Henfield, in Suſſex, in 1535. He was educated partly at Canterbury and partly at Wincheſter, and was then entered of New college, Oxford, of which he became a perpetual fellow. In the reign of queen Mary, he obtained a prebend of Chicheſter, but on the acceſſion of Elizabeth, his ſteady attachment to the Roman Catholic religion cauſed him and his family to remove to Louvain. Here he ſtudied theology, and afterwards viſited Paris and Rome. Returning to Louvain, he employed himſelf in writing books till 1572, when he was invited to Douay, where Philip II. had founded an univerſity. After taking the degree of doctor in theology, he was preſented to a canonry in that town, and was made royal profeſſor of the holy ſcriptures. A diſtaſte to the world induced him to enter among the Jeſuits, who ſent him to Louvain. This ſituation did not at all accord with his taſte, and he returned to the canonry of Douay, whence, in 1590, he was called to occupy a royal profeſſorſhip at Louvain: he was afterwards nominated to the deanery of Hilverbeck, near Bois-le-Duc, a preferment of conſiderable value, the profits of which placed him in good circumſtances. He had now acquired a high reputation by his writings, which procured him an invitation to Rome from pope Clement VIII.; but he felt himſelf too old for ſuch a change, and being beſet with infirmities, he was led to decline the honour intended him. He died in 1598, at the age of ſixty-three. He was a very voluminous writer, and his works, when collected, formed four volumes folio, which were printed at Paris in 1620. They all relate to the principles and controverſies of the Romiſh religion, and the eulogies of its aſſertors. One of the moſt known was entitled "Propugnaculum Fidei primitivæ Anglorum," which was tranſlated into Engliſh under the title of Stapleton's "Fortreſs of Faith." He gave an Engliſh verſion of Bede's Church Hiſtory.

STAPLING *of Wool*, in *Rural Economy*, the art or proceſs of ſorting and adjuſting its different properties and qualities in the ſame fleece, or in the whole quantity, ſo as that thoſe of the ſame kind, and which are proper for the ſame uſe and intention in the manufactures, may be put together in the moſt uſeful and appropriate manner.

The Highland Society of Scotland has lately offered a premium for an eſſay on the beſt mode of executing the buſineſs, and the advantages that may be derived from it to that country. See WOOL.

STAPODIA, or *The Brothers*, in *Geography*, two iſlets in the Grecian Archipelago; 6 miles E. of Mycone. N. lat. 37° 32′. E. long. 36° 42′.

STAPPEN, a place of Iceland, farther along the coaſt towards the W. than Stadarſtad (which ſee); ſituated on the brow of a range of curiouſly columnar rocks, large inſulated maſſes of which ſtand in the ſea, in various ſingular forms. Stappen, like Buderſtad, is a trading ſtation, and conſiſts of a merchant's houſe, two or three ſtore-houſes, and a few cottages, inhabited by fiſhermen. The coaſt in the neighbourhood of Stappen is very remarkable; preſenting, for an extent of about two miles, ſtriking and beautiful columnar appearances, both in the cliffs which form the ſhore, and in the numerous inſulated rocks which appear at different diſtances from the land. The ranges of columns, which in general are about 50 feet high, and perfectly regular in their forms, are variouſly broken, in conſequence of their expoſure to the action of the ſea. In ſome places large caves have been formed; and in two of theſe the light is admitted by fiſſures in the roof, producing a very ſingular and ſtriking effect. In general, the columns have a vertical poſition; but in different places they are diſpoſed in bundles upon one another in all directions. In ſeveral inſtances they appear diverging from a centre; and they aſſume, in ſhort, every form which ſuch rocks can be imagined to take. About a mile and a half W. of Stappen, there is a curious perforated rock, forming a detached arch of conſiderable magnitude, the view through which is ſingularly pictureſque, comprehending in the fore-ground many of the inſulated maſſes of columnar rock, and in the diſtance, the fine range of mountains which ſtretches along the peninſula towards the eaſt. On the beach at Stappen were ſeveral ſharks, that had been taken for the ſake of the oil of the liver, and the ſkin. Of the ſkin ſhoes were made; and ſome parts of the fleſh were occaſionally ſmoked, and uſed as food by the natives. But what they eſteem a delicacy, preſents a moſt horrible odour to ſtrangers. Mackenzie's Travels in Iceland.

STAR, Stella, in *Aſtronomy*, a general name for all the heavenly bodies.

The ſtars are diſtinguiſhed, from the phenomena of their motion, &c. into *fixed* and *erratic*.

Stars, *Erratic*, or *Wandering*, are thoſe whoſe diſtances and places, with regard to each other, are continually changing. Theſe are what we properly call planets. Though to the ſame claſs may likewiſe be referred what we popularly call *blazing* ſtars, or comets.

Stars, *Fixed*, called alſo, by way of eminence, *ſtars*, are thoſe which have been generally obſerved to keep the ſame diſtance with regard to each other, or becauſe (except ſome few) they do not appear to have any proper motion of their own.

The principal points that have come under the conſideration of aſtronomers concerning the fixed ſtars, are, their *diſtance*, *magnitude*, *number*, *nature*, and *motion*.

Stars, *Diſtance of the Fixed*. The fixed ſtars are bodies exceedingly remote from us; indeed ſo remote, that we have no diſtance in the planetary ſyſtem to compare to them.

Their immenſe diſtance is argued hence, that they have no ſenſible parallax, that is, that the diameter of the earth's orbit bears no ſenſible proportion to it; but they are ſeen the very ſame in all the points of it. M. Huygens (Coſmotheor. lib. iv.) attempts to determine the diſtance of the ſtars, by making the aperture of a teleſcope ſo ſmall, as that the ſun through it appears no bigger than Sirius. In this ſtate he found the ſun's diameter to be as 1 to 27,664 of his diameter, when ſeen with the naked eye. Were the ſun's diſtance, then, 27,664 times as great as it is, it would be ſeen of the ſame diameter with Sirius; ſo that, allowing Sirius to be equal in magnitude with the ſun (which is a very reaſonable ſuppoſition), the diſtance of Sirius from the earth will be found to be to that of the ſun from the earth, as 27,664 to 1. On which principle, Sirius will be 657,020,000 ſemidiameters of the earth diſtant from our earth.

Mr. James Gregory inveſtigated the diſtance of Sirius, by ſuppoſing it of the ſame magnitude with the ſun, and of the ſame diameter with Jupiter in oppoſition, as may be ſeen at large in Gregory's Aſtr. lib. iii. prop. 47.

Caſſini (Mem. de l'Acad. ann. 1717), from comparing Jupiter and Sirius, when viewed through the ſame teleſcope, inferred, that the diameter of that planet was ten times as great as that of the ſtar; and the diameter of Jupiter being 50″, he concluded that the diameter of Sirius was about 5″; ſuppoſing then that Sirius is equal to the ſun in magnitude, and the diſtance of the ſun from us to be about 10,000 diameters of the earth, and the apparent diameter of Sirius being to that of the ſun as 1 to 384, the diſtance of Sirius from the earth becomes equal to 3,840,000 diameters of the earth.

Theſe methods of Gregory, Huygens, and Caſſini, are conjectural and precarious, becauſe they ſuppoſe that the ſun and Sirius are equal in magnitude, and principally becauſe they take it for granted, that the diameter of Sirius is determined with ſufficient exactneſs.

Mr. Michell has propoſed an enquiry into the probable parallax and magnitude of the fixed ſtars, from the quantity of light which they afford us, and the particular circumſtances of their ſituation. With this view he ſuppoſes, that they are, at a medium, equal in magnitude and natural brightneſs to the ſun; and then proceeds to enquire what would be the parallax of the ſun, if he were to be removed ſo far from us, as to make the quantity of the light, which we ſhould then receive from him, no more than equal to that of the fixed ſtars. Accordingly, he aſſumes Saturn in oppoſition, excluſively of his ring, (and when the earth and this planet are at their mean diſtances from the ſun,) as equal, or nearly equal, in light to the moſt luminous fixed ſtar. As the mean diſtance of Saturn from the ſun is equal to about 2082 of the ſun's ſemidiameters, the denſity of the ſun's light at Saturn will conſequently be leſs than at his own ſurface, in the proportion of the ſquare of 2082 (or 4,334,724) to 1. If Saturn, therefore, was to reflect all the light that falls upon him, he would be leſs luminous in the ſame proportion; and, beſides, his apparent diameter, in oppoſition, is at moſt but 105th part of that of the ſun, and, conſequently, the quantity of light which we receive from him, muſt be again diminiſhed in the proportion of the ſquare of 105 (or 11,025) to 1. By multiplying theſe two numbers together, we ſhall have the whole of the light of the ſun to that of Saturn, as the ſquare of nearly 220,000 (or 48,400,000,000) to 1: and removing the ſun to 220,000 times its preſent diſtance, he would ſtill appear at leaſt as bright as Saturn, and his whole parallax upon the diameter of the earth's orbit would be leſs than 2″: and this muſt be aſſumed for the parallax of the brighteſt of the fixed ſtars, upon the ſuppoſition that their light does not exceed that of Saturn.

By a ſimilar computation it may be found, that the diſtance at which the ſun would afford us as much light as we receive from Jupiter, is not leſs than 46,000 times his preſent diſtance, and his whole parallax in that caſe, upon the diameter of the earth's orbit, would not be more than 9″; the light of Jupiter and Saturn, as ſeen from the earth, being in the ratio of about 22 to 1, when they are both in oppoſition, and ſuppoſing them to reflect equally in proportion to the whole of the light that falls upon them. But if Jupiter and Saturn, inſtead of reflecting the whole of the light that falls upon them, ſhould really reflect only a part of it, *e. g.* a fourth or a ſixth, which may be the caſe, their diſtances, computed above, muſt be increaſed in the proportion of 2 or $2\frac{1}{2}$ to 1, to make the ſun's light no more than equal to their's; and his parallax would be leſs in the ſame proportion. Suppoſing, then, that the fixed ſtars are of the ſame magnitude and brightneſs with the ſun, it is no wonder that their parallax ſhould hitherto have eſcaped obſervation; ſince, if this is the caſe, it could hardly amount to $2''$, and probably not more than $1''$ in Sirius himſelf, though he had been placed in the pole of the ecliptic; and in thoſe that appear much leſs luminous, *e. g.* γ Draconis, which is only of the third magnitude, it could hardly be expected to be ſenſible with ſuch inſtruments as have hitherto been uſed. However, Mr. Michell ſuggeſts, that it is not impracticable to conſtruct inſtruments, capable of diſtinguiſhing even to the 20th part of a ſecond, provided the air will admit of that degree of exactneſs. This ingenious writer apprehends, that the quantity of light which we receive from Sirius, does not exceed the light which we receive from the leaſt fixed ſtars of the ſixth magnitude, in a greater proportion than that of 1000 to 1, nor in a leſs proportion than that of 400 to 1; and the ſmaller ſtars of the ſecond magnitude ſeem to be about a mean proportional between the other two. Hence, the whole parallax of the leaſt fixed ſtars of the ſixth magnitude, ſuppoſing them of the ſame ſize and native bigneſs with the ſun, ſhould be from about $2'''$ to $3'''$, and their diſtance from about eight to twelve million times that of the ſun: and the parallax of the ſmaller ſtars of the ſecond magnitude, upon the ſame ſuppoſition, ſhould be about $12'''$, and their diſtance about two million times that of the ſun.

This author farther ſuggeſts, that, from the apparent ſituation of the ſtars in the heavens, there is the higheſt probability (the odds againſt the contrary opinion being many million millions to one) that the ſtars are collected together in cluſters in ſome places, where they form a kind of ſyſtem, whilſt in others there are either few or none of them, whether this diſpoſition be owing to their mutual gravitation, or to ſome other law or appointment of the Creator. Hence it may be inferred, that ſuch double ſtars, &c. as appear to conſiſt of two or more ſtars placed very near together, do really conſiſt of ſtars placed near together, and under the influence of ſome general law: and he proceeds to inquire, whether, if the ſtars are collected into ſyſtems, the ſun does not likewiſe make one of ſome ſyſtem, and which are thoſe, among the fixed ſtars, that belong to the ſame ſyſtem with himſelf.

Thoſe ſtars, he apprehends, which are found in cluſters, and ſurrounded by many others at a ſmall diſtance from them, belong probably to other ſyſtems, and not to ours. And thoſe ſtars which are ſurrounded with nebulæ, are probably only very great ſtars, which, on account of their ſuperior magnitude, are ſingly viſible; while the others, which compoſe the remaining part of the ſame ſyſtem, are ſo ſmall as to eſcape our ſight. And thoſe nebulæ in which we can diſcover either none or only a few ſtars, even with the aſſiſtance of the beſt teleſcopes, are probably ſyſtems that are ſtill more diſtant than the reſt.

For other particulars of this inquiry, we muſt refer to Phil. Tranſ. vol. lvii. art. 27. p. 234, &c.

As the diſtance of the fixed ſtars is beſt determined by their parallax, various methods have been purſued, hitherto without ſucceſs, for inveſtigating it; and the reſult of the moſt accurate obſervations has given us little more than a diſtant approximation, from which we may conclude, that the neareſt of the fixed ſtars cannot be leſs than 40,000 diameters of the whole annual orbit of the earth diſtant from us.

The method pointed out by Galileo, and firſt attempted by Hooke, Flamſtead, Molineux, and Bradley, of taking diſtances of ſtars from the zenith that paſs very near it, has given us a much juſter idea of the immenſe diſtance of the ſtars, and furniſhed us with an approximation to the knowledge of their parallax, that is much nearer the truth than we ever had before.

Dr. Bradley aſſures us (Phil. Tranſ. N° 406, or Abr. vol. vi. p. 162.), that, if it had amounted to a ſingle ſecond, or two at moſt, he ſhould have perceived it in the great number of obſervations which he made, eſpecially upon γ Draconis; and that it ſeemed to him very probable, that the annual parallax of this ſtar is not ſo great as a ſingle ſecond, and conſequently, that it is above four hundred thouſand times farther from us than the ſun.

But Dr. Herſchel, to whoſe ingenuity and induſtry in exploring the heavens aſtronomy is already much indebted, and from whom much more may be expected, remarks, that the inſtrument uſed on this occaſion, being the ſame with the preſent zenith ſectors, can hardly be allowed ſufficient to ſhew an angle of one or even two ſeconds with accuracy: and beſides, the ſtar on which the obſervations were made, is only a bright ſtar of the third or ſmall ſtar of the ſecond magnitude; and, therefore, its parallax is probably conſiderably leſs than that of a ſtar of the firſt magnitude: ſo that we are not warranted in inferring that the parallax of the ſtars in general does not exceed $1''$, whereas thoſe of the firſt magnitude may have, notwithſtanding the reſult of Dr. Bradley's obſervations, a parallax of ſeveral ſeconds.

Moreover, the method of zenith diſtances is liable to conſiderable errors, on account of refraction, the change of poſition of the earth's axis ariſing from nutation, preceſſion of the equinoxes, and other cauſes, and the aberration of light.

Dr. Herſchel has propoſed another method, by means of double ſtars, which is free from theſe errors, and of ſuch a nature, that the annual parallax, even if it ſhould not exceed the tenth part of a ſecond, may ſtill become viſible and be aſcertained, at leaſt to a much greater degree of approximation than it ever has been done. This method, which was firſt propoſed in an imperfect manner by Galileo, and has been alſo mentioned by other authors, is capable of every improvement which the teleſcope and mechaniſm of micrometers can furniſh. In order to obtain a general idea of it, let O, E, (*Plate* XX. *Aſtronomy*, *fig.* 8.) be two oppoſite points of the annual orbit, taken in the ſame plane with two ſtars *a*, *b*, of unequal magnitudes. Let the angle *a* O *b* be obſerved when the earth is at O, and *a* E *b* be obſerved when the earth is at E. From the difference of theſe angles, if there ſhould be any, we may calculate the parallax of the ſtars, according to the theory ſubjoined. Theſe two ſtars ought to be as near each other as poſſible, and alſo to differ as much in magnitude as we can find them.

Dr. Herſchel's theory of the annual parallax of double ſtars, with the method of computing from thence what is generally called the parallax of the fixed ſtars, or of ſingle ſtars of the firſt magnitude, ſuch as are neareſt to us, ſuppoſes, *firſt*, that the ſtars, one with another, are about the ſize of the ſun: and, *ſecondly*, that the difference of their apparent magnitudes is owing to their different diſtances, ſo that the ſtar of the ſecond, third, or fourth magnitude, is two, three, or four times as far off as one of the firſt. Theſe principles, which he premiſes as poſtulata, have ſo great a probability in their favour, that they will hardly be objected to by thoſe who are the leaſt acquainted with the doctrine of chances. See Mr. Michell's Inquiry, &c. already cited. Phil. Tranſ. vol. lvii. p. 234. 236, 237. 240. And Dr. Halley on the Number, Order, and Light of the Fixed Stars. Phil. Tranſ. vol. xxxi. or Abr. vol. vi. p. 148.

Accordingly, let O E (*Plate* XX. *Aſtronomy*, *fig.* 9.) be the whole diameter of the earth's annual orbit; and let *a*, *b*, *c*, be three ſtars ſituated in the ecliptic, in ſuch a manner, that they may be ſeen all in one line O *a b c*, when the earth is at O. Let the line O *a b c* be perpendicular to O E, and draw P E parallel to *c* O: then, if O *a*, *a b*, *b c*, are equal to each other, *a* will be a ſtar of the firſt magnitude, *b* of the ſecond, and *c* of the third. Let us now ſuppoſe the angle O *a* E, or parallax of the whole orbit of the earth, to be 1″ of a degree; then we have $PEa = OaE = 1''$: and becauſe very ſmall angles, having the ſame ſubtenſe O E, may be taken to be in the inverſe ratio of the lines O *a*, O *b*, O *c*, &c. we ſhall have $ObE = \frac{1}{2}''$, $OcE = \frac{1}{3}''$, &c. Now when the earth is removed to E, we ſhall have $PEb = EbO = \frac{1}{2}''$, and $PEa - PEb = aEb = \frac{1}{2}''$: *i. e.* the ſtars *a*, *b*, will appear to be $\frac{1}{2}''$ diſtant. We alſo have $PEc = EcO = \frac{1}{3}''$, and $PEa - PEc = aEc = \frac{2}{3}''$; *i. e.* the ſtars *a*, *c*, will appear to be $\frac{2}{3}''$ diſtant, when the earth is at E. Now, ſince we have $bEP = \frac{1}{2}''$, and $cEP = \frac{1}{3}''$, therefore $bEP - cEP = bEc = \frac{1}{2}'' - \frac{1}{3}'' = \frac{1}{6}''$; *i. e.* the ſtars *b*, *c*, will appear to be only $\frac{1}{6}''$ removed from each other, when the earth is at E. Whence we may deduce the following expreſſion, to denote the parallax that will become viſible in the change of diſtance between the two ſtars, by the removal of the earth from one extreme of its orbit to the other. Let P expreſs the total parallax of a fixed ſtar of the firſt magnitude, M the magnitude of the largeſt of the two ſtars, *m* the magnitude of the ſmalleſt, and *p* the partial parallax to be obſerved by the change in the diſtance of a double ſtar; then will $p = \frac{m - M}{Mm} P$; and *p*, being found by obſervation, will give us $P = \frac{pMm}{m - M}$.

E. gr. Suppoſe a ſtar of the firſt magnitude ſhould have a ſmall ſtar of the twelfth magnitude near it: then will the partial parallax we are to expect to ſee be $\frac{12 \times 1\,P}{12 - 1}$, or $\frac{11}{12}$th of the total parallax of a fixed ſtar of the firſt magnitude; and if we ſhould, by obſervation, find the partial parallax between two ſuch ſtars to amount to 1″, we ſhall have the total parallax $P = \frac{1 \times 1 \times 12}{12 - 1} = 1''.0909$. If the ſtars are of the third and twenty-fourth magnitudes, the partial parallax will be $\frac{24 - 3}{3 \times 24} = \frac{21}{72} P$; and if, by obſervation, *p* is found to be a tenth of a ſecond, the whole parallax will come out $\frac{1 \times 3 \times 24}{24 - 3} = 0''.3428$.

Farther, ſuppoſe the ſtars, being ſtill in the ecliptic, to appear in one line, when the earth is in any other part of its orbit between O and E; then will the parallax ſtill be expreſſed by the ſame algebraic formula, and one of the maxima will ſtill lie at O, the other at E: but the whole effect will be divided into two parts, which will be in proportion to each other as radius — ſine to radius + ſine of the ſtars' diſtance from the neareſt conjunction or oppoſition.

When the ſtars are any where out of the ecliptic, ſituated ſo as to appear in one line O *a b c* perpendicular to O E, the maximum of parallax will ſtill be expreſſed by $\frac{m - M}{Mm} P$; but there will ariſe another additional parallax in the conjunction and oppoſition, which will be to that which is found 90° before or after the ſun, as the ſine (S) of the latitude of the ſtars ſeen at O is to the radius (R); and the effect of this parallax will be divided into two parts; half of it lying on one ſide of the large ſtar, the other half on the other ſide of it. This latter parallax, moreover, will be compounded with the former, ſo that the diſtance of the ſtars in the conjunction and oppoſition will then be repreſented by the diagonal of a parallelogram, of which the two ſemi-parallaxes are the ſides; a general expreſſion for which will be $\sqrt{\left(\frac{m - M}{2mM} P\right)^2 \times \frac{SS}{RR} + 1}$; for the ſtars will apparently deſcribe two ellipſes in the heavens, whoſe tranſverſe axes will be to each other in the ratio of M to *m* (*fig.* 10.) and A *a*, B *b*, C *c*, D *d*, will be contemporary ſituations. Now, if *b* Q be drawn parallel to A C, and the parallelogram *b q* B Q be completed, we ſhall have $bQ = \frac{1}{2} CA - \frac{1}{2} ca = \frac{1}{2} Cc = \frac{1}{2} p$, or ſemi-parallax 90° before or after the ſun, and B *b* may be reſolved into, or is compounded of, *b* Q and *b q*; but $bq = \frac{1}{2} BD - \frac{1}{2} bd =$ the ſemi-parallax in the conjunction or oppoſition. We alſo have $R : S :: bQ : bq = \frac{pS}{2R}$; therefore the diſtance B *b* (or D *d*) $= \sqrt{\left(\frac{p}{2}\right)^2 + \left(\frac{pS}{2R}\right)^2}$; and by ſubſtituting the value of *p* into this expreſſion, we obtain $\sqrt{\left(\frac{m - M}{2Mm} P\right)^2 \times \frac{SS}{RR} + 1}$, as above. When the ſtars are in the pole of the ecliptic, *b q* will become equal to *b* Q, and B *b* will be $.7071\, P \frac{m - M}{Mm}$. Again, let the ſtars be at ſome diſtance, *e. g.* 5″, from each other, and let them both be in the ecliptic. This caſe is reſolvable into the firſt; for imagine the ſtar *a* (*fig.* 11.) to ſtand at *x*, and in that ſituation the ſtars *x*, *b*, *c*, will be in one line, and their parallax expreſſed by $\frac{m - M}{Mm} P$. But the angle *a* E *x* may be taken to be equal to *a* O *x*; and as the foregoing formula gives us the angles *x* E *b*, *x* E *c*, we are to add *a* E *x* or 5″ to *x* E *b*, and we ſhall have *a* E *b*. In general, let the diſtance of the ſtars be *d*, and let the obſerved diſtance at E be D; then will $D = d + p$, and therefore the whole parallax of the annual orbit will be expreſſed by $\frac{DMm - dMm}{m - M} = P$.

Suppoſe the two ſtars now to differ only in latitude, one being in the ecliptic, the other, *e. g.* 5″ north, when ſeen at O. This caſe may alſo be reſolved by the former; for imagine the ſtars *b*, *c*, (*fig.* 9.) to be elevated at right angles above the plane of the figure, ſo that *a* O *b*, or *a* O *c*, may make an angle of 5″ at O; then inſtead of the lines O *a b c*, E *a*, E *b*, E *c*, E P, imagine them all to be planes at right angles to the figure; and it will appear, that the parallax of the ſtars in longitude muſt be the ſame as if the ſmall ſtar had been without latitude. And ſince the ſtars *b*, *c*, by the motion of the earth from O to E, will not change their latitude, we ſhall have the following conſtruction for finding the diſtance of the ſtars ab, ac, at E, and from thence the parallax P. Let the triangle $ab\beta$ (*Plate* XX. *Aſtronomy*, *fig.* 12.) repreſent the ſituation of the ſtars; ab is the ſubtenſe of 5″, the angle under which they are to be ſeen at O. The quantity $b\beta$ by the former theorem is found $\frac{m-M}{Mm}P$, which is the partial parallax that would have been ſeen by the earth's moving from O to E, if both ſtars had been in the ecliptic; but on account of the difference in latitude, it will be now repreſented by $a\beta$, the hypothenuſe of the triangle $ab\beta$: therefore in general, putting $ab = d$, and $a\beta = D$, we have $\sqrt{\frac{\overline{DD-dd}\times Mm}{m-M}} = P$. Hence, D being taken by obſervation, and d, M, and m, given, we obtain the total parallax.

If the ſituation of the ſtars differs in longitude as well as latitude, we may reſolve this caſe by the following method. Let the triangle $ab\beta$ (*Plate* XX. *Aſtronomy*, *fig.* 13.) repreſent the ſituation of the ſtars, $ab = d$ being their diſtance ſeen at O, $a\beta = D$ their diſtance ſeen at E. That the change $b\beta$, which is produced by the earth's motion, will be truly expreſſed by $\frac{m-M}{Mm}P$, may be proved as before, by ſuppoſing the ſtar a to have been placed at α. Now let the angle of poſition $ba\alpha$ be taken by a micrometer, or by any other method ſufficiently exact; then, by ſolving the triangle $ab\alpha$, we ſhall have the longitudinal and latitudinal differences $a\alpha$ and $b\alpha$ of the two ſtars. Put $a\alpha = x$, $b\alpha = y$, and it will be $x + b\beta = aq$, whence $D = \sqrt{\left(x + \frac{m-M}{Mm}P\right)^2 + yy}$; and $\sqrt{\frac{\overline{D^2-y^2}\times Mm - xMm}{M-m}} = P$.

If neither of the ſtars ſhould be in the ecliptic, nor have the ſame longitude or latitude, the laſt theorem will ſtill ſerve to calculate the total parallax whoſe maximum will lie in E. There will, moreover, ariſe another parallax, whoſe maximum will be in the conjunction and oppoſition, which will be divided, and lie on different ſides of the large ſtar; but as we know the whole parallax to be exceedingly ſmall, it will not be neceſſary to inveſtigate every particular caſe of this kind; for, by reaſon of the diviſion of the parallax, which renders obſervations taken at any other time, except where it is greateſt, very unfavourable, the formulæ would be of little uſe. Dr. Herſchel cloſes his account of this theory with a general obſervation on the time and place where the maxima of parallax will happen.

When two unequal ſtars are both in the ecliptic, or, not being in the ecliptic, have equal latitudes, north or ſouth, and the largeſt ſtar has moſt longitude, the maximum of the apparent diſtance will be when the ſun's longitude is 90° more than the ſtars, or when obſerved in the morning: and the minimum when the longitude of the ſun is 90° leſs than that of the ſtar, or when obſerved in the evening. When the ſmall ſtar has moſt longitude, the maximum and minimum, as well as the time of obſervation, will be the reverſe of the former. When the ſtars differ in latitude, this makes no alteration in the place of the maximum or minimum, nor in the time of obſervation; *i. e.* it is immaterial whether the largeſt ſtar has the leaſt or the greateſt latitude of the two ſtars. Phil. Tranſ. vol. lxxii. part i. art. 11.

The diſtance of the ſtar γ Draconis appears by Dr. Bradley's obſervations, already recited, to be at leaſt four hundred thouſand times that of the ſun, and the diſtance of the neareſt fixed ſtar not leſs than forty thouſand diameters of the earth's annual orbit: *i. e.* the former is diſtant from the earth at leaſt 38,000,000,000,000 miles, and the latter not leſs than 7,600,000,000,000 miles. As theſe diſtances are immenſely great, it may not be unamuſing to compare them with the velocity of ſome moving body by which they may be meaſured.

The ſwifteſt motion we know of is that of light, (ſee LIGHT,) which paſſes from the ſun to the earth in eight minutes thirteen ſeconds, and yet this would be above ſix years traverſing the firſt ſpace, and nearly 1¼ year in paſſing from the neareſt fixed ſtar to the earth. A cannon-ball diſcharged from a twenty-four pounder, with two-thirds its weight of powder, which moves at the rate of about nineteen miles in a minute (ſee GUN), would be three million eight hundred thouſand years paſſing from γ Draconis to the earth, and ſeven hundred and ſixty thouſand years paſſing from the neareſt fixed ſtar. Sound, which moves at the rate of about thirteen miles in a minute, would be five million ſix hundred thouſand years traverſing the former diſtance, and one million one hundred and twenty thouſand paſſing through the latter.

The celebrated Huygens purſued ſpeculations of this kind ſo far, as to believe it not impoſſible, that there may be ſtars at ſuch inconceivable diſtances, that their light has not yet reached the earth ſince its creation.

Dr. Halley has alſo advanced, what he ſays (Phil. Tranſ. No. 364. or Abr. vol. vi. p. 418.) ſeems to be a metaphyſical paradox, *viz.* that the number of fixed ſtars muſt be more than any finite number, and ſome of them more than at a finite diſtance from others: and Mr. Addiſon has juſtly obſerved, that this thought is far from being extravagant, when we conſider that the univerſe is the work of infinite power, prompted by infinite goodneſs, having an infinite ſpace to exert itſelf in; ſo that our imagination can ſet no bounds to it.

STARS, *The Magnitudes of the Fixed*, appear to be very different, which difference may probably ariſe, not only from a diverſity in their real magnitudes, but principally from their diſtances, which are different.

The ſtars appear of a ſenſible magnitude to the bare eye, becauſe the retina is affected not only by the rays of light which are emitted directly from them, but by many thouſands more, which, falling upon our eye-lids, and upon the aerial particles about us, are reflected into our eyes ſo ſtrongly, as to excite vibrations, not only in thoſe points of the retina where the real images of the ſtars are formed, but alſo in other points at ſome diſtance round about. This makes us imagine the ſtars to be much bigger than they would appear, if we ſaw them only by the few rays which come directly from them, ſo as to enter our eyes without being intermixed with others.

Any one may be ſenſible of this by looking at a ſtar of the firſt magnitude through a long narrow tube, which, though it takes in as much of the ſky as would hold a thouſand ſuch ſtars, ſcarcely renders that one viſible.

The more a teleſcope magnifies, the leſs is the aperture through which the ſtar is ſeen, and conſequently the fewer rays it admits into the eye. Since, therefore, the ſtars appear leſs in a teleſcope which magnifies 200 times, than they do to the bare eye, inſomuch that they ſeem to be only indiviſible points, we may infer that they are at immenſe diſtances from us, and alſo that they ſhine by their own proper light. If they ſhone by borrowed light, they would be as inviſible without teleſcopes as the ſatellites of Jupiter are: for theſe ſatellites appear bigger when viewed with a good teleſcope than the largeſt fixed ſtars do.

The ſtars, on account of their apparently various magnitudes,

nitudes, have been diſtributed into ſeveral claſſes, called *magnitudes*.

The firſt claſs, or ſtars of the firſt magnitude, are thoſe which appear largeſt, and may probably be neareſt us. Next theſe, are thoſe of the ſecond magnitude, and ſo on to the ſixth, which comprehends the ſmalleſt ſtars viſible to the naked eye. All beyond theſe are called *teleſcopic* ſtars. Not that all the ſtars of each claſs appear juſtly of the ſame magnitude; there is great latitude in this reſpect; and thoſe of the firſt magnitude appear almoſt all different in luſtre and ſize. Other ſtars there are, of intermediate magnitudes, which aſtronomers cannot refer to one rather than another claſs, and therefore they place them between the two.

Procyon, for inſtance, which Ptolemy makes of the firſt magnitude, and Tycho of the ſecond, Mr. Flamſtead lays down as between the firſt and ſecond.

Thus, inſtead of ſix ſeveral magnitudes, we may ſay there are almoſt as many orders of ſtars as there are ſtars; ſuch a difference being obſervable in the magnitude, colour, and brightneſs of them.

Whatever room there may be to hope, that we may ſome time or other be able to diſcover the parallax of a few among the fixed ſtars, yet at the ſame time it ſeems probable, that we ſhall never be able to diſcover any ſenſible magnitude in their apparent diameters, which, even in Sirius, if his native brightneſs is not leſs than that of the ſun, muſt be conſiderably leſs, whatever be his parallax, than the hundredth, probably than the two hundredth part of a ſecond; ſo that it could ſcarcely be diſtinguiſhable with a teleſcope, upon the former ſuppoſition, that ſhould magnify ſix, or, upon the latter, with one that ſhould magnify twelve thouſand times. Nor can we well expect to find their apparent diameters from any occultation by the moon, ſince the diameter of a hundredth part of a ſecond would be covered by the moon, if it entered directly, in leſs than the fiftieth part of a ſecond of time, and, therefore, a ſtar can hardly enter ſo obliquely, as to appear to vaniſh by degrees: no ſtar, probably, which the moon can paſs over, ſubtending an angle half ſo great. Nor is it likely there can any thing be determined from occultations by any of the planets. And, therefore, there ſeems to be little chance of diſcovering with certainty the real ſize of any of the fixed ſtars, and we muſt be content to deduce it from their parallax (if that ſhould ever be found) and the quantity of light which they afford us, compared with that of the ſun. Dr. Herſchel, however, informs us, that with a magnifying power of 6450, and by means of his new micrometer, he found the apparent diameter of α Lyræ to be $0''.355$.

The ſtars are likewiſe diſtinguiſhed, with regard to their ſituation, into *aſteriſms*, or *conſtellations*, which are nothing but aſſemblages of ſeveral neighbouring ſtars, conſidered as conſtituting ſome determinate figure, as of an animal, &c. and denominated from it; a diviſion as ancient as the book of Job, in which we find mention of Orion, and the Pleiades, &c. See CONSTELLATION.

Beſides the ſtars thus diſtinguiſhed into magnitudes and conſtellations, there are others not reduced to either. Thoſe not reduced into conſtellations, are called *informes*, (which ſee,) or *unformed ſtars*; of which kind ſeveral, ſo left at large by the ancients, have been ſince formed into new conſtellations by the modern aſtronomers; as *Cor Caroli*, by Dr. Halley; *Scutum Sobieſci*, by Hevelius, &c.

In deſcribing the particular ſtars, it will be moſt convenient to begin with ſuch as never ſet in our climates, and we may then refer the ſituations of others to their poſitions with reſpect to theſe.

The Great Bear is the moſt conſpicuous of the conſtellations which never ſet; it conſiſts of ſeven ſtars, placed like the four wheels of a waggon, and its three horſes, except that the horſes are fixed to one of the wheels. The two hind-wheels are the pointers, which direct us to the pole-ſtar, in the extremity of the tail of the Little Bear: and further on, to the conſtellation Caſſiopeia, which is ſituated in the milky way, where it is neareſt to the pole, and which conſiſts of ſeveral ſtars, nearly in the form of the letter W. The two northernmoſt wheels of the Great Bear, or wain, point at the bright ſtar Capella, the goat, in Auriga. Deſcending along the milky way from Caſſiopeia, if we go towards Capella, we come to Algenib, in Perſeus; and a little further from the pole we find Algol, or Meduſa's head: but if we take the oppoſite direction, we arrive at Cygnus, the ſwan; and beyond it, a little out of the milky way, is the bright ſtar Lyra. The Dragon conſiſts of a chain of ſtars partly ſurrounding the Little Bear; and between Caſſiopeia and the Swan is the conſtellation Cepheus.

Near Algenib, and pointing directly towards it, are two ſtars of Andromeda, and a third is a little beyond them. A line drawn through the Great Bear and Capella paſſes to the Pleiades, and then, turning at a right angle towards the milky way, reaches Aldebaran, or the bull's eye, and the ſhoulders of Orion, who is known by his belt, conſiſting of three ſtars, placed in the middle of a quadrangle. Aldebaran, the Pleiades, and Algol, make the upper, and Menkar, or the whale's jaw, with Aries, the lower points of a W. In Aries we obſerve two principal ſtars, one of them with a ſmaller attendant.

A line drawn from the pole, midway between the Great Bear and Capella, paſſes to the Twins and to Procyon; and then, in order to reach Sirius, it muſt bend acroſs the milky way. Algol and the Twins point at Regulus, the lion's heart, which is ſituated at one end of an arch, with Denebola at the other end.

The pole-ſtar and the middle horſe of the wain direct us to Spica Virginis, conſiderably diſtant: the pole and the firſt horſe nearly to Arcturus, in the waggoner, or Bootes. Much further ſouthwards, and near the milky way, is Antares, in the Scorpion, forming, with Arcturus and Spica, a triangle, within which are the two ſtars of Libra. The Northern crown is nearly in a line between Lyra and Arcturus, and the heads of Hercules and Serpentarius are between Lyra and Scorpio.

In the milky way, below the part neareſt to Lyra, and on a line drawn from Arcturus through the head of Hercules, is Aquila, making with Lyra and Cygnus a conſpicuous triangle. The laſt of the three principal ſtars in Andromeda makes, with three of Pegaſus, a ſquare, of which one of the ſides points to Fomalhaut, ſituated at a conſiderable diſtance in the ſouthern fiſh, and in the neighbourhood of the whale, which has already been mentioned.

By means of theſe allineations, all the principal ſtars that are ever viſible in Britain may be eaſily recogniſed. Of thoſe which never riſe above our horizon, there are ſeveral of the firſt magnitude; Canopus, in the ſhip Argo, and Achernar, in the river Eridanus, are the moſt brilliant of them; the feet of the Centaur, and the Croſier are the next; and, according to Humboldt's obſervations, perhaps ſome others may require to be admitted into the ſame claſs.

Thoſe ſtars not reduced to claſſes or magnitudes, are called *nebulous* ſtars, being ſuch as only appear faintly in cluſters, in form of little lucid nebulæ, or clouds. See NEBULÆ.

Ptolemy ſets down five cloudy ſtars, *viz.* one at the extremity of the right hand of Perſeus, which appears, through the teleſcope, thickly ſet with ſtars; one in the middle of the Crab, called *Præſepe*, or the Manger, in which Galileo counted above forty ſtars; one unformed near the ſting of the Scorpion; the eye of Sagittarius, in which two ſtars may be ſeen in a clear ſky with the naked eye, and ſeveral more with the teleſcope; and one in the head of Orion, in which Galileo counted twenty-one ſtars.

Flamſtead obſerved a cloudy ſtar before the bow of Sagittarius, which conſiſts of a great number of ſmall ſtars, and the ſtar *d* above Sagittarius's right ſhoulder is encompaſſed with ſeveral more.

Caſſini and Flamſtead diſcovered one between the Great and Little Dog, which is very full of ſtars, viſible only by the teleſcope.

But the moſt remarkable of all the cloudy ſtars is that in the middle of Orion's ſword, in which Huygens, and ſince Dr. Long, obſerved twelve ſtars, ſeven of which (three of them, now known to be four, being very cloſe together) ſeem to ſhine through a cloud, very lucid near the middle, but faint and ill-defined about the edges. (See GALAXY, MAGELLANIC *Clouds*, and *Lucid* SPOTS.) Caſſini is of opinion, that the brightneſs of theſe proceeds from ſtars ſo minute, as not to be diſtinguiſhed by the beſt glaſſes: others more probably think, they are large ſpaces in the ether through which a lucid medium is diffuſed. Although moſt of theſe ſpaces are but a few minutes of a degree in breadth, yet, ſince they are among the fixed ſtars, they are probably ſpaces not leſs than our whole ſolar ſyſtem; in which there ſeems to be a perpetual uninterrupted day, which may furniſh matter of ſpeculation, as well to the curious naturaliſt, as to the aſtronomer.

There are alſo ſeveral ſtars which appear ſingle to the naked eye, but are diſcovered by the teleſcope to be double, &c. Of theſe ſeveral have been obſerved by Caſſini, Hooke, Long, Maſkelyne, Hornſby, Pigott, Mayer, &c.; but Dr. Herſchel has been much the moſt ſucceſsful in obſervations of this kind. Beſides the ſkill and induſtry by which he is no leſs diſtinguiſhed than other aſtronomers who have been employed in celeſtial obſervations, his ſucceſs has been chiefly owing to the very extraordinary magnifying powers of the Newtonian ſeven-feet reflector which he has uſed, and the advantage of an excellent micrometer of his own conſtruction. The powers which he has uſed have been 146, 227, 278, 460, 754, 932, 1159, 1536, 2010, 3168, and even 6450. His obſervations appear to commence with the year 1776, but almoſt all of them were made in the years 1779, 1780, 1781; and they have been ſince continued with the ſame ſkill and general aſſiduity. For the reſult, we refer to the articles DOUBLE *Stars*, GALAXY, HEAVENS, NEBULA, NEBULOSITY, and the ſequel of this article.

STAR, *Double*, or a *Binary Sidereal Syſtem*, is formed by two ſtars ſituated ſo near to each other, as to be kept together by their mutual gravitation. The two bodies may revolve round their common centre of gravity in circles, or in ſimilar ellipſes, the dimenſions of their orbits being proportional to their relative quantities of matter. From a ſeries of obſervations on double ſtars, Dr. Herſchel has found that they have changed their ſituations with regard to each other, that the one performs a revolution round the other, and that the motion of ſome of them is direct, while that of others is retrograde. In the courſe of obſervations purſued for twenty-five years, he diſcovered that in more than fifty of the double ſtars, there is a change either in the diſtance of the two ſtars, or in the angle made by a line joining them with the direction of their daily motion, which he calls "the angle of poſition." The intereſting obſervations that have been publiſhed (Phil. Tranſ. vol. lxxiii.) relate to ſix double ſtars, α Geminorum, γ Leonis, ε Bootes, ζ Herculis, δ Serpentis, and γ Virginis. In reſpect to the firſt of theſe, Caſtor or α Geminorum, the angle of poſition was found to have diminiſhed in the ſpace of 43 years 142 days, 45° 39′; and from the regularity of its decreaſe, he thinks it highly probable that the orbits in which the two ſtars move round their common centre of gravity are nearly circular, and at right angles to the line in which we ſee them; and that the time of a whole apparent revolution of the ſmall ſtar round Caſtor will be nearly 342 years and 2 months, in a retrograde direction. From the year 1778 to 1803, he never could perceive any variation in the diſtance of the two ſtars, which was uniformly $1\frac{7}{8}$ of the diameter of the large one. The diſtance of the two ſtars which compoſe γ Leonis has undergone a decided change from February 16th, 1782, to March 26th, 1803. The diameters of the two ſtars were as 5 to 4. The angle of poſition had diminiſhed in this time from 7° 37′ N. following, to 6° 21′ S. following. From the interval between the two ſtars, the ratio of their diameters, and the variation in the angle of poſition, Dr. Herſchel has found that the apparent orbit of the ſmall ſtar is elliptical, and that it performs a whole revolution in about 1200 years, in a retrograde direction. The beautiful double ſtar of ε Bootes is compoſed of two ſtars, one of which is of a light red, and the other of a fine blue, having the appearance of a planet and its ſatellite. The diſtance between the two ſtars, obſerved with a power of 460, and an aperture of 6.3 inches, in 1781, was $1\frac{1}{2}$ the diameter of the large ſtar, and in 1803, the interval had increaſed to $1\frac{3}{4}$ of that diameter. The ratio of the ſize of the ſtars is as 3 to 2. The angle of poſition appeared to have ſuffered a change of 12° 33′, in the ſpace of 22 years and 207 days. From theſe facts Dr. Herſchel concludes that the orbit of the ſmall ſtar is elliptical, and performs its revolution, according to the order of the ſigns, in 1681 years. The double ſtar ζ Hercules is compoſed of a greater and a leſſer ſtar; the former being of a beautiful blueiſh-white, and the latter of a fine aſh-colour. On the 18th July, 1782, the interval between the two ſtars was one half the diameter of the ſmaller one, with a power of 460. On the 21ſt July of the ſame year, their diſtance remained the ſame, but with a power of 987; they were one full diameter of the ſmall ſtar aſunder. In 1795, Dr. Herſchel found it difficult to perceive the ſmall ſtar. In the month of October 1795, however, he ſaw it diſtinctly with a power of 460. In 1802, he could no longer perceive the ſmall ſtar, but in a clear night in September of that year, with a power of 460, the apparent diſc of ζ Hercules ſeemed to be a little lengthened in one direction. With the ten-feet teleſcope, and a power of 600, it had the appearance of a lengthened, or rather wedge-formed, ſtar. With a power of 2140, he again examined it on the 11th of April, 1803, and found the diſc a little diſtorted; but he was convinced that not more than three-eighths of the apparent diameter of the ſmall ſtar was wanting to a complete occultation. The angle of poſition, on the 21ſt July, 1782, was 20° 42′ north following.

The double ſtar of δ Serpentis has, like ε Bootes, undergone a conſiderable change in the angle of poſition, without any variation in the diſtance between the two ſtars. On the 5th September, 1782, the angle of poſition was 42° 48′ ſouth preceding; and on the 7th February 1802, it was 61° 27′ ſouth preceding, having ſuſtained a diminution of 18° 39′ in the ſpace of 19 years and 155 days. Hence the period of a complete revolution of the ſmaller ſtar will be about 375 years.

The double ſtar of γ Virginis, which has long been known to aſtronomers, is compoſed of two ſtars, which Dr. Herſchel at firſt conſidered as nearly equal, though he has ſince aſcertained that the one is a little larger than the other. Their diſtance, which is about 2½ diameters, has continued the ſame for 21 years, while the angle of poſition has varied conſiderably. On the 21ſt November, 1781, the angle of poſition was 40° 44′ ſouth following, or rather north preceding, ſince the other ſtar was afterwards found to be the ſmaller of the two; and on the 15th April, 1803, the angle of poſition was 30° 20′ north preceding, having ſuffered a diminution of 10° 24′ in 21 years and 145 days. From an obſervation of Mayer's, however, in 1756, Dr. Herſchel has found the angle of poſition for that year to be 54° 21′ 37″ north preceding, which gives a motion of 24° 2′ in 47 years and 105 days. Hence he concludes, that a complete revolution is performed in about 708 years.

For a catalogue, ſuch as our limits would allow, of the principal double ſtars, ſee the article DOUBLE *Stars*.

For an account of cluſtering ſtars, cluſters of ſtars, and groups of ſtars, and alſo treble, quadruple, quintuple, and multiple ſyſtems of ſtars, we muſt refer to the articles GALAXY and HEAVENS; and for a more particular detail, and catalogues of them, to Dr. Herſchel's papers, or to the 2d volume of Ferguſon's Aſtronomy, by Dr. Brewſter.

STARS, *Inſulated*, a name applied by Dr. Herſchel to thoſe celeſtial bodies which are in a great degree out of the reach of the attractive force of other ſtars, ſuch as our Sun, Arcturus, Capella, Lyra, Sirius, Canobus, Markab Bellatrix, Menkar, Shedir, Algorah, Propus, and probably many others. It is obvious that no two ſtars in the univerſe can be altogether out of the ſphere of each other's attraction; but in the caſe of Sirius and our ſun, which, upon the ſuppoſition that their maſſes are equal, and that the former has a parallax of 1″, would take 33 millions of years to fall to one another by their mutual action, we are entitled to ſay that they are inſulated. Inſulated ſtars are conſidered by Dr. Herſchel as the centres of extenſive planetary ſyſtems like our own; an opinion which he deduces from analogy, and from the nature of other ſidereal combinations. Inſtead of ſuppoſing, therefore, as has generally been done, that every ſtar in the firmament is encircled with planets, ſatellites, and comets, Dr. Herſchel believes that the inſulated ſtars alone are ſurrounded with ſuch numerous attendants.

STARS, called *Nebulæ.* (See NEBULÆ, NEBULOSITY, and the articles to which we have above referred.) Mr. Michell has ſhewn, from the computation of probabilities, that it is many million million chances to one, that the ſtars, which appear to form double ſtars, &c. cluſters and nebulæ in the heavens, are really collected together into ſeparate ſyſtems. In the caſe of the Pleiades, for example, he computes that it is 500,000 to 1, that no ſix ſtars out of the number of thoſe that are equal to the fainteſt of them in ſplendour, ſcattered at random in the whole heavens, ſhould be within ſo ſmall a diſtance from each other as the Pleiades are.

A ſimilar opinion was maintained by profeſſor Kant and M. Lambert, who ſuppoſed that all the ſtars in the univerſe are collected into nebulæ; and that all the inſulated or ſcattered ſtars which appear in the heavens, belong to the particular nebula in which our ſyſtem is placed. We are indebted, however, ſolely to the genius and induſtry of Dr. Herſchel, for perfecting theſe ſagacious views, and ſupporting them by a body of evidence amounting nearly to demonſtration. He has obſerved the poſition, magnitude, and ſtructure of no fewer than 2500 nebulæ. He generally detected them in certain directions, rather than in others; and in many parts of the heavens there were vacant ſpaces, both preceding and following the nebulous ſtrata. Dr. Herſchel ſuppoſes the nebula in Cancer, and that of Coma Berenices, to belong to two ſtrata which are neareſt the nebula of the Milky Way.

The following catalogue of nebulæ, copied from Dr. Brewſter's edition of Ferguſon's Aſtronomy, is founded chiefly on the obſervations of Meſſier, as given in the "Connoiſſance des Tems" for 1784, the more recent obſervations of Dr. Herſchel being always added. The *firſt* column contains the number of the nebulæ, and the time when the obſervation was made; the *ſecond* and *third*, its right aſcenſion and declination for that time, which are more convenient than their longitude and latitude for finding them on a celeſtial globe. The *fourth*, its diameter in degrees and minutes; and the laſt, ſome general remarks on its appearance. All the nebulæ in this claſs may be ſeen with good teleſcopes of a moderate ſize.

Catalogue of 103 Nebulæ, the Poſitions of which have been determined by Meſſier.

No. and Year when obſerved	Poſition of the Nebulæ.	Right Aſcen. in Degrees.	Declination.	Diamet.	General Remarks.
1. 1758.	Above the Bull's ſouthern horn, weſt of ζ -	80 0 33	21 45 27 N.		A whitiſh light, elongated like the flame of a taper. It exhibited a mottled nebuloſity to Dr. Herſchel.
2. 1760.	In the head of Aquarius, near the 24th ſtar -	320 17 0	1 47 0 S.	4′	It is like the nucleus of a comet, ſurrounded with a large round nebula. Dr. H. reſolved it into ſtars.
3. 1764.	Between Arcturus and Cor Caroli - -	202 51 19	29 32 57 N.	3′	It is round, bright in the centre, and fades away gradually. It exhibited a mottled nebuloſity to Dr. H.
4.	Near Antares - -	242 16 56	25 55 40 S.	2½′	A maſs of ſmall ſtars.
5.	Near 6 Serpent - -	226 39 4	2 57 16 N.	3′	A round nebula. Reſolved into ſtars by Dr. H.
6.	Between the bow of Sagittarius and the tail of Scorpio - - -	261 10 39	32 10 34 S.	15′	A maſs of ſmall ſtars.
7.	Near the preceding - -	264 30 24	34 40 34 S.	30′	A maſs of ſmall ſtars.
8.	Between the bow of Sagittarius, and the right foot of Ophiuchus -	267 29 30	24 21 10 S.	30′	An elongated maſs of ſtars. Near this maſs is the 9th of Sagittarius, which is encircled with a faint light.

No. and Year when obſerved.	Poſition of the Nebulæ.	Right Aſcen. in Degrees.	Declination.	Diamet.	General Remarks.
9.	In the right leg of Ophiuchus - - -	256 20 36	18 13 26 S.	3′	Round and faint; but reſolved by Dr. Herſchel into ſtars.
10.	In the girdle near 30 Ophiuchus - -	251 12 6	3 42 18 S.	4′	A fine and round nebula. Reſolved into ſtars by Dr. H.
11.	Near K. Antinous - -	279 35 43	6 31 1 S.	4′	A maſs of many ſmall ſtars, mixed with a faint light.
12.	Between the arm and the left ſide of Ophiuchus	248 43 10	2 30 28 S.	3′	Round and faint. Near it is a ſtar of the 9th magn. Reſolved by Dr. H. into ſtars.
13.	In the girdle of Hercules, between two ſtars of the 8th magnitude - -	248 18 48	36 54 44 N.	6′	Round and bright in the middle. Reſolved by Dr. H. into ſtars.
14.	In the drapery over the R. arm of Ophiuchus	261 18 29	3 5 45 S.	7′	Round and faint. Near a ſtar of the 9th magn. Reſolved into ſtars by Dr. H.
15.	Between the head of Pegaſus, and that of the Little Horſe - -	319 40 19	10 40 3 N.	3′	Round and bright in the centre. Reſolved into ſtars by Dr. H.
16.	Near the Serpent's tail -	271 15 3	13 51 44 N.	8′	A maſs of ſmall ſtars, mixed with a faint light, reſolved by Dr. H.
17.	North of the bow of Sagittarius - - -	271 45 48	16 14 44 S.	5′	A train of faint light, with ſtars.
18.	Above the preceding -	271 34 3	17 13 14 S.	5′	A maſs of ſmall ſtars ſurrounded with nebuloſity.
19.	Between Scorpio and the R. foot of Ophiuchus	252 1 45	25 54 46 S.	3′	Round, and reſolved into ſtars by Dr. H.
20.	Between the bow of Sagittarius and the right foot of Ophiuchus -	267 4 5	22 59 10 S.		A maſs of ſtars of the 8th and 9th magnitude, ſurrounded with nebuloſity.
21.	Near 11 Sagittarius - -	267 31 35	22 31 25 S.		The ſame as the preceding.
22.	Near 25 Sagittarius - -	275 28 39	24 6 11 S.	6′	Round, and reſolved into ſtars by Dr. H.
23.	Near 65 Ophiuchus - -	265 42 50	18 45 55 S.	15′	A maſs of ſtars very near each other.
24.	Near the end of the bow of Sagittarius in the Milky Way - -	270 26 0	18 26 0 S.	1° 30′	Great nebuloſity, containing ſeveral ſtars. The light is divided into ſeveral parts. Reſolved into ſtars by Dr. H.
25.	Near the preceding, near 21 Sagittarius - -	274 25 0	19 5 0 S.	10′	A maſs of ſmall ſtars.
26.	Near *n* and *o* Antinous -	278 5 25	9 38 14 S.	2′	A maſs of ſmall ſtars.
27.	Near 14 of the Fox - -	297 21 41	22 4 0 N.	4′	Oval. It exhibited a mottled nebuloſity to Dr. H.
28.	A degree from λ Sagittarius - - -	272 29 30	24 57 11 S.	2′	Round, and reſolved into ſtars by Dr. H.
29.	Below γ Cygni - -	303 54 29	37 11 57 N.		A maſs of 7 or 8 ſmall ſtars.
30.	Near 41 Capricorn - -	321 46 18	24 19 4 S.	2′	Round, and reſolved into ſtars by Dr. H.
31.	In Andromeda's girdle -	7 26 32	39 9 32 N.	40′	It reſembles two cones of light joined at their baſe, which is 15′ broad. Reſolved into ſtars by Dr. H.
32.	Below the preceding -	7 27 32	38 45 34 N.	2′	Round, without ſtars, and with a faint light.
33.	Below the head of the N. Fiſh and the Great Triangle - - -	20 9 17	29 32 23 N.	15′	Its light is uniform and whitiſh. It exhibited a mottled nebuloſity to Dr. H.
34.	Between Meduſa's head and the left foot of Andromeda - -	36 51 37	41 39 32 N.	15′	A maſs of ſmall ſtars.
35.	Near μ and η Caſtor -	88 40 9	24 33 30 N.	20′	A maſs of ſmall ſtars near Caſtor's left foot.
36.	Near φ Bootes - -	80 11 42	34 8 6 N.	9′	A maſs of ſmall ſtars.
37.	Near the preceding - -	84 15 12	32 11 51 N.	9′	A maſs of ſmall ſtars with a nebuloſity, reſolved into ſtars by Dr. H.
38.	Near σ Auriga - -	78 10 12	36 11 51 N.	15′	A ſquare maſs of ſmall ſtars.
39.	Near the Swan's tail -	320 57 10	47 25 0 N.	1° 0′	A maſs of ſmall ſtars.
40.	At the root of the Great Bear's tail - -	182 45 30	59 23 50 N.		Two ſtars very near one another
41.	Below Sirius - -	98 58 12	20 33 0 S.		A maſs of ſmall ſtars.

STARS.

No. and Year when obſerved.	Poſition of the Nebulæ.	Right Aſcen. in Degrees.	Declination.	Diamet.	General Remarks.
1765. 42.	Between θ and *c* in Orion's ſword	80 59 40	5 34 6 S.	6′	A beautiful nebula, containing ſeven ſmall ſtars.
1769. 43.	Above the preceding	81 3 0	5 26 37 S.		A ſtar ſurrounded with nebuloſity.
44.	Between γ and δ Cancer	126 50 30	20 31 38 N.		A maſs of ſmall ſtars.
45.	The Pleiades	53 27 4	23 22 41 N.		Cluſter of ſtars.
46. 1771.	Between the G. Dog's head and the hind feet of the Unicorn	112 47 43	14 19 7 S.		A maſs of ſtars, with a little nebuloſity.
47.	Near the preceding	116 3 58	14 50 8 S.		A maſs of ſmall ſtars.
48.	Near the three ſtars at the root of the Unicorn's tail	120 36 0	1 16 42 S.		A maſs of ſmall ſtars.
49.	Near ρ Virgo	184 26 58	9 16 9 N.		See Mem. Acad. 1779.
50. 1772.	Above θ Great Dog	102 57 28	7 57 42 S.		A maſs of ſmall ſtars below the Unicorn's right thigh.
51. 1774.	Below η Great Bear. Near the ear of the Northern Greyhound	200 5 48	48 24 24 N.		Double. The two atmoſpheres, whoſe centres are 4′ 35″ diſtant, touch one another, and are bright in the middle. The one is fainter than the other. Reſolved into ſtars by Dr. Herſchel.
52.	Below *d* Caſſiopeiæ	348 39 27	60 22 12 N.		Maſs of ſtars, mixed with a nebuloſity, according to Dr. H. This cluſter appears like a ſolid ball, conſiſting of ſmall ſtars, quite compreſſed into one blaze of light, with a great number of looſe ones ſurrounding it.
53.	Near 42 Berenice's hair	195 30 26	19 22 44 N.		Round, and reſolved into ſtars by Dr. H.
1777. 54.	In Sagittarius	280 12 55	30 44 1 S.	6′	Faint and bright in the centre.
1778. 55.	In Sagittarius	291 30 25	31 26 27 S.		A white ſpot, reſolved into ſtars by Dr. H.
56.	Near the Milky Way	287 0 1	29 48 14 N.		Faint, and reſolved into ſtars by Dr. H.
1779. 57.	Between γ and β Lyra	281 20 8	32 46 3 N.		Round, and conſiſting of a mottled nebuloſity.
58.	In Virgo	186 37 23	13 2 42 N.		Very faint, without any ſtar.
59.	Near the preceding	187 41 38	12 52 36 N.		Very faint, without any ſtar.
60.	In Virgo	188 6 53	12 46 2 N.		Brighter than the two preceding.
61.	In Virgo	182 41 5	5 42 5 N.		Very faint.
62.	In Scorpio	251 48 24	29 45 30 S.		Like a comet, with a brilliant centre, ſurrounded with a faint light. Reſolved into ſtars by Dr. H.
63.	In the Canes Venatici	196 5 30	43 12 37 N.		Very faint.
64.	In Berenice's hair	191 27 38	22 52 31 N.		Faint.
1780. 65.	In the Lion	166 50 54	14 16 8 N.		Faint, but reſolved into ſtars by Dr. H.
66.	Very near the preceding	167 11 39	14 12 21 N.		Very faint, but reſolved into ſtars by Dr. H.
67.	Below the ſouthern claw of the Crab	129 6 57	12 36 38 N.		A maſs of ſtars, with nebuloſity. It is a cluſter, pretty much compreſſed, in which Dr. H. has obſerved 200 ſtars at once, with a power of 157 in his great reflector.
68.	Below the Crow	186 54 33	25 30 20 S.	2′	Very faint.
69.	Below the left arm of Sagittarius	274 11 46	32 31 45 S.	2′	Faint, like the nucleus of a ſmall comet.
70.	Near the preceding	277 13 16	32 31 7 S.	2′	Near four teleſcopic ſtars.
71.	Between γ and δ Arrow	295 59 9	18 13 0 N.	3′ 30″	Very faint, and reſolved into ſtars by Dr. H.
72.	Above the tail of Capricorn	310 20 49	13 20 51 S.	2′	Faint, but reſolved into ſtars by Dr. H.
73.	Near the preceding	311 43 4	13 28 40 S.		Three or four ſmall ſtars, containing a little nebuloſity.

No. and Year when obſerved.	Poſition of the Nebulæ.	Right Aſcen. in Degrees.	Declination.	Diamet.	General Remarks.
74.	Near η in the ſtring that connects the Fiſhes -	21 14 9	14 39 35 N.		Very faint, but reſolved into ſtars by Dr. Herſchel.
75.	Between Sagittarius and the head of Capricorn	298 17 24	22 32 23 S.		Compoſed of ſmall ſtars, with nebuloſity. Mechain makes it only nebulous.
76.	In Andromeda's right foot	22 10 47	50 28 48 N.	2′	Compoſed of ſmall ſtars, with nebuloſity. Small and faint.
77.	In the Whale - - -	37 52 33	0 57 43 S.		A maſs of ſmall ſtars, containing nebuloſity.
78.	In Orion - - -	83 53 35	0 1 23 S.	3′	A maſs of ſtars, with two bright nuclei, ſurrounded with a nebuloſity.
79.	Below the Hare - -	78 49 2	24 42 57 S.		A fine nebula, bright in the centre, and a little diffuſed. Reſolved into a mottled nebuloſity by Dr. H.
80.	Between g and δ Scorpio -	240 59 48	22 25 13 S.	2′	Round and bright in the centre, like a comet.
1781. 81.	Near the ear of the Great Bear - - -	144 27 44	70 7 24 N.		A little oval, bright in the centre, and exhibiting a mottled nebuloſity to Dr. H.
82.	Near the preceding - -	144 29 22	70 44 27 N.		Faint, and elongated, with a teleſcopic ſtar at its extremity. It ſhewed a mottled nebuloſity to Dr. H.
83.	Near the Centaur's head -	201 8 13	28 42 27 S.		Very faint.
84.	In Virgo - - -	183 30 21	14 7 1 N.		Bright in the centre, and ſurrounded with nebuloſity.
85.	Above and near Spica -	183 35 21	19 24 26 N.		Very faint.
86.	In Virgo - - -	183 46 21	14 9 52 N.		The ſame as N° 84, and near it.
87.	In Virgo - - -	184 57 6	13 38 1 N.		As luminous as the preceding.
88.	In Virgo - - -	185 15 49	15 37 51 N.		Very faint, and like N° 58.
89.	Near N° 87 - - -	186 9 36	13 46 49 N.		Very faint.
90.	In Virgo - - -	186 27 0	14 22 50 N.		Like the preceding.
91.	Above the preceding -	186 37 0	14 57 6 N.		Fainter than the preceding.
92.	Between the knee and the left leg of Hercules -	257 38 3	43 21 59 N.	5′	A beautiful nebula, bright in the centre, and ſurrounded with great nebuloſity. Reſolved into ſtars by Dr. H.
93.	Between the Great Dog and the Ship - -	113 48 35	23 19 45 S.	8′	A maſs of ſmall ſtars.
94.	Above Cor Caroli - -	190 10 46	42 18 43 N.	2′ 30″	Bright in the centre, with a diffuſed nebuloſity.
95.	In the Lion, above *l* - -	158 3 5	12 50 21 N.		Very faint.
96.	Near the preceding - -	158 46 20	12 58 9 N.		Fainter than the preceding.
97.	Near β Great Bear - -	165 13 40	56 13 30 S.	2′	Very faint. Another near it, and another near γ.
98.	Above N. wing of Virgo -	180 50 49	16 8 15 N.		Very faint.
99.	On the N. wing of Virgo -	181 55 19	15 37 12 N.		Brighter than the preceding. Between two ſtars of the 7th and 8th magnitude.
100.	In the ear of corn in Virgo	182 59 19	16 59 21 N.		Like the preceding.
101.	Between the left hand of Bootes and the tail of the Great Bear - -	208 52 4	55 24 25 N.	7′	Very faint. Diſcovered by Mechain. Mottled nebuloſity, according to Dr. H.
102.	Between ο Bootes and ι Dragon - - -	- - -	- - -		Very faint. Diſcovered by Mechain.
103.	Between ε and δ Caſſiopeiæ	- - -	- - -		A maſs of ſtars.

Star, *Nebulous*, is a luminous point, ſurrounded with an immenſe viſible atmoſphere. Dr. Herſchel thinks, that the central point is a ſtar, from its complete reſemblance to a ſtar of equal magnitude. Allied to theſe are planetary nebulæ, or circular ſpaces in the heavens, uniformly luminous, reſembling a planetary diſc. The light of one of theſe nebulæ, 15″ in diameter, was hardly equal to that of a ſtar of the 8th or 9th magnitude. Hence Dr. Herſchel ſuppoſes, that they can ſcarcely be bodies like our ſun, as a part of the ſun's diſc, 15″ in diameter, would exceed the greateſt luſtre of the full moon. If, on the other hand, he obſerves, we ſhould ſuppoſe them to be groups or cluſters of ſtars, at a diſtance ſufficiently great to reduce them to ſo ſmall an apparent diameter, we ſhall be at a loſs to account for their uniform light, if cluſters; or for their circular forms, if mere groups of ſtars. Perhaps they may be rather allied to nebulous ſtars; for, ſhould the planetary nebulæ, with lucid centres, be an intermediate ſtep between planetary nebulæ and nebulous ſtars, the appearances of theſe different ſpecies, when all the individuals of them are fully examined, might throw a conſiderable light on the ſubject. The claſs of planetary nebulæ with centres differs only from the laſt in having a bright central point. See Nebulosity.

Catalogue of Two Hundred and Eighty-eight of the Claſs of Bright Nebulæ, according to the Obſervations of Dr. Herſchel:—F. ſignifying following, P. preceding, N. north, and S. ſouth.

Number.	Stars by which the Nebulæ may be found.	Differ. of Right Aſcenſion in Time between the Nebulæ and the Star.			Difference in Declination.		
		M.	S.		D.	M.	
1.	82 δ Ceti	2	17	F.	0	8	N.
2.	3 Leonis	18	7	P.	1	12	S.
3.	34 Sextantis	28	55	P.	0	13	S.
4.		28	27	P.	0	10	S.
5.	81 Leonis	2	42	P.	0	7	N.
6.	64 Virginis	33	56	F.	0	1	S.
7.	49 Leonis	126	45	F.	0	40	S.
8.	32 2 *l* Virginis	2	50	F.	0	48	N.
9.	10 *r* Virginis	3	12	F.	0	35	S.
10.		33	37	F.	0	4	N.
11.	5 Comæ Berenices	1	30	P.	2	11	S.
12.	6 Comæ	9	12	F.	0	9	S.
13.	69 Leonis	7	57	P.	0	2	N.
14.	29 γ Virginis	0	43	F.	1	23	N.
15.		3	23	F.	0	58	N.
16.		10	34	F.	0	13	N.
17.	46 *i* Leo	15	50	F.	1	32	S.
18.		16	18	F.	1	29	S.
19.	11 Comæ	10	30	P.	0	46	N.
20.	73 *n* Leonis	8	52	F.	1	57	S.
21.		25	31	F.	1	49	S.
22.	34 Virginis	22	24	P.	0	17	S.
23.		18	24	P.	0	19	S.
24.	30 ϱ Virginis	1	42	P.	0	5	S.
25.	34 Virginis	4	45	F.	0	40	S.
26.	52 K. Leonis	3	45	P.	2	9	S.
27.	46 *i* Leonis	18	47	F.	0	43	S.
28.	34 Virginis	19	36	P.	1	8	N.
29.	73 *n* Leonis	1	9	P.	0	30	S.
30.	31 1 *d* Virginis	17	41	P.	0	32	N.
31.	31 1 *d* Virginis	8	0	P.	0	37	N.
32.		5	11	P.	0	28	N.
33.	9 *o* Virginis	3	12	F.	1	39	N.
34.	59 *e* Virginis	20	42	F.	0	34	S.
35.	34 Virginis	31	42	P.	1	5	N.
36.		11	24	P.	0	20	N.
37.							
38.	32 2 *d* Virginis	11	36	P.	0	0	N.
39.	51 θ Virginis	21	36	P.	0	14	S.
40.		5	48	P.	0	2	N.
41.	28 Virginis	9	24	F.	1	2	N.
42.	26 χ Virginis	30	27	F.	0	8	N.
43.	49 *g* Virginis	28	6	P.	0	51	S.
44.	51 *e* Ophiuchi	7	18	F.	0	0	N.
45.	43 Ophiuchi	6	36	P.	0	4	N.
46.		0	54	F.	1	46	N.
47.	1 *m* Aquilæ	17	48	F.	0	33	S.
48.	43 *d* Sagittarius	114	6	P.	1	44	N.
49.	10 γ Sagittarius	2	18	P.	0	23	N.
50.	19 δ Sagittarius	3	0	F.	0	33	S.
51.	22 λ Sagittarius	3	12	F.	0	13	S.
52.	17 Delphini	6	0	F.	2	24	N.
53.	66 υ Cygni	78	6	F.	0	51	S.
54.	35 ν Andromeda	18	36	F.	1	26	S.
55.	66 Pegaſi	17	59	P.	0	2	N.
56.	4 λ Leonis	0	46	F.	1	29	S.
57.							
58.	19 Eridani	5	9	F.	1	22	S.
59.	15 ι Navis	64	18	F.	0	21	N.
60.	19 Eridani	6	51	P.	0	16	N.
61.	6 Sextantis	8	42	P.	0	31	N.
62.	55 ζ Ceti	0	25	P.	0	37	N.
63.	80 Ceti	5	12	F.	0	[illegible]5	S.
64.	8 1 ϱ Eridani	15	9	P.	0	2	N.
65.	31 Crateris	23	30	F.	0	52	N.
66.	12 Hydræ	25	2	F.	1	7	S.
67.	8 η Corvi	37	17	P.	2	10	N.
68.	53 Virginis	12	40	P.	1	4	N.
69.		11	4	P.	1	34	N.
70.	106 Virginis	1	2	F.	0	54	N.
71.	19 δ Libræ	0	3	P.	1	4	N.
72.	23 Leonis min.	13	7	F.	0	13	N.
73.	13 Can. vena	50	17	P.	0	22	S.
74.	13 Can. vena	43	5	P.	1	11	S.
75.		40	35	P.	1	9	S.
76.		38	3	P.	0	52	S.
77.		34	15	P.	0	23	N.
78.	27 Urſæ	7	46	F.	0	4	N.
79.		33	52	F.	1	17	N.
80.		67	10	F.	0	46	N.
81.	41 Leonis min.	0	6	P.	1	40	N.
82.	14 *b* Comæ	37	40	P.	0	14	S.
83.	21 *g* Comæ	0	10	F.	1	12	N.
84.		19	34	F.	0	55	N.
85.	40 Comæ	5	9	F.	0	18	N.
86.	39 Leonis min.	13	14	P.	0	59	N.
87.	44 Leonis min.	9	30	F.	1	1	N.
88.		13	30	F.	0	1	N.
89.	14 *b* Comæ	8	18	P.	0	55	N.
90.		6	30	P.	1	57	N.
91.	15 *c* Comæ	1	10	F.	0	19	N.
92.		9	8	F.	0	19	S.
93.	31 Comæ	2	56	F.	1	24	N.
94.	61 Urſæ	0	6	F.	2	17	N.
95.		35	0	F.	2	7	N.
96.	14 Canum	5	30	F.	1	12	N.
97.		7	58	F.	0	47	N.
98.		36	50	F.	0	12	S.
99.	27 γ Bootes	13	46	P.	1	46	S.
100.	41 Ceti	13	43	F.	0	48	N.
101.	67	17	19	P.	0	25	N.
102.		21	37	F.	0	13	S.
103.	14 Delphini	16	10	P.	0	3	S.
104.	93 ψ Aqua.	1	8	F.	0	42	N.
105.	47 Ceti	26	24	F.	0	37	S.
106.	89 π	38	10	F.	1	24	S.
107.	20 Eridani	4	3	F.	1	4	S.
108.	111 ξ Piſcium	34	22	P.	0	1	S.
109.	12 Eridani	7	17	P.	2	54	N.
110.	9 Ceti	44	0	P.	0	47	S.
111.		43	3	P.	0	6	S.
112.	5 γ Arietis	5	48	F.	0	17	S.
113.	66 4th σ Can.	18	22	F.	1	34	N.
114.	18 Leonis min.	13	39	P.	0	35	S.

STARS.

Number.	Stars by which the Nebulæ may be found.	Differ. of Right Aſcenſion in Time between the Nebulæ and the Star.			Difference in Declination.		
		M.	S.		D.	M.	
115.		5	47	P.	1	10	N.
116. 117.	37	11	5	F.	1	1	N.
118.	46 Urſæ	3	41	P.	1	32	S.
119.	31 1ſt *d* Virginis	6	0	P.	0	55	N.
120.	30 η Crateri	9	0	P.	0	17	N.
121.	13 *n* Virginis	18	15	P.	0	19	S.
122.	57 μ Eridani	4	0	P.	0	22	N.
123.	60 σ Virginis	52	27	P.	0	30	S.
124.		39	57	P.	0	3	S.
125.		39	12	P.	1	6	S.
126.	108	0	35	P.	1	15	N.
127.	110	1	47	P.	0	23	S.
128.		3	37	F.	0	30	S.
129.	26 χ	9	46	F.	0	41	S.
130.		26	35	F.	0	3	S.
131.	14 ε Crateri	0	29	F.	1	3	N.
132.	26 Hydræ	1	44	F.	0	4	N.
133.	49 *g* Virginis	16	4	P.	0	18	N.
134.		13	27	P.	0	13	N.
135. 136.	68 ι	32	2	P.	0	11	N.
137.	41 Lyncis	3	13	F.	0	8	N.
138.	102 *e* Hydræ	33	45	F.	1	27	N.
139.	11 ſ Virginis	12	1	F.	1	21	S.
140.		39	55	F.	0	31	S.
141.		45	50	F.	1	32	S.
142.	37	6	35	P.	0	0	N.
143.	43 δ Virginis	4	55	F.	2	7	S.
144.	109	25	58	P.	0	54	N.
145. 146.		25	14	P.	1	27	N.
147.	43 Ophiuchi	8	54	P.	1	17	S.
148.	24 α Serpentis	22	26	P.	1	16	S.
149.	40 ϱ Ophiuchi	0	14	F.	1	32	N.
150.		27	53	F.	0	36	N.
151.	71 ε Piſcium	21	41	F.	1	41	N.
152.	24 ξ Arietis	16	23	P.	0	20	N.
153.	59 2d υ Ceti	23	16	P.	0	6	S.
154.	14 Triang.	1	23	F.	0	59	N.
155.	32 Eridani	7	49	F.	1	1	S.
156.	12 *q* Perſei	1	41	P.	1	10	S.
157.	90 υ Piſcium	28	9	F.	0	13	N.
158.	48 ν Eridani	4	32	P.	1	46	S.
159.	20 π Caſſiopeia	8	30	F.	0	33	N.
160.	20 γ Virginis	6	17	P.	2	19	S.
161.	6 Comæ	12	58	F.	0	55	S.
162.	29 Comæ	10	35	F.	0	2	N.
163.	20 Sextantis	8	29	P.	0	22	S.
164.	38 Leo min.	2	54	P.	0	36	S.
165.	6 Canum	15	42	P.	0	25	N.
166.		1	20	P.	0	23	N.
167.	10 *n* Urſæ	13	43	F.	1	30	S.
168.	34 μ	4	9	P.	0	6	S.
169.	6 Canum	16	16	P.	0	53	N.
170.	20 :	28	12	F.	1	6	N.
171.	53 2d ν Bootes	49	57	P.	1	10	N.
172.	31 Leo min.	25	2	F.	0	3	S.
173.		86	19	F.	0	23	N.
174.	53 ξ Urſæ	46	14	F.	0	24	N.
175.	13 Canum	46	3	P.	2	28	N.
176. 177.		16	33	P.	1	26	N.
178. 179.	8	7	36	F.	0	12	S.
180.	20	29	9	F.	3	15	N.
181.		40	13	F.	1	11	N.
182.	1 Serpentis	17	22	P.	0	2	S.
183.		11	19	P.	0	1	N.
184.	8 Libræ	8	21	P.	1	15	S.
185.	19 λ Bootes	11	6	F.	0	1	N.
186.		47	14	P.	1	20	N.
187.		20	15	P.	1	14	N.
188.	38 2d *h*	13	24	P.	2	44	N.
189.	24 *g*	3	57	F.	0	23	S.
190. 191.	Canum 6 m.	11	32	F.	1	11	S.
192.	3 Lacertæ	80	46	P.	2	32	N.
193.	54 Φ Androm.	1	26	P.	0	54	N.
194.	56 Urſæ	3	19	F.	0	5	N.
195.	67	4	49	F.	0	2	N.
196.		7	17	F.	0	38	N.
197. 198.	8 Canum	3	32	P.	0	19	N.
199.	15 Leo min.	32	1	F.	0	24	S.
200.	59 2d τ Canum	4	29	P.	0	29	N.
201.	63 χ Urſæ	0	5	F.	0	17	S.
202.		0	47	F.	0	4	N.
203.	59	7	42	F.	0	31	N.
204.	9	16	27	P.	2	7	N.
205.		22	18	F.	3	1	N.
206.	3 Canum	14	39	P.	1	35	N.
207.		14	0	P.	1	32	S.
208.		9	9	P.	1	32	N.
209.		3	33	P.	1	6	S.
210.	60 Urſæ	46	0	F.	0	9	N.
211.	11 Canum	5	47	F.	1	58	S.
212.	60 Urſæ	50	50	F.	1	58	S.
213.	19 λ Bootes	110	25	P.	1	48	N.
214.	17 κ	8	26	P.	1	56	N.
215.	Neb. II. 757	3	27	P.	1	14	S.
216.	22 Urſæ	13	52	P.	3	4	S.
217.	54 Perſei	9	25	F.	0	46	N.
218.	63 Aurigæ	26	43	F.	0	20	S.
219.	55 Urſæ	5	33	F.	0	36	N.
220.	64 γ Urſæ	43	59	P.	0	20	S.
221.		21	41	P.	0	37	S.
222.		20	20	P.	0	35	S.
223.		6	4	F.	2	45	S.
224.	1 Canum	9	19	P.	3	10	S.
225.		8	31	P.	0	46	S.
226.	64 γ Urſæ	33	32	P.	0	34	S.
227.		15	28	P.	2	37	N.
228.		5	20	P.	2	24	N.
229.		3	46	F.	1	47	N.
230.	83 Urſæ	20	24	F.	0	27	N.
231.		24	34	F.	0	10	N.
232.		27	7	F.	0	16	N.
233.	44 Urſæ	1	14	F.	0	16	S.
234.	74 Urſæ	1	31	F.	0	28	S.

Number.	Stars by which the Nebulæ may be found.	Differ. of Right Aſcenſion in Time between the Nebulæ and the Star.		Difference in Declination.	
		M.	S.	D.	M.
235.	12 ι Draconis -	66	52 P.	2	3 S.
236.		59	56 P.	2	13 S.
237.		54	10 P.	0	52 S.
238.	69 Urſæ, Hev. -	27	55 P.	0	32 S.
239.		28	10 F.	0	17 S.
240.		28	34 F.	0	17 S.
241.	19 Hyd. Crat. -	14	43 P.	0	57 S.
242.	15 *f* Urſæ - -	15	40 P.	0	21 S.
243.	77 ε Urſæ - -	1	47 F.	2	25 N.
244.	39 Urſæ - -	36	44 F.	0	40 N.
245.		39	27 F.	1	58 N.
246.	66 Urſæ - -	29	19 P.	0	20 N.
247.		28	13 P.	2	0 N.
248.		7	5 P.	2	52 N.
249.	17 Urſæ - -	9	0 P.	3	43 N.
250.		4	47 P.	3	17 N.
251.	76 Urſæ - -	50	48 P.	2	3 S.
252.		41	11 P.	0	34 S.
253.		41	46 P.	0	51 S.
254.		1	47 P.	1	8 S.
255.	69 Urſæ, Hev. -	19	26 F.	1	1 N.
256.		21	33 F.	0	13 N.
257.	12 Eridani - -	16	58 F.	1	58 S.
258.	47 λ Perſei - -	3	41 P.	1	0 N.
259.	17 Hydræ Crat. -	18	31 F.	0	27 N.
260.	23 *h* Urſæ - -	1	49 P.	0	34 S.
261.	38 of Connoiſ. -	3	7 F.	1	35 S.
262.	1 λ Draconis -	2	6 P.	2	41 S.
263.	4 Draconis - -	22	48 P.	0	23 S.
264.		14	18 P.	1	36 N.
265.	37 Urſæ - -	16	16 P.	1	5 N.
266.		13	35 P.	0	11 S.
267.	39 Urſæ - -	11	21 F.	0	10 S.
268.		12	46 F.	0	4 S.
269.		18	1 F.	0	29 N.
270.		35	36 F.	1	42 N.
271.		35	54 F.	0	55 N.
272.	Georgium Sidus -	0	53 P.	0	6 N.
273.	A double ſtar -	5	45 F.	0	39 S.
274.		10	13 F.	0	24 S.
275.	5 Draconis, Hev. -	1	32 F.	0	12 N.
276.		2	45 F.	0	12 N.
277.		6	20 F.	0	20 N.
278.		11	5 P.	0	15 S.
279.		10	28 P.	1	38 N.
280.	16 ζ Urſæ min. -	51	33 P.	0	3 N.
281.	τ Appſ. Sculpſ. L. C. 95. -	1	47 P.	0	27 N.
282.	208 N. Camelop. of Bode's Cat.	153	15 P.	2	43 S.
283.		113	40 P.	3	4 S.
284.		85	18 P.	0	23 S.
285.	24 *d* Urſæ - -	13	14 F.	1	53 S.
286.		30	0 F.	1	8 S.
287.	1 λ Draconis -	4	37 P.	1	13 N.
288.	184 Camelop. of Bode's Cat.	11	58 P.	2	34 S.

A table of nebulæ in the ſouthern hemiſphere, by La Caille, may be ſeen in the "Connoiſſance des Tems" for 1784, p. 270.

Stars, *The Number of*, appears to be vaſtly great, almoſt infinite; yet have aſtronomers long ago aſcertained the number of thoſe viſible to the eye, which are found much fewer than one might imagine. See Catalogue *of the Stars*.

Of the 3000 contained in the Britannic Catalogue, there are many only viſible through a teleſcope; nor does a good eye ſcarcely ever ſee more than a thouſand at the ſame time in the cleareſt heaven; the appearance of innumerable more, frequent in clear winter nights, ariſing from our ſight's being deceived by their twinkling, and from our viewing them confuſedly, and not reducing them to any order. Yet, for all this, the ſtars are really almoſt infinite. See Halley on the Number, Order, and Light of the fixed Stars, Phil. Tranſ. N° 364, or Abr. vol. vi. p. 148.

Riccioli makes no ſcruple to affirm, in his New Almageſt, that a man who ſhould ſay there are above twenty thouſand times twenty thouſand, would ſay nothing improbable.

For a good teleſcope, directed to almoſt any point of the heavens, diſcovers numbers that are loſt to the naked ſight; particularly in the Milky Way, which Dr. Herſchel has aſcertained to be an aſſemblage of ſtars, too remote to be ſingly ſeen, but ſo cloſely diſpoſed as to give a luminous appearance to that part of the heavens where they are. See Galaxy.

In the ſingle conſtellation of the Pleiades, inſtead of 6, 7, or 8 ſtars ſeen by the beſt eye, Dr. Hooke, with a teleſcope 12 feet long, told 78, and with larger glaſſes many more of different magnitudes. And F. de Rheita, a Capuchin, affirms, that he has obſerved above 2000 ſtars in the ſingle conſtellation of Orion.

The ſame author found above 188 in the Pleiades. And Huygens, looking at the ſtar in the middle of Orion's ſword, inſtead of one found it to be twelve. Galileo found 80 in the ſpace of the belt of Orion's ſword, 21 in the nebulous ſtar of his head, and above 500 in another part of him, within the compaſs of one or two degrees ſpace, and more than 40 in the nebulous ſtar Præſepe. See *Magnitudes of the* Stars, *ſupra*.

If an ordinary teleſcope, therefore, will, in ſeveral parts of the heavens, diſcover ten times as many ſtars as are viſible to the naked eye, what may not be expected from the improved magnifying powers of modern times?

Stars, *The Changes that have happened in the*, are very conſiderable; contrary to the opinion of the ancients, who held, that the heavens and heavenly bodies were incapable of any change, the matter of which being permanent and eternal, infinitely exceeding the hardneſs of diamonds, and not ſuſceptible of any different form. And, in effect, till the time of Ariſtotle, and even two hundred years afterwards, there had no change been obſerved. The firſt was above 120 years before the incarnation; when Hipparchus, diſcovering a new ſtar to appear, was firſt induced to make a catalogue of the ſtars, that poſterity might perceive any future changes of the like kind. (See Catalogue.) The number of ſtars which are aſcertained to be variable, amounts only to 15; while thoſe which are ſuſpected to be variable, amount to 37.

In the year 1572, Cornelius Gemma and Tycho Brahe obſerved another new ſtar in the conſtellation Caſſiopeia, which was, likewiſe, the occaſion of Tycho's making a new catalogue. Its magnitude and brightneſs, at firſt, exceeded that of the biggeſt of our ſtars, Sirius and Lyra; it even equalled that of Venus when neareſt the earth, and was ſeen in fair day-light. It continued ſixteen months; towards the latter end of which, it began to dwindle, and at laſt, *viz.* March, 1573, totally diſappeared, without any change of place in all that time.

Leovicius tells us of another ſtar appearing in the ſame conſtellation about the year 945, which reſembled that of 1572, and quotes another ancient obſervation, by which it appears, that a new ſtar was ſeen about the ſame place in 1264.

Dr. Keil takes thoſe to have been all the ſame ſtar: and he conjectures its period to be 150 years; but though it did not appear at the end of this period, this might be owing to its having different degrees of luſtre at different periods. Right aſc. in 1786, $0^h\,13'\,0''$. Declin. N. $62^\circ\,58'$. Greateſt and leaſt magn. 1—0.

Fabricius, in 1596, diſcovered another new ſtar, called the *ſtella mira,* or wonderful ſtar, in the neck of the Whale, which has been ſince found to appear and diſappear periodically, ſeven times in ſix years, continuing in the greateſt luſtre for fifteen days together; and is never quite extinguiſhed. Its courſe and motion are deſcribed by Bullialdus, in a treatiſe printed at Paris in 1667. R. aſc. in 1786, $2^h\,8'\,33''$. Decl. S. $3^\circ\,37'\,25''$. Greateſt and leaſt magn. 2—0. Period, determined by Caſſini, 334 days: ſeen by Mr. Goodricke of the 2d magnitude, Auguſt 9th, 1782, and by Mr. Pigott of the 8.9 magn. Dec. 30, 1782.

Dr. Herſchel has lately, *viz.* in the years 1777, 1778, 1779, 1780, made ſeveral obſervations on this ſtar, an account of which may be ſeen in the Phil. Tranſ. vol. lxx. part ii. art. 21. He makes its period $331^d\,10^h\,19'$.

The variations of Algol, or β Perſeus, were firſt obſerved by Montanari. In 1693, Maraldi could not perceive any change in its brightneſs; but in 1694 he ſaw its variation from the ſecond to the fourth magnitude. Its period was firſt diſcovered by Mr. Goodricke to be $2^d\,20^h\,48'\,56''$. He found that its brightneſs, at its minimum, is different in different periods; and Pigott perceived, that, at its maximum of brightneſs, it is ſometimes more luminous than α Perſei, and at other times leſs brilliant. R. aſc. 1786, $2^h\,54'\,19''$. Decl. N. $40^\circ\,6'\,55''$. Greateſt and leaſt magn. 2—4.

The 420th ſtar in Mayer's Catalogue, ſituated in the Lion, was found to be variable by M. Koch, being in February, 1782, of the ſeventh magnitude; in April, 1783, of the ninth; and in April, 1784, of the tenth. Mr. Pigott could not ſee it, and it muſt therefore have diſappeared. R. aſc. 1786, $9^h\,36'\,5''$. Decl. N. $12^\circ\,25'\,0''$. Greateſt and leaſt magn. 6—0.

Star in Hydra, as far eaſt of π as ψ is weſt of γ, the 30th Hydra of Hevelius, and probably the 1ſt of the Balance, according to Flamſtead, was diſcovered to be variable, in 1784, by Maraldi; and he made its period two years. According to Pigott, it is of the fourth magnitude at its full brightneſs, and for a fortnight ſuffers no perceptible change. It takes about ſix months to increaſe from the tenth to the fourth magnitude, and about the ſame time to return to the tenth; ſo that it may be regarded as inviſible to the naked eye during ſix months. R. aſc. 1786, $13^h\,18'\,4''$. Decl. S. $22^\circ\,9'\,38''$. Greateſt and leaſt magn. 4—0. Period 494 days.

In the year 1604, 17th October, Kepler, and ſeveral of his friends, ſaw a new ſtar near the heel of the right foot of Serpentarius, particularly bright and ſparkling; and took notice, that it was every moment changing into ſome of the colours of the rainbow, except when it was near the horizon, at which time it was generally white. It ſurpaſſed Jupiter in magnitude, but was eaſily diſtinguiſhed from it by the ſteady light of that planet. It began to diminiſh, and ceaſed to be viſible, October 18th, 1605, and has not been ſeen ſince that time; though Mr. Pigott has examined that part of the heavens with great care ſince the year 1782. R. aſc. $17^h\,18'\,0''$. Decl. S. $21^\circ\,10'\,30''$. Greateſt and leaſt magn. 1—0.

Simon Marius diſcovered another in Andromeda's girdle, in 1612 and 1613; though Bullialdus ſays, it had been ſeen before in the 15th century.

The variations and period of β Lyræ were diſcovered by Mr. Goodricke. R. aſc. $18^h\,42'\,11''$. Decl. N. $33^\circ\,7'\,46''$. Greateſt and leaſt magn. 3—4.5. Period, not accurately aſcertained, $6^d\,9^h$.

The new ſtar diſcovered by Don Anthelme in the Swan's head, on the 20th of June, 1670, ſoon reached the third magnitude, and, after ſeveral variations, diſappeared in 1672. It was obſerved of the ſixth magnitude, by Hevelius, in the years 1671, 1672; but ſince that time has not been ſeen, though Mr. Pigott muſt have detected it, if it had been of the tenth or eleventh magnitude. R. aſc. $19^h\,38'\,58''$. Decl. N. $26^\circ\,48'\,30''$. Greateſt and leaſt magn. 3—0.

The ſtar η Antinoi was diſcovered to be variable by Mr. Pigott, who alſo determined its period. It continues 40^h at its greateſt brightneſs, 30^h at its leaſt, 66^h on its decreaſe, and 36^h on its increaſe. R. aſc. $19^h\,41'\,34''$. Decl. N. $0^\circ\,28'\,14''$. Greateſt and leaſt magn. 3.4—5. Period $7^d\,4^h\,15'$.

The ſtar χ in the Swan's neck was diſcovered to be variable by Kirch, in 1686. Maraldi, Caſſini, and M. le Gentil, make its period 405 days; whence Pigott concludes that its period is variable, who ſtates that it continues a fortnight at its full brightneſs. It takes about $3\frac{1}{2}$ months to increaſe from the eleventh magnitude to its maximum brightneſs, and to decreaſe to the eleventh again; ſo that it may be regarded as inviſible for ſix months. At its greateſt luſtre, it is ſometimes of the fifth, and, at other times, of the ſeventh magnitude. R. aſc. $19^h\,42'\,21''$. Decl. N. $32^\circ\,22'\,58''$. Greateſt and leaſt magn. 5—0. Period $396^d\,21^h$.

The changeable ſtar near γ in the Swan's breaſt was obſerved by William Janſenius and Kepler in 1600: it became, in time, ſo ſmall as to be thought to have entirely diſappeared, until the years 1657, 1658, and 1659, when it recovered its former luſtre and magnitude; but it ſoon decayed. Pigott concludes, from the obſervations of the 17th century, that it continues about five years at its full brightneſs; that its luſtre decreaſes rapidly during two years; that it is inviſible to the naked eye during four years; and that it increaſes ſlowly during ſeven years. At the end of the year 1663, it was at its minimum brightneſs. From November, 1781, to 1786, Pigott always ſaw it of the ſixth magnitude; though he ſuſpects, that in 1785, 1786, it had rather decreaſed. R. aſc. $20^h\,9'\,54''$. Decl. N. $37^\circ\,22'\,37''$. Greateſt and leaſt magn. 3—0. Period 18 years.

The variation and period of δ Cephei were diſcovered by Mr. Goodricke, and the period has been confirmed by Mr. Pigott's obſervations. Its variations are not eaſily perceptible, unleſs at its minimum and maximum brightneſs. R. aſc. $22^h\,21'\,0''$. Decl. N. $57^\circ\,20'\,0''$. Greateſt and leaſt magn. 4.3—4.5. Period $5^d\,8^h\,37\frac{1}{2}'$.

The variation and period of the ſtar 64 or α Hercules were diſcovered by Dr. Herſchel, by comparing it with κ Ophiuchi. R. aſc. $17^h\,4'\,54''$. Decl. N. $14^\circ\,38'$. Period of variation $60\frac{1}{4}$ days.

The period and variations of a ſtar in Sobieſki's ſhield, having nearly the ſame right aſcenſion as the ſtar *l*, and ſituated about a degree farther ſouth, were diſcovered by Mr. Pigott, who has given the reſult of his obſervations in a table. R. aſc. in 1796, 18^h 36′ 38″. Decl. S. 5° 56′. Greateſt and leaſt magn. 5—7.8. Period 62 days.

The ſtar in the Northern Crown, ranked of the ſixth magnitude by Bayer, but omitted in Flamſtead's Catalogue, was ſuſpected by Mr. Pigott, in 1783, to be variable; and his ſuſpicions were confirmed in the ſpring of 1795, when it became inviſible. He ſaw it on the 20th of June in this year, of the 9.10th magnitude; and in ſix weeks afterwards, it attained its full brightneſs; and on the 11th of Auguſt, 1795, it was of the 6.7th magnitude, and ſo continued for about three weeks. In 3½ weeks it decreaſed to the 9.10th magnitude, and a few days afterwards it diſappeared. In April, 1796, it re-appeared; and on the 7th of May it reached the 9.10th magnitude, increaſing as it had done on the 20th of June, 1795. At its maximum brightneſs, it exhibited great unſteadineſs. It then increaſed, as before, till it reached the 7.8th magnitude; wavering between theſe two magnitudes till Auguſt, 1797. R. aſc. in 1796, 15^h 40′ 11″. Decl. N. 28° 49′ 30″. Greateſt and leaſt magn. 6.7—0. Period 10½ months.

The ſtars that are ſuppoſed to be variable are the following: *viz.* Hevelius's 6 Caſſiopeiæ; R. aſc. 0^h 23′ 16″. Decl. N. 60° 50′. Greateſt and leaſt magn. 7—0:——46 or ξ Andromedæ, ſuſpected to be different ſtars; R. aſc. 1^h 9′ 46″. Decl. N. 44° 24′. Greateſt and leaſt magn. 4.5—5.6:——Flamſtead's 50 or υ Andromedæ; R. aſc. 1^h 24′ 16″. Decl. N. 40° 20′ 15″. Greateſt and leaſt magn. 4.5—0:——Hevelius's 41 Andromedæ, probably the ſame with Tycho's Andromedæ; alſo, Flamſtead's 50, of the 4.5th magnitude; Flamſtead's τ, of the fifth magnitude; Flamſtead's 49 and 52, and Hevelius's 41, all three of the ſame brightneſs, are of the 5.6th magnitude. A ſtar between Hevelius's 41 and Flamſtead's 52 is rather leſs than the ſixth magnitude:——Tycho's 20 Ceti, probably χ in the Whale's belly, of the 4.5th magnitude, and of the ſame brightneſs as the three ψ Aquarii, which diſappeared in the time of Hevelius; R. aſc. 1^h 39′. Decl. S. 13° 20′. Greateſt and leaſt magn. 5—0:——Flamſtead's 55 Andromedæ, marked nebulous in his catalogue, obſerved to be a ſtar of the ſixth magnitude; R. aſc. 1^h 40′ 30″. Decl. N. 39° 40′ 3″. Greateſt and leaſt magn. 6—0:——σ or the 17th Eridani, according to Ptolemy and Ulugh Beigh, could not be ſeen by Flamſtead in 1691 and 1692; but in 1782, 1783, and 1784, Mr. Pigott obſerved in this place a ſtar of the ſeventh magnitude, without any variation of brightneſs; R. aſc. 2^h 42′. Decl. S. 9° 40′. Greateſt and leaſt magn. 4—0:——Flamſtead's 41 Tauri, the 26th of Ulugh Beigh, and the 43d of Tycho, ſuſpected by Caſſini to be new and variable, was ſeen by Ulugh Beigh and Tycho, and found by Mr. Pigott, in 1784 and 1785, to be of the fifth magnitude, as Hevelius made it, but of the ſixth magnitude, according to Flamſtead; R. aſc. 3^h 53′ 27″. Decl. N. 27° 0′ 39″. Greateſt and leaſt magn. 5—8:——The ſtar 2° 15′ N. of 53 Eridani, was believed by Caſſini to be a new ſtar, and was not viſible in 1664; but in 1784, Mr. Pigott obſerved it to be leſs than ω and *d*, brighter than A, and equal to ψ Eridani; R. aſc. 4^h 29′. Decl. S. 12° 30′. Greateſt and leaſt magn. 4—0:——Flamſtead's 47 Eridani was alſo ſuppoſed by Caſſini to be a new one; but in 1784 it appeared to Mr. Pigott leſs than 46 Eridani. R. aſc. 4^h 23′ 54″. Decl. S. 8° 41′ 40″. Greateſt and leaſt magn. 4—0:——The ſtar γ of the Great Dog is marked by Tycho, Bayer, Hevelius, and Flamſtead, as of the third magnitude: inviſible in 1670, according to Maraldi and Montanari, but in 1692 and 1693, it appeared of the fourth magnitude; obſerved by Mr. Pigott frequently ſince 1782, without the leaſt variation; always of the fourth magnitude, a little brighter than θ, and decidedly brighter than ι; made by La Caille of the fourth magnitude. R. aſc. 6^h 54′ 5″. Decl. S. 15° 19′ 36″. Greateſt and leaſt magn. 3—0:——Pollux, or β Gemini, was undoubtedly brighter in 1783, 1784, and 1785, than Caſtor; both made by Hevelius of the ſecond magnitude: Flamſtead makes Caſtor of the firſt, and Pollux of the ſecond magnitude: La Caille makes Caſtor of the 1.2d, and Pollux of the 2.3d magnitude: and Bradley makes them both of the firſt magnitude. R. aſc. 7^h 32′ 11″. Decl. N. 28° 31′ 38″. Greateſt and leaſt magn. 1—3:——The ſtar ξ Leonis is marked by Tycho, Bayer, Flamſtead, Mayer, and Bradley, of the fourth magnitude; could ſcarcely be ſeen by Maraldi and Montanari in 1693; always ſeen in 1783, 1784, and 1785, of the fifth magnitude, leſs than A and π, and perhaps rather brighter than *b* and ω Leonis. R. aſc. 9^h 20′ 4″. Decl. N. 12° 14′ 23″. Greateſt and leaſt magn. 5.6—0:——The ſtar ψ Leonis is ſaid to have diſappeared in 1667, when it was ſeen by Montanari; obſerved by Maraldi in 1691, when it was very ſmall; from 1784 to 1786, always ſeen by Pigott of the 5.6th magnitude, leſs than ω, and brighter than *i*, Flamſtead's 46th; made by Hevelius of the fifth, and by Flamſtead of the ſixth magnitude. R. aſc. 9^h 32′ 3″. Decl. N. 14° 59′ 36″. Greateſt and leaſt magn. 5.6—0:——The ſtar 25 Leonis was found by Mr. Pigott to be miſſing in 1783, nor could he ſee it in 1784 and 1785. R. aſc. 9^h 46′ 8″. Decl. N. 12° 20′ 36″. Greateſt and leaſt magn. 6.7—0:——Bayer's *i* Leonis and Tycho's 16 Leonis was inviſible in 1709; and could not be ſeen by Pigott in 1785; nor is it the *i* Leonis of other catalogues. R. aſc. 9^h 52′ 30″. Decl. N. 15° 30′. Greateſt and leaſt magn. 6—0:——δ of the Great Bear is marked of the ſecond magnitude by Tycho and the prince of Heſſe; but Hevelius, La Caille, and Bradley, mark it of the third. From 1783 to 1786 it appeared to Pigott as a bright fourth magnitude, rather leſs than ι, equal to α, and rather brighter than κ Draconis: Flamſtead makes it of the 2.3d magnitude. R. aſc. 12^h 4′ 45″. Decl. N. 58° 13′ 24″. Greateſt and leaſt magn. 2—4:——The ſtar *n* Virginis, though not in the charts of Bayer, was obſerved by Ricciolus; was not ſeen by Flamſtead on the 27th of January, 1680, though he muſt have obſerved it on the 12th of May 1677, and ſome years afterwards, as it is in his catalogue; obſerved frequently in 1784 and 1785, by Pigott; but it always appeared of the ſixth magnitude, as it is marked by Flamſtead; by Bradley it is of the fifth magnitude. R. aſc. 12^h 7′ 43″. Decl. N. 0° 24′ 16″. Greateſt and leaſt magn. 6—0:——Bayer's ſtar of the ſixth magnitude, 1° S. of γ Virginis, could not be ſeen by Maraldi, and looked for in vain by Pigott in May, 1785. R. aſc. 12^h 53′. Decl. S. 10°. Greateſt and leaſt magn. 6—0:——The ſtar in the Virgin's northern thigh is marked by Ricciolus as of the 6th magnitude; could not be ſeen by Maraldi in 1709, nor by Pigott in 1785. R. aſc. 13° 29′+. Decl. S. 0° 30′. Greateſt and leaſt magn. 6—0:——91 or 92 Virginis, the firſt ſuppoſed by Pigott to be miſſing in 1785; the other is of the 6.7th magnitude. R. aſc. 13^h 43′ 43″. Decl. N. 2° 5′ 50″. Greateſt and leaſt magn. 6—0:——The ſtar α Draconis is at preſent only of the 4th magnitude, though Hevelius, Flamſtead, and Bradley, mark it of the third; Pigott and Herſchel think it to be variable; La Caille marks it of the third magnitude. R. aſc. 13^{h}58° 36′. Decl. N. 65° 24′ 8″. Greateſt and leaſt magn. 2—4:——Bayer's ſtar in the Weſt Scales of Libra, could not be found by Maraldi, nor by Pigott in 1784 and 1785.

R. aſc. 14° 53′ 30″. Decl. S. 13° 26′. Greateſt and leaſt magn. 4—7 :——Ptolemy's and Ulugh Beigh's N° 6 of the unformed ſtars in Libra, is marked of the fourth magnitude, and nevertheleſs does not appear in any modern catalogue; in 1785, Mr. Pigott often obſerved a ſtar of the ſeventh magnitude very near its place, rather leſs than Flamſtead's 41. R. aſc. 15^h 29′ +. Decl. S. 20° 30′. Greateſt and leaſt magn. 4—7 :——The ſtar κ Libræ is marked by Tycho and Bayer as of the fourth magnitude; Hevelius ſays that it had diſappeared: in the years 1783, 1784, and 1785, Pigott always found it of the fifth magnitude; but Flamſtead marks it of the fourth. R. aſc. 15^h 29′ 39″. Decl. S. 19° 58′ 27″. Greateſt and leaſt magn. 4—5 :——Tycho's 11 Libræ could not be found by Hevelius and Pigott; the latter thinks that it never exiſted, and that it is the κ, with an error of 2° in longitude. R. aſc. 15^h 37′ 30″. Decl. S. 19° 30′. Greateſt and leaſt magn. 4—0 :——The ſtar 33 Serpentis was found to be miſſing in 1784 and 1785, by Pigott. R. aſc. 15^h 38′. Decl. N. 17° 14′. Greateſt and leaſt magn. 6—0 :——Bayer's ſtar, near ε of the Great Bear, could not be ſeen by Caſſini; nor could Pigott find any ſtar near the ε brighter than the 7.8th magnitude. R. aſc. 16^h 15′. Decl. N. 82° 45′. Greateſt and leaſt magn. 6—0 :——The ſtar ς, or Ptolemy's and Ulugh Beigh's 14th of Ophiuchus, or Flamſtead' 36th, is ſaid to have diſappeared before 1695; could not be found by Hevelius; but Pigott found it in 1784 and 1785 of the 4.5th magnitude, much brighter than 39, rather brighter than 51 and 58, and leſs than 44. R. aſc. 17^h 2′ 14″. Decl. S. 26° 15′ 37″. Greateſt and leaſt magn. 4—0 :——Ptolemy's 13th Ophiuchi. R. aſc. 17^h 18′ +. Decl. S. 20° 35′. Greateſt and leaſt magn. 4—0 :——Ptolemy's 18th Ophiuchi. R. aſc. 17^h 22′. Decl. S. 24° 10′. Greateſt and leaſt magn. 5—0. Theſe two laſt-mentioned ſtars ſeem to have diſappeared; however, Mr. Pigott thinks that the 13th Ophiuchi is Flamſtead's 40th, and that the 18th Ophiuchi ſhould be marked with north inſtead of ſouth latitude, which would make it coincide nearly with Flamſtead's 58th :——The ſtar σ Sagittarii is thought by Dr. Herſchel and Mr. Pigott to be variable; in 1783, 1784, and 1785, he obſerved it to be of the 2.8th magnitude, and brighter than π Sagittarii. Hevelius makes it of the fourth, and La Caille of the 2.3d magnitude. R. aſc. 18^h 42′. Decl. S. 26° 32′ 34″. Greateſt and leaſt magn. 2—4 :——The ſtar θ Serpentis was obſerved by Tycho, Bayer, Hevelius, and Flamſtead, to be of the third magnitude; according to Montanari, it was of the fifth; it was frequently obſerved in 1783, 1784, and 1785, by Pigott, without any perceptible change of luſtre, always of the fourth magnitude, leſs than δ Aquilæ and P Ophiuchi; La Caille makes it of the 4.3d magnitude. R. aſc. 18^h 45′ 35″. Decl. N. 3° 56′ 36″. Greateſt and leaſt magn. 4—5 :——Tycho's 27 Capricorni could not be ſeen by Hevelius nor by Pigott. R. aſc. 21^h 41′ 0″. Decl. S. 14° 28′ 0″. Greateſt and leaſt magn. 6—0 :——Tycho's 22 Andromedæ, at the end of the chain, was, as Caſſini obſerves, ſo ſmall, that it could ſcarcely be ſeen: Pigott could find no ſtar in its place near the two π Cygni, in 1784 and 1785. R. aſc. 21^h 43′ 30″. Decl. N. 49° 15′. Greateſt and leaſt magn. 4—0 :——Tycho's 19th Aquarii was marked as miſſing by Hevelius, nor could Flamſtead ſee it with his naked eye; Pigott is confident that it is the ſame with Flamſtead's 56th, marked *f* by Bayer, from which it is only $1\frac{1}{2}$° diſtant. R. aſc. 22^h 25′. Decl. S. 15° 55′ 0″. Greateſt and leaſt magn. 6—0 :——The ſtar ο Andromedæ is, according to Pigott, leſs than σ Cephei, equal to ζ Caſſiopeiæ, or perhaps brighter than it, and brighter than λ, κ, or ι Andromedæ. R. aſc. 22^h 52′ 6″. Decl. N. 41° 10′ 45″. Greateſt and leaſt magn. 4—6 :——La Caille's 483 Aquarii was found by Pigott miſſing in 1778, nor could he ſee it in 1783 or 1784. R. aſc. 22^h 55′ 40″. Decl. S. 8° 50′ 45″.

The following 13 ſtars are ranked by Dr. Herſchel among thoſe that are loſt, or have undergone ſome great change; *viz.* 80 and 81 Hercules; 71 Hercules; 55 Hercules; 56 Cancer; 19 Perſeus; 108 Piſces; 73 and 74 Cancer; 8 Hydræ; 26 Cancer; 62 Orion; 34 Berenice's Hair; and 19 Berenice's Hair. The following are reckoned by Dr. Herſchel among thoſe that have undergone a change of magnitude ſince the time of Flamſtead: *viz.* α Draconis, α Ceti, ζ Serpentis, η in the Swan, the 2 of the Great Bear, η Bootes, ι Dolphin, β Triangle, γ Eagle, σ Sagittarius, δ of the Great Dog, κ Serpent, κ Serpentarius, β of the Little Horſe, δ Dolphin, ε Bootes, δ in the Arrow, δ in the Great Bear, α Great Bear, 1ſt and 2d Hydræ, γ Lyræ, 31ſt and 34th of the Dragon, 44 Cancer, 96 Tauri, 62 Aries, 12 and 14 Lynx, 38 Perſeus, θ Perſeus, δ Unicorn, 23 Gemini, 26 Orion, and ξ Lion. The following are marked by Dr. Herſchel among the ſtars that have recently become viſible; *viz.* a ſtar in the end of the Lizard's tail, of the 4.5th magnitude; the ſtar of the eighth magnitude following τ Perſeus, probably new; a ſtar near the head of Cepheus, not given by Flamſtead; a conſiderable ſtar in a direction from the 68th to the 61ſt Gemini, not in Flamſtead's catalogue; a ſtar of conſiderable brightneſs, preceding the firſt of the Little Horſe, not given by Flamſtead; a conſiderable ſtar, following the firſt of the Sextant, and another following the 7th, not in Flamſtead's catalogue; a remarkable ſtar between β and δ Hydra, not given by Flamſtead; a ſtar nearly 1° 30′ N. following δ Hercules, in the direction of δ and ν, and of the 4.5th magnitude, not given by Flamſtead; a ſtar of the 6th magnitude, about 3° S. preceding γ Bootes, and another of the ſame ſize, preceding λ, not obſerved by Flamſtead. Phil. Tranſ. for 1783, vol. lxxiii. p. 247, &c.

From the old catalogues, it is certain that many of the ancient ſtars are not now viſible: this has been particularly remarked with regard to the Pleiades: and it is equally certain, as we have now ſhewn, that ſome have become viſible.

M. Montanari, in his letter to the Royal Society in 1670, obſerves, that there are now wanting in the heavens two ſtars of the ſecond magnitude, in the ſtern of the ſhip Argo and its yard, which had been ſeen till the year 1664. When they firſt diſappeared is not known; but he aſſures us there was not the leaſt glimpſe of them in 1668. He adds he has obſerved many more changes in the fixed ſtars, even to the number of a hundred.

Many other changes in the ſtars have been taken notice of by Caſſini, Maraldi, and other obſervers. See Gregory's Aſtr. lib. ii. prop. 30, and the preceding part of this article.

As none of theſe ſtars could ever be perceived to have tails, it is plain they could not be comets; eſpecially as they had no parallax, even when largeſt and brighteſt. It is not improbable that the periodical ſtars have vaſt cluſters of dark ſpots, and very ſlow rotations on their axes, by which means they muſt diſappear when the ſide covered with ſpots is turned towards us. And as for thoſe which break out on a ſudden with ſuch luſtre, theſe may, perhaps, be ſuns whoſe fuel is almoſt ſpent, and again ſupplied by ſome of their comets falling upon them, and occaſioning an uncommon blaze and ſplendour for ſome time; which has been conjectured to be one uſe of the cometary part of any ſyſtem.

M. Maupertuis, in his Diſſertation on the Figures of the

Celeſtial Bodies (p. 61—63.), is of opinion, that ſome ſtars, by their prodigious ſwift rotation on their axes, may not only aſſume the figures of oblate ſpheroids, but that by the great centrifugal force ariſing from ſuch rotations, they may become of the figures of mill-ſtones, or be reduced to flat circular planes, ſo thin, as to be quite inviſible when their edges are turned towards us, as Saturn's ring is in ſuch poſition. But when very eccentric planets or comets go round any flat ſtar in orbits much inclined to its equator, the attraction of the planets or comets in their perihelions muſt alter the inclination of the axes of that ſtar; on which account it will appear more or leſs large and luminous, as its broad ſide is more or leſs turned towards us. And thus he imagines we may account for the apparent changes of magnitude and luſtre of thoſe ſtars, and likewiſe for their appearing and diſappearing.

Hevelius (Cometograph. p. 380.) apprehends, that the ſun and ſtars are ſurrounded with atmoſpheres, and that, whirling round their axes with great rapidity, they throw off great quantities of matter into thoſe atmoſpheres, and thereby cauſe great changes in them; and that thus it may come to paſs, that a ſtar, which when its atmoſphere is clear, ſhines out with great luſtre, may at another time, when it is full of clouds and thick vapours, appear greatly diminiſhed in brightneſs and magnitude, or even become quite inviſible.

The periodical variation in the light of the ſtars has alſo been aſcribed to the interpoſition of the planets which circulate around them; but it is by no means probable, that theſe planets, even if they do exiſt, are ſufficiently large to obſtruct any large portion of their light. Even when ſeen from the earth, the light of our own ſun is not ſenſibly impaired, when Mercury and Venus are paſſing over his diſc.

The ingenious Mr. Pigott has ventured a ſtep farther than any of his predeceſſors in this branch of aſtronomy. In his inveſtigation of the phenomena exhibited by the variable ſtar of Sobieſki's ſhield, the periodical changes of which are affected by very ſingular anomalies, he ſuppoſes, that the greater part of its diſc is unenlightened; and that a few luminous ſpots, placed at certain intervals, produce, by the rotation of the ſtar, all the variations which have been obſerved. Mr. Pigott ſuppoſes, that the body of the ſtars is dark and ſolid; that their rotation on their axes is regular; and that the ſurrounding medium is occaſionally generating and abſorbing its luminous particles, by a proceſs ſimilar to what Dr. Herſchel ſuppoſes is going on in the atmoſphere of the ſun. He imagines, that theſe luminous particles are ſparingly diſperſed in the atmoſphere of the variable ſtar of Sobieſki, from the circumſtance of its diminiſhing even to the ninth magnitude; and as the duration of its full luſtre continues only about 9½ days, while it performs a complete rotation in 62 days, he conſiders the luminous ſpots to be ſomewhat circular, and of no great extent. Since this ſmall portion of light may naturally be ſuppoſed to diminiſh and finally diſappear, Mr. Pigott imagines, that this may have been the cauſe of the diſappearance of the new ſtars of 1572 and 1604. Hence he concludes, that there are others which have never ſhewn a glimpſe of brightneſs; and that there are "primary inviſible bodies, or unenlightened ſtars, that have ever remained in eternal darkneſs." Following out this notion, Mr. Pigott conceives, that cluſters of theſe dark bodies may be found, and by intercepting "all more diſtant rays," may appear like dark ſpaces in the heavens, ſimilar to what has been obſerved in the ſouthern hemiſphere.

Stars, *As for the Nature of the fixed*, their immenſe diſtance leaves us greatly at a loſs about it. What we can gather for certain from their phenomena is as follows:

1. That the fixed ſtars are greater than our earth: becauſe, if that was not the caſe, they could not be viſible at ſuch an immenſe diſtance.

2. The fixed ſtars are farther diſtant from the earth than the fartheſt of the planets. For we frequently find the fixed ſtars hid behind the moſt diſtant of the planets: and beſides, they are ſuppoſed to have no parallax, which the planets have.

3. The fixed ſtars ſhine with their own light; for they are much farther from the ſun than the remoteſt planet, and appear much ſmaller; but ſince, notwithſtanding this, they are found to ſhine much brighter than ſuch planet, it is evident they cannot borrow their light from the ſame ſource as that does, *viz.* the ſun; but ſince we know of no other luminous body beſide the ſun, whence they might derive their light, it follows, that they ſhine with their own native light.

Beſides, it is known, that the more a teleſcope magnifies, the leſs is the aperture through which the ſtar is ſeen; and, conſequently, the fewer rays it admits into the eye. Now ſince the ſtars appear leſs in a teleſcope which magnifies two hundred times, than they do to the naked eye, inſomuch that they ſeem to be only indiviſible points, it proves at once that the ſtars are at immenſe diſtances from us, and that they ſhine by their own proper light. If they ſhone by borrowed light, they would be as inviſible without teleſcopes as the ſatellites of Jupiter are; for theſe ſatellites appear bigger, when viewed with a good teleſcope, than the largeſt fixed ſtars do. Hence,

1. We deduce, that the fixed ſtars are ſo many ſuns; for they have all the characters of ſuns.

2. That, in all probability, the ſtars are not ſmaller than our ſun.

3. That it is highly probable, that each ſtar is the centre of a ſyſtem, and has planets or earths revolving round it, in the ſame manner as round our ſun, *i. e.* it has opaque bodies illuminated, warmed, and cheriſhed by its light. As we have incomparably more light from the moon than from all the ſtars together, it is abſurd to imagine that the ſtars were made for no other purpoſe than to caſt a faint light upon the earth; eſpecially ſince many more require the aſſiſtance of a good teleſcope to find them out than are viſible without that inſtrument. Our ſun is ſurrounded by a ſyſtem of planets and comets, all which would be inviſible from the neareſt fixed ſtar; and from what we already know of the immenſe diſtance of the ſtars, it is eaſy to prove, that the ſun, ſeen from ſuch a diſtance, would appear no bigger than a ſtar of the firſt magnitude.

From all this it is highly probable, that each ſtar is a ſun to a ſyſtem of worlds moving round it, though unſeen by us; eſpecially as the doctrine of a plurality of worlds is rational, and greatly manifeſts the power, wiſdom, and goodneſs of the great Creator.

How immenſe, then, does the univerſe appear! Indeed, it muſt either be infinite, or infinitely near it.

Kepler, it is true, denies that each ſtar can have its ſyſtem of planets as our's has; and takes them all to be fixed in the ſame ſurface or ſphere; urging, that were one twice or thrice as remote as another, it would appear twice or thrice as ſmall, ſuppoſing their real magnitudes equal; whereas there is no difference in their apparent magnitudes, juſtly obſerved, at all. But to this we oppoſe, that Huygens has not only ſhewn that fires and flames are viſible at diſtances where other bodies, comprehended under equal angles, diſappear; but it ſhould likewiſe ſeem, that the optic theorem about the apparent diameters of objects, being reciprocally proportional to their diſtances from the eye, does only hold while the diameter of the object has ſome ſenſible ratio to its diſtance.

As for periodical ſtars, &c. ſee *Changes*, &c. *of* Stars, *ſupra.*

Stars, *Motion of the.* The fixed ſtars have two kinds of apparent motion; one called the *firſt, common,* or *diurnal* motion, ariſing from the earth's motion round its axis: by this they ſeem to be carried along with the ſphere, or firmament, (in which they appear fixed,) round the earth, from eaſt to weſt, in the ſpace of twenty-four hours.

The other, called the *ſecond,* or *proper* motion, is that by which they appear to go backwards from weſt to eaſt, round the poles of the ecliptic, with ſuch ſlowneſs, as not to deſcribe above a degree of their circle in the ſpace of 72 years, or 50 ſeconds in a year.

This apparent motion is owing to the receſſion of the equinoctial points, which is 50 ſeconds of a degree in a year backward, or contrary to the order of the ſigns of the zodiac.

Some have imagined, but it is unknown on what grounds, that when they are got round to the points whence they firſt departed, nature will have finiſhed her courſe, and the ſtars having performed their career, the heavens will remain at reſt; unleſs the Being, who firſt gave them motion, appoint them to begin another circuit.

On the footing of this calculation, the world ſhould laſt about 30,000 years, according to Ptolemy; 25,816, according to Tycho; 25,920, according to Riccioli; and 24,800, according to Caſſini.

In conſequence of this ſecond motion, the longitude of the ſtars will be always increaſing.

Thus, *e. gr.* the longitude of Cor Leonis was found by Ptolemy, A.D. 138, to be 2° 30′; in 1115, it was obſerved by the Perſians to be 17° 30′; in 1364, by Alphonſus, 20° 40′; in 1586, by the prince of Heſſe, 24° 11′; in 1601, by Tycho, 24° 17′; and in 1690, by Mr. Flamſtead, 25° 31′ 20″; whence the proper motion of the ſtars, according to the order of the ſigns in circles parallel to the ecliptic, is eaſily inferred.

It was Hipparchus who firſt ſuſpected this motion, upon comparing the obſervations of Timocharis and Ariſtyllus with his own. Ptolemy, who lived three centuries after Hipparchus, demonſtrated the ſame by undeniable arguments.

Tycho Brahe makes the increaſe of longitude in a century 1° 25′; Copernicus, 1° 23′ 40″ 12‴; Flamſtead and Ricciolus, 1° 23′ 20″; Bullialdus, 1° 24′ 54″; Hevelius, 1° 24′ 46″ 50‴; whence, with Flamſtead, the annual increaſe of the longitudes of the fixed ſtars may be well fixed at 50″.

From theſe data, the increaſe of the longitude of a ſtar for any given time is eaſily had; and hence the longitude of a ſtar for any given year being given, its longitude for any other year is readily found: *e. gr.* the longitude of Sirius, in Mr. Flamſtead's tables, for the year 1690, being 9° 49′ 1″; its longitude for the year 1724 is found by multiplying the interval of time, *viz.* 34 years, by 50″; the product 1700″, or 28′ 20″, added to the given longitude, will give the longitude required, 10° 17′ 21″. By means of this correction, applied as the caſe requires, the longitudes of the ſtars, tranſcribed from any tables, may be adapted to the preſent or any given time.

The principal phenomena of the fixed ſtars, ariſing from their common and proper motion, beſides their longitude, are their altitudes, right aſcenſions, declinations, occultations, culminations, riſings, and ſettings. See Altitude, Ascension, Declination, and Occultation.

Some have ſuppoſed that the latitudes of the ſtars are invariable; but this ſuppoſition is founded on two aſſumptions, which are both controverted among aſtronomers: one is, that the orbit of the earth continues unalterably in the ſame plane, and conſequently that the ecliptic is invariable, the contrary of which is now very generally allowed. See Ecliptic.

The other aſſumption is, that the ſtars are ſo fixed as to keep their places immoveably. Ptolemy, Tycho, and others, comparing the obſervations of ancient aſtronomers with their own, have adopted this opinion. But from the reſult of the compariſon of our beſt modern obſervations, with ſuch as were formerly made with any tolerable degree of exactneſs, there appears to have been a real change in the poſition of ſome of the fixed ſtars, with reſpect to each other; and ſeveral ſtars of the firſt magnitude have already been obſerved, and others ſuſpected to have a proper motion of their own.

Dr. Halley (Phil. Tranſ. N° 355, or Jones's Abr. vol. iv. p. 225.) has obſerved, that the Bull's eye, Sirius, and Arcturus, are now found to be about half a degree more ſoutherly than the ancients reckoned them: that this difference cannot ariſe from the errors of the tranſcribers, becauſe the declination of the ſtars, ſet down by Ptolemy, as obſerved by Timocharis, Hipparchus, and himſelf, ſhew their latitudes given by him are ſuch as thoſe authors intended; and it is ſcarcely to be believed, that thoſe three obſervers could be deceived in ſo plain a matter. To this he adds, that the bright ſtar in the ſhoulder of Orion has, in Ptolemy, almoſt a whole degree more ſoutherly latitude than at preſent: that an ancient obſervation, made A.D. 509, at Athens, as Bullialdus ſuppoſes, of an appulſe of the moon to the Bull's eye, ſhews that ſtar to have had leſs latitude at that time than it now has; that as to Sirius, it appears by Tycho's obſervations, that he found him 4½ more northerly than he is at this time. All theſe obſervations, compared together, ſeem to favour an opinion, that ſome of the ſtars have a proper motion of their own, which changes their places in the ſphere of heaven: this change of place, as Dr. Halley obſerves, may ſhew itſelf in ſo long a time as 1800 years, though it be entirely imperceptible in the ſpace of one ſingle century; and it is likely to be ſooneſt diſcovered in ſuch ſtars as thoſe juſt now mentioned, becauſe they are all of the firſt magnitude, and may, therefore, probably be ſome of the neareſt to our ſolar ſyſtem. Arcturus, in particular, affords a ſtrong proof of this: for if its preſent declination be compared with its place as determined either by Tycho or Flamſtead, the difference will be found to be much greater than what can be ſuſpected to ariſe from the uncertainty of their obſervations. See Arcturus, and Mr. Hornſby's Inquiry into the Quantity and Direction of the proper Motion of Arcturus, Phil. Tranſ. vol. lxiii. part i. p. 93, &c.

Upon the whole, we have reaſon to conclude, that there is not, ſtrictly ſpeaking, any *fixed* ſtar in the heavens; and to admit the general motion of all the ſtarry ſyſtems, and conſequently of the ſolar one among the reſt.

For an account of Dr. Bradley's obſervations, ſee the ſequel of this article.

Dr. Herſchel has alſo lately obſerved, that the diſtance of the two ſtars forming the double ſtar γ Draconis, Fl. 24 and 25, is 54″ 48‴, and their poſition 44° 19′ N. preceding. Whereas, from the right aſcenſion and declination of theſe ſtars in Flamſtead's Catalogue, their diſtance, in his time, appears to have been 1′ 11″.418, and their poſition 44° 23′ N. preceding. Hence he infers, that as the difference in the diſtance of theſe two ſtars is ſo conſiderable, we can hardly account for it, otherwiſe than by admitting a proper motion in one or the other of the ſtars, or in our ſolar ſyſtem: moſt probably, he ſays, neither of the three is at reſt. He alſo ſuſpects a proper motion in one of the double ſtars in cauda Lyncis media, Fl. 38, and in ο Ceti, Fl. 68. Phil. Tranſ. vol. lxxii. part i. p. 117. 143. 150.

It is reaſonable to expect, that other inſtances of the like kind muſt alſo occur among the great number of viſible ſtars, becauſe their relative poſitions may be altered by various means. For if our own ſolar ſyſtem be conceived to change its place with reſpect to abſolute ſpace, this might, in proceſs of time, occaſion an apparent change in the angular diſtances of the fixed ſtars; and in ſuch a caſe, the places of the neareſt ſtars being more affected than of thoſe that are very remote, their relative poſition might ſeem to alter, though the ſtars themſelves were really immoveable: and *vice verſâ*, we may ſurmiſe, from the obſerved motion of the ſtars, that our ſun, with all his planets and comets, may have a motion towards ſome particular part of the heavens, on account of a greater quantity of matter collected in a number of ſtars and their ſurrounding planets there ſituated, which may perhaps occaſion a gravitation of our whole ſolar ſyſtem towards it. If this ſurmiſe ſhould have any foundation, as Dr. Herſchel obſerves, *ubi ſupra*, p. 103, it will ſhew itſelf in a ſeries of ſome years; as from that motion will ariſe another kind of hitherto unknown parallax (ſuggeſted by Mr. Michell, Phil. Tranſ. vol. lvii. p. 252.), the inveſtigation of which may account for ſome part of the motions already obſerved in ſome of the principal ſtars; and for the purpoſe of determining the direction and quantity of ſuch a motion, accurate obſervations of the diſtance of ſtars that are near enough to be meaſured with a micrometer, and a very high power of teleſcopes, may be of conſiderable uſe, as they will undoubtedly give us the relative places of thoſe ſtars to a much greater degree of accuracy than they can be had by tranſit inſtruments or ſectors, and thereby much ſooner enable us to diſcover any apparent change in their ſituation, occaſioned by this new kind of ſyſtematical parallax, if we may ſo expreſs the change ariſing from the motion of the whole ſolar ſyſtem. For an account of Dr. Herſchel's theory of the annual parallax of double ſtars, with the method of computing from thence what is generally called the parallax of the fixed ſtars, or of ſingle ſtars of the firſt magnitude, ſuch as are neareſt to us, ſee the preceding part of this article, under *Diſtance of the* STARS.

On the other hand, if our ſyſtem be at reſt, and any of the ſtars really in motion, this might likewiſe vary their apparent poſitions; and the more ſo, the nearer they are to us, or the ſwifter their motions are, or the more proper the direction of the motion is to be rendered perceptible by us. Since then the relative places of the ſtars may be changed from ſuch a variety of cauſes, conſidering the amazing diſtance at which it is certain ſome of them are placed, it may require the obſervations of many ages to determine the laws of the apparent changes even of a ſingle ſtar; much more difficult, therefore, muſt it be to ſettle the laws relating to all the moſt remarkable ſtars.

When the cauſes which affect the places of all the ſtars in general are known, ſuch as the preceſſion, aberration, and nutation; it may be of ſingular uſe to examine nicely the relative ſituations of particular ſtars, and eſpecially of thoſe of the greateſt luſtre, which, it may be preſumed, lie neareſt to us, and may therefore be ſubject to more ſenſible changes, either from their own motion, or from that of our ſyſtem. And if at the ſame time that the brighter ſtars are compared with each other, we likewiſe determine the relative poſitions of ſome of the ſmalleſt that appear near them, whoſe places can be aſcertained with ſufficient exactneſs, we may perhaps be able to judge to what cauſe the change, if any be obſervable, is owing. The uncertainty that we are at preſent under, with reſpect to the degree of accuracy with which former aſtronomers could obſerve, makes us unable to determine ſeveral things relating to this ſubject; but the improvements which have of late years been made in the methods of taking the places of the heavenly bodies are ſo great, that a few years may hereafter be ſufficient to ſettle ſome points, which cannot now be ſettled, by comparing even the earlieſt obſervations with thoſe of the preſent age.

The firſt perſon who pointed out the method of inveſtigating the parallax of the ſtars, by taking the diſtances from the zenith of thoſe that paſs very near it, was Galileo. The execution of this method was alſo attempted by Hooke, Flamſtead, Molyneux, and Bradley. See *Diſtance of the* STARS, *ſupra*.

Dr. Hooke communicated ſeveral obſervations on the apparent motions of the fixed ſtars; and as this was a matter of great importance in aſtronomy, ſeveral of the learned were deſirous of verifying and confirming his obſervations. An inſtrument was accordingly contrived by Mr. George Graham, and executed with ſurpriſing exactneſs.

With this inſtrument the ſtar γ, in the conſtellation Draco, was frequently obſerved by Meſſrs, Molyneux, Bradley, and Graham, in the years 1725, 1726; and the obſervations were afterwards repeated by Dr. Bradley with an inſtrument contrived by the ſame ingenious perſon, Mr. Graham, and ſo exact, that it might be depended on to half a ſecond. The reſult of theſe obſervations was, that the ſtar did not always appear in the ſame place, but that its diſtance from the zenith varied; and that the difference of the apparent places of Themis, the third ſatellite of Jupiter, amounted to 21 or 22 ſeconds. Similar obſervations were made on other ſtars, and a like apparent motion was found in them, proportional to the latitude of the ſtar. This motion was by no means ſuch as was to have been expected, as the effect of a parallax; and it was ſome time before any way could be found of accounting for this new phenomenon. At length Dr. Bradley reſolved all its variety, in a ſatisfactory manner, by the motion of light and the motion of the earth compounded together. See LIGHT, and Phil. Tranſ. N° 406. p. 364, or Abr. vol. vi. p. 149, &c.

Our excellent aſtronomer, Dr. Bradley, had no ſooner diſcovered the cauſe, and ſettled the laws of the aberration of the fixed ſtars, than his attention was again excited by another new phenomenon, *viz.* an annual change of declination in ſome of the fixed ſtars, which appeared to be ſenſibly greater than a preceſſion of the equinoctial points of $50''$ in a year, the mean quantity now uſually allowed by aſtronomers, would have occaſioned.

This apparent change of declination was obſerved in the ſtars near the equinoctial colure, and there appearing at the ſame time an effect of a quite contrary nature in ſome ſtars near the ſolſtitial colure, which ſeemed to alter their declination leſs than a preceſſion of $50''$ required, Dr. Bradley was thereby convinced, that all the phenomena in the different ſtars could not be accounted for merely by ſuppoſing that he had aſſumed a wrong quantity for the preceſſion of the equinoctial points. He had alſo, after many trials, ſufficient reaſon to conclude, that theſe ſecond unexpected deviations of the ſtars were not owing to any imperfection of his inſtruments. At length, from repeated obſervations, he began to gueſs at the real cauſe of theſe phenomena.

It appeared from the doctor's obſervations, during his reſidence at Wanſtead, from the year 1727 to 1732, that ſome of the ſtars near the ſolſtitial colure had changed their declinations $9''$ or $10''$ leſs than a preceſſion of $50''$ would have produced; and, at the ſame time, that others near the equinoctial colure had altered theirs about the ſame quantity more than a like preceſſion would have ocoaſioned; the north pole of the equator ſeeming to have approached the ſtars which come to the meridian with the ſun about the vernal equinox and the winter ſolſtice; and to have receded from thoſe which come to the meridian with the ſun about the autumnal equinox and the ſummer ſolſtice.

From the conſideration of theſe circumſtances, and the ſituation of the aſcending node of the moon's orbit when he firſt began to make his obſervations, he ſuſpected that the moon's action upon the equatorial parts of the earth might produce theſe effects. For if the preceſſion of the equinox be, according to ſir Iſaac Newton's principles, cauſed by the actions of the ſun and moon upon thoſe parts; the plane of the moon's orbit being, at one time, above ten degrees more inclined to the plane of the equator than at another, it was reaſonable to conclude, that the part of the whole annual preceſſion which ariſes from her action, would, in different years, be varied in its quantity; whereas the plane of the ecliptic, in which the ſun appears, keeping always nearly the ſame inclination to the equator, that part of the preceſſion which is owing to the ſun's action, may be the ſame every year; and from hence it would follow, that although the mean annual preceſſion, proceeding from the joint actions of the ſun and moon, were 50″; yet the apparent annual preceſſion might ſometimes exceed, and ſometimes fall ſhort of that mean quantity, according to the various ſituations of the nodes of the moon's orbit.

In the year 1727, the moon's aſcending node was near the beginning of Aries, and conſequently her orbit was as much inclined to the equator as it can at any time be; and then the apparent annual preceſſion was found, by the doctor's firſt year's obſervations, to be greater than the mean; which proved, that the ſtars near the equinoctial colure, whoſe declinations are moſt of all affected by the preceſſion, had changed theirs above a tenth part more than a preceſſion of 50″ would have cauſed. The ſucceeding year's obſervations proved the ſame thing; and in three or four years time the difference became ſo conſiderable, as to leave no room to ſuſpect it was owing to any imperfection either of the inſtrument or obſervation.

But ſome of the ſtars that were near the ſolſtitial colure having appeared to move, during the ſame time, in a manner contrary to what they ought to have done, by an increaſe of the preceſſion; and the deviations in them being as remarkable as in the others; it was evident that ſomething more than a mere change in the quantity of the preceſſion would be requiſite to ſolve this part of the phenomenon. Upon comparing the obſervations of ſtars near the ſolſtitial colure that were almoſt oppoſite to each other in right aſcenſion, they were found to be equally affected by this cauſe. For whilſt γ Draconis appeared to have moved northward, the ſmall ſtar, which is the 35th Camelopardali Hevelii in the Britiſh Catalogue, ſeemed to have gone as much towards the ſouth; which ſhewed, that this apparent motion in both thoſe ſtars might proceed from a nutation of the earth's axis; whereas the compariſon of the doctor's obſervations of the ſame ſtars, formerly enabled him to draw a different concluſion with reſpect to the cauſe of the annual aberrations ariſing from the motion of light. For the apparent alteration in γ Draconis, from that cauſe, being as great again as in the other ſmall ſtar, proved that that did not proceed from a nutation of the earth's axis; as, on the contrary, this may. Upon making the like compariſon between the obſervation of other ſtars that lie nearly oppoſite in right aſcenſion, whatever their ſituations were with reſpect to the cardinal points of the equator, it appeared that their change of declination was nearly equal, but contrary; and ſuch as a nutation or motion of the earth's axis would effect.

The moon's aſcending node being got back towards the beginning of Capricorn in the year 1732, the ſtars near the noctial colure appeared about that time to change their no more than a preceſſion of 50″ required; thoſe near the ſolſtitial colure altered theirs ear leſs than they ought. Soon after, the annual change of declination of the former was perceived to be diminiſhed, ſo as to become leſs than 50″ of preceſſion would cauſe; and it continued to diminiſh till the year 1736, when the moon's aſcending node was about the beginning of Libra, and her orbit had the leaſt inclination to the equator. But by this time, ſome of the ſtars near the ſolſtitial colure had altered their declinations 18″ leſs ſince the year 1727, than they ought to have done from a preceſſion of 50″. For γ Draconis, which in thoſe nine years would have gone about 8″ more ſoutherly, was obſerved, in 1736, to appear 10″ more northerly than it did in the year 1727.

As this appearance in γ Draconis indicated a diminution of the inclination of the earth's axis to the plane of the ecliptic, and as ſeveral aſtronomers have ſuppoſed that inclination to diminiſh regularly; if this phenomenon depended upon ſuch a cauſe, and amounted to 18″ in nine years, the obliquity of the ecliptic would, at that rate, alter a whole minute in thirty years; which is much faſter than any obſervations before made would allow. The doctor had therefore reaſon to think, that ſome part of this motion at leaſt, if not the whole, was owing to the moon's action upon the equatorial parts of the earth, which, he conceived, might cauſe a libratory motion of the earth's axis. But as he was unable to judge, from only nine years' obſervations, whether the axis would entirely recover the ſame poſition that it had in the year 1727, he found it neceſſary to continue his obſervations through a whole period of the moon's nodes; at the end of which he had the ſatisfaction to ſee, that the ſtars returned into the ſame poſitions again, as if there had been no alteration at all in the inclination of the earth's axis, which fully convinced him that he had gueſſed rightly as to the cauſe of the phenomenon. This circumſtance proves likewiſe, that if there be a gradual diminution of the obliquity of the ecliptic, it does not ariſe only from an alteration in the poſition of the earth's axis, but rather from ſome change in the plane of the ecliptic itſelf; becauſe the ſtars, at the end of the period of the moon's nodes, appeared in the ſame places, with reſpect to the equator, as they ought to have done if the earth's axis had retained the ſame inclination to an invariable plane.

The doctor having communicated theſe obſervations, and his ſuſpicion of their cauſe, to the late Mr. Machin, that excellent geometer ſoon after ſent him a table, containing the quantity of the annual preceſſion in the various poſitions of the moon's nodes, as alſo the correſponding nutations of the earth's axis; which was computed upon the ſuppoſition that the mean annual preceſſion is 50″, and that the whole is governed by the pole of the moon's orbit only; and, therefore, Mr. Machin imagined, that the numbers in the table would be too large, as, in fact, they were found to be. But it appeared that the changes which Dr. Bradley had obſerved, both in the annual preceſſion and nutation, kept the ſame law, as to increaſing and decreaſing, with the numbers of Mr. Machin's table. Thoſe were calculated upon the ſuppoſition, that the pole of the equator, during a period of the moon's nodes, moved round in the periphery of a little circle, whoſe centre was 23° 29′ diſtant from the pole of the ecliptic; having itſelf alſo an angular motion of 50″ in a year about the ſame pole. The north pole of the equator was conceived to be in that part of the ſmall circle which is fartheſt from the north pole of the ecliptic, at the time when the moon's aſcending node is in the beginning of Aries; and in the oppoſite point of it, when the ſame node is in Libra.

If the diameter of the little circle, in which the pole of the equator moves, be ſuppoſed equal to 18″, which is the whole quantity of the *nutation*, (which ſee,) as collected from

Dr. Bradley's obſervations of the ſtar γ Draconis, then all the phenomena of the ſeveral ſtars which he obſerved will be very nearly ſolved by his hypotheſis. But for the particulars of his ſolution, and the application of his theory to the practice of aſtronomy, we muſt refer to the excellent author himſelf, our intention being only to give the hiſtory of the invention.

The corrections ariſing from the aberration of light, and from the nutation of the earth's axis, muſt not be neglected in aſtronomical obſervations; ſince ſuch neglects might produce errors of near a minute in the polar diſtances of ſome ſtars.

As to the allowance to be made for the aberration of light, Dr. Bradley aſſures us, that having again examined thoſe of his own obſervations, which were moſt proper to determine the tranſverſe axis of the ellipſis which each ſtar ſeems to deſcribe, he found it to be neareſt to 40″; and this is the number he makes uſe of in his computations relating to the nutation.

Dr. Bradley ſays, in general, that experience has taught him, that the obſervations of ſuch ſtars as lie neareſt the zenith, generally agree beſt with one another, and are therefore the fitteſt to prove the truth of any hypotheſis. Phil. Tranſ. No. 485. vol. xlv. p. 1, &c.

Monſieur d'Alembert has publiſhed a treatiſe, entitled "Recherches ſur la Preceſſion des Equinoxes et ſur la Nutation de la Terre dans le Syſtème Newtonien," 4to. Paris, 1749. The calculations of this learned gentleman agree, in general, with Dr. Bradley's obſervations. But Monſieur d'Alembert finds, that the pole of the equator deſcribes an ellipſis in the heavens, the ratio of whoſe axes is as 4 to 3; whereas, according to Dr. Bradley, the curve deſcribed is either a circle or an ellipſis, the ratio of whoſe axes is as 18 to 16.

From this digreſſion we ſhall return to the proper motion of the ſtars and ſolar ſyſtem. This motion was firſt obſerved, as we have already ſuggeſted, by Dr. Halley, and afterwards by Le Monnier and Caſſini. Tobias Mayer had the merit of giving the firſt explanation of this proper motion; he compared the places of about eighty ſtars, as determined by Roemer, with his own obſervations, and he found that the greater number of them had a proper motion. He was apprized that this change of place in the poſition of the ſtars might be explained by a progreſſive motion of the ſun towards one quarter of the heavens; but the reſult of his obſervations not according with this hypotheſis, he concluded, that many centuries might elapſe before the true cauſe of this motion is explained. The poſſibility of a ſolar motion was ſuggeſted, upon theoretical principles, by the late Dr. Wilſon of Glaſgow; and M. de la Lande deduced the ſame opinion from the rotatory motion of the ſun; but another kind of argument has completely confirmed theſe conjectures.

If the ſun has a motion in abſolute ſpace, directed towards any quarter of the heavens, it is obvious that the ſtars in that quarter muſt appear to recede from each other, while thoſe in the oppoſite region ſeem gradually approaching. The proper motion of the ſtars, therefore, in thoſe oppoſite regions, as aſcertained by a compariſon of ancient with modern obſervations, ought to correſpond with this hypotheſis.

Dr. Herſchel has examined this ſubject with his uſual ſucceſs, and he has certainly diſcovered the direction in which our ſyſtem is gradually advancing. He found that the apparent proper motions of about forty-four ſtars out of fifty-ſix are very nearly in the direction which ſhould reſult from a motion of the ſun towards the conſtellation Hercules, or, more accurately, to a point in the heavens, whoſe right aſcenſion is 250° 52′·30″, and whoſe north polar diſtance is 40° 22′.

Dr. Herſchel, in eſtabliſhing this motion of the ſtarry and ſolar ſyſtems, begins with principles drawn from the theory of attraction, which evidently oppoſe every idea of abſolute reſt in any one of the ſtars, when once it is known that ſome of them are in motion; for the change that muſt ariſe by ſuch motion, in the value of a power which acts inverſely as the ſquares of the diſtances, muſt be felt in all the neighbouring ſtars; and if theſe be influenced by the motion of the former, they will again affect thoſe that are next to them, and ſo on till all are in motion. Now as we know that ſeveral ſtars, in divers parts of the heavens, do actually change their place, it will follow, that the motion of our ſolar ſyſtem is not a mere hypotheſis; and this conſideration will be confirmed by the reaſons that induce us to ſuppoſe, that moſt of thoſe very ſtars which have been obſerved to move, to be ſuch as are neareſt to us; and, therefore, their influence on our ſituation would of itſelf be a powerful argument in favour of the proper motion of the ſun, if it had been originally at reſt. Moreover, it ſeems very natural, that the changes which are obſerved to take place among the ſtars; ſuch as the increaſe of magnitude in many, and the gradual diſappearance of others; the periods of ſome not before obſerved, and the diſtances of many that are actually changing, while many more are ſuſpected to have a conſiderable motion; afford a ſtrong ſuſpicion that moſt probably every ſtar in the heavens is more or leſs in motion. Allowing the proper motion of the ſtars, it muſt follow, that our ſyſtem, with all its planets and comets, that is, the ſolar ſyſtem, is not leſs liable to ſuch a general agitation as is found to obtain among all the other celeſtial bodies. Aſtronomers have already obſerved what they call a proper motion in ſeveral of the fixed ſtars, and the ſame may be ſuppoſed of them all. We ought, therefore, to reſolve that which is common to all the ſtars, which are found to have what has been called a proper motion, into a ſingle real motion of the ſolar ſyſtem, as far as that will anſwer the known facts, and only to attribute to the proper motion of each particular ſtar the deviations from the general law the ſtars ſeem to follow in thoſe movements.

By Dr. Maſkelyne's account of the proper motion of ſome principal ſtars, we find that Sirius, Caſtor, Procyon, Pollux, Regulus, Arcturus, and α Aquilæ, appear to have reſpectively the following proper motions in right aſcenſion; − 0″.63; − 0″.28; − 0″.80; − 0″.93; − 0″.41; − 1″.40; and + 0″.57; and two of them, Sirius and Arcturus, in declination, *viz.* 1″.20 and 2″.01, both ſouthward.

Since the apparent motions of theſe ſeven ſtars may be accounted for, either by ſuppoſing them to move juſt as they appear to do, or elſe by ſuppoſing the ſun alone to have a motion in a direction ſuch as Dr. Herſchel aſſigns to it, we are no more authoriſed to ſuppoſe the ſun at reſt than we ſhould be to deny the diurnal motion of the earth, except in this reſpect, that the proofs of the latter are very numerous, whereas the former reſts only on a few though capital teſtimonies. Our author finds from other conſiderations, founded on a table by M. de la Lande of the proper motion of twelve ſtars, both in right aſcenſion and declination, for fifty years, (Phil. Tranſ. vol. lxxiii. p. 270, &c.), that this motion of the ſun, or ſolar ſyſtem, is directed towards the ſtar λ Herculis; and he mentions ſome very ſtriking circumſtances in the quantities of the real proper motions of the ſtars that deſerve notice. Firſt, Arcturus and Sirius being the largeſt of the ſtars, and therefore probably the neareſt, ought to have the moſt apparent motion, both in right aſcenſion and declination, which is agreeable to obſervation. Next, in regard to the right aſcenſion only, Arcturus being better ſituated to ſhew its motion, ought to have it much larger, which we find it has. Aldebaran, both badly ſituated and conſiderably ſmaller than the two former, ought to ſhew but little motion. Procyon, better ſituated than Sirius, though not quite ſo large, ſhould have almoſt as much motion; for, on ſuppoſing it farther off becauſe it appears ſmaller, the effect of the ſun's motion will be leſſened upon it; whereas, on the other hand, its better ſituation will partly compenſate for its greater diſtance. ι Cygni, very favourably ſituated, though but a ſmall ſtar, ſhould ſhew it conſiderably as well as α Aquilæ; whereas β Cygni ſhould have but little motion; and γ Piſcium, beſt ſituated of all, ſhould have a great increaſe of right aſcenſion.

In the laſt place, a very ſtriking agreement with the hypotheſis is diſplayed in Caſtor and Pollux. They are both pretty well ſituated; and we accordingly find that Pollux, for the ſize of the ſtar, ſhews as much motion in right aſcenſion as we could expect: but it is remarkable, and ſeemingly contrary to our hypotheſis, that Caſtor, equally well placed, ſhews no more than one half of the motion of Pollux. Now, if we recollect that the former is a double ſtar, conſiſting of two ſtars not much different in ſize, we can allow but about half the light to each of them, which affords a ſtrong preſumption of their being at a greater diſtance, and therefore their partial ſyſtematical parallax ought to be ſo much leſs than that of Pollux, which agrees wonderfully with obſervation. Not to mention the great difficulty in which we ſhould be involved, were we to ſuppoſe the motion of Caſtor to be really in the ſtar; for how extraordinary muſt appear the concurrence, that two ſtars, namely, thoſe that make up this apparently ſingle ſtar, ſhould both have a proper motion ſo exactly alike, that in all our obſervations hitherto they have not been found to diſagree a ſingle ſecond, either in right aſcenſion or declination, for fifty years together! Does not this ſeem ſtrongly to point out the common cauſe, the motion of the ſolar ſyſtem?

As to the quantity of the ſolar motion, Dr. Herſchel ſuggeſts the following hints. From the annual parallax of the fixed ſtars, which, from obſervations, he finds much leſs than it has hitherto been proved to be, we may certainly admit, that the diameter of the earth's orbit, at the diſtance of Sirius or Arcturus, would not nearly ſubtend an angle of one ſecond; but the apparent motion of Arcturus, if owing to a tranſlation of the ſolar ſyſtem, amounts to no leſs than 2″.7 a-year, as will appear if we compound the two motions of 1′ 11″ in right aſcenſion, and 1′ 55″ in declination, into one ſingle motion, and reduce it to an annual quantity. Hence we may, in a general way, eſtimate, that the ſolar motion can certainly not be leſs than that which the earth has in her annual orbit.

By conſidering the motion of the ſatellites round their primary planets, and of the primary planets round the ſun, Dr. Herſchel is led to ſuppoſe that the proper motion of the ſun is not rectilineal, but that it is performed round ſome diſtant and unknown centre. Although we may not acquieſce in the hypotheſis, that there is any immenſe central body of ſufficient magnitude to carry round it all the ſyſtems with which aſtronomers have filled the regions of ſpace, yet we may ſuppoſe, with M. de la Lande, that there is a kind of equilibrium among all the ſyſtems of the world, and that they have all a periodical circulation round their common centre of gravity. See Phil. Tranſ. vol. xcv. p. 233—256. Lalande's Aſtron. tom. iii.

The following table contains the proper motion of 36 of the principal fixed ſtars in right aſcenſion and declination, according to the accurate obſervations of Dr. Maſkelyne.

Table of the Annual Proper Motion of 36 Stars in Right Aſcenſion and Declination.

Names of the Stars.	Magnitude.	Annual proper Motion in Right Aſcenſion.	Annual proper Motion in Declination.
		Seconds.	Seconds.
γ Pegaſi	2	− 0.09	− 0.15 N.
α Arietis	2.3	+ 0.10	+ 0.07 S.
α Ceti	2	− 0.12	− 0.08 N.
Aldebaran	1	+ 0.03	+ 0.12 S.
Capella	1	+ 0.21	+ 0.44 S.
Rigel	1	− 0.03	− 0.16 N.
β Tauri	2	+ 0.01	+ 0.10 S.
α Orion	1	+ 0.01	− 0.13 N.
Sirius	1	− 0.42	+ 1.04 S.
Caſtor	2	− 0.15	+ 0.44 S.
Procyon	1.2	− 0.80	+ 0.95 S.
Pollux	2	− 0.74	0.00
α Hydræ	2	− 0.09	− 0.14 N.
Regulus	1	− 0.22	− 0.08 N.
β Leonis	1.2	− 0.57	+ 0.07 S.
β Virginis	3	+ 0.74	+ 0.24 S.
Spica Virginis	1	− 0.02	− 0.19 N.
Arcturus	1	− 1.26	+ 1.72 S.
1 } α Libræ	6	− 0.11	− 0.18 N.
2 }	2	− 0.11	− 0.15 N.
α Cor. Bor.	2.3	+ 0.26	+ 0.03 S.
α Serpentis	2	+ 0.11	− 0.19 N.
Antares	1	0.00	− 0.26 N.
α Herculis	2	0.00	− 0.23 N.
α Ophiuchi	2	+ 0.06	+ 0.05 S.
α Lyræ	1	+ 0.23	− 0.27 N.
γ }	3	− 0.11	− 0.16 N.
α } Aquilæ	1.2	+ 0.48	− 0.54 N.
β }	3.4	− 0.03	+ 0.35 S.
1 } α Capricorni	3	0.00	− 0.28 N.
2 }	3	+ 0.05	− 0.26 N.
α Cygni	1.2	− 0.08	− 0.03 N.
α Aquarii	3	− 0.08	− 0.19 N.
Fomalhaut	1.2	+ 0.35	− 0.06 N.
α Pegaſi	2	− 0.06	− 0.18 N.
α Andromedæ	2	+ 0.08	+ 0.06 S.

In the following table we have given the proper motion of nine principal fixed ſtars in longitude and latitude, according to the moſt recent obſervations of Dr. Maſkelyne, including the preceſſion, &c.

Names of the Stars.	Annual Increaſe of Longitude.	Annual Variation of Latitude.
	″	″
α Arietis	50.271	+ 0.180
Aldebaran	50.204	− 0.317
Pollux	49.470	+ 0.280
Regulus	50.004	+ 0.200
Spica Virginis	50.059	+ 0.080
Antares	50.141	+ 0.167
α Aquilæ	50.870	+ 0.372
Fomalhaut	50.717	+ 0.013
α Pegaſi	50.133	+ 0.163

Catalogue of 600 principal Stars, viſible at Paris, for the Beginning of 1810, after the lateſt Obſervations, by Michael Lalande, Nephew.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.				Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.		
88 γ Pegaſus	2	0	3	0	51	55	46.0	14	7	38	N.	+ 20.0
8 ι Cetus	3	0	9	2	26	10	45.9	9	52	38	S.	— 20.1
15 κ Caſſiopeia	4	0	22	5	34	22	49.6	61	52	52	N.	+ 20.0
17 ζ Caſſiopeia	4	0	26	6	36	41	49.0	52	50	59	N.	+ 19.9
30 ε Andromeda	4	0	28	7	8	10	47.2	28	16	51	N.	+ 19.9
31 δ Andromeda	3	0	29	7	17	57	47.8	29	49	13	N.	+ 19.8
18 α Caſſiopeia	3	0	30	7	26	54	49.8	55	29	36	N.	+ 19.8
16 β Cetus	2	0	34	8	30	43	45.2	19	1	52	S.	— 19.9
34 ζ Andromeda	4	0	37	9	19	21	47.3	23	13	55	N.	+ 19.8
24 η Caſſiopeia	4	0	38	9	25	9	52.8	56	48	23	N.	+ 19.9
63 δ Piſces	4	0	39	9	42	27	46.3	6	33	3	N.	+ 19.7
35 ν Andromeda	4	0	39	9	50	38	48.8	40	2	31	N.	+ 19.7
27 γ Caſſiopeia	3	0	45	11	19	55	52.7	59	41	9	N.	+ 19.6
37 μ Andromeda	4.3	0	46	11	33	38	49.0	37	27	38	N.	+ 19.6
71 ε Piſces	4	0	53	13	16	25	46.6	6	51	55	N.	+ 19.5
α Polaris	2.3	0	54	13	38	17	204.4	88	17	40	N.	+ 19.5
31 η Cetus	3.4	0	59	14	45	28	44.9	11	11	24	S.	— 19.4
43 β Andromeda	2	0	59	14	46	52	49.9	34	36	38	N.	+ 19.3
33 θ Caſſiopeia	4	1	0	14	54	7	53.0	54	8	7	N.	+ 19.4
86 ζ Piſces	4	1	4	15	57	4	46.6	6	34	7	N.	+ 19.3
46 Andromeda	4.5	1	11	17	48	6	51.9	44	31	48	N.	+ 19.1
37 δ Caſſiopeia	3	1	13	18	22	12	56.4	59	14	39	N.	+ 19.0
45 θ Cetus	3	1	15	18	37	53	44.9	9	9	56	S.	— 19.0
48 Andromeda	5	1	16	19	5	1	52.3	44	25	19	N.	+ 18.9
49 ξ Andromeda	5	1	19	19	41	24	52.9	46	1	23	N.	+ 18.9
99 η Piſces	4	1	21	20	20	0	47.8	14	21	46	N.	+ 18.8
102 π Piſces	4.5	1	27	21	45	36	47.5	11	9	58	N.	+ 18.6
106 ν Piſces	4.5	1	32	22	53	18	46.5	4	31	21	N.	+ 18.5
54 φ Andromeda	4	1	32	22	57	18	55.1	49	43	37	N.	+ 18.5
52 τ Cetus	3.4	1	35	23	48	55	43.5	16	56	38	S.	— 18.3
110 ο Piſces	4.5	1	35	23	50	34	47.2	8	11	51	N.	+ 18.4
45 ε Caſſiopeia	3	1	41	25	12	55	62.3	62	43	40	N.	+ 18.1
55 ζ^1 Cetus	3	1	42	25	31	12	44.2	11	16	37	S.	— 18.1
2 α Triangularis B	3.4	1	42	25	34	7	50.6	28	38	54	N.	+ 18.1
5 γ Aries *middle*	4	1	43	25	46	53	48.8	18	21	34	N.	+ 18.1
6 β Aries	3	1	44	26	2	28	49.4	19	52	28	N.	+ 18.0
50 *f* Caſſiopeia	4.5	1	47	26	51	57	72.7	71	29	34	N.	+ 17.9
113 α Piſces	3	1	52	28	3	22	46.3	1	50	30	N.	+ 17.6
57 γ Andromeda	2	1	52	28	4	18	54.6	41	24	42	N.	+ 17.6
213 α Aries	3	1	56	29	7	16	50.2	22	33	31	N.	+ 17.5
4 β Triangularis B	4	1	58	29	34	9	52.6	34	5	0	N.	+ 17.4
9 γ Triangularis B	4	2	6	31	30	46	52.6	32	57	40	N.	+ 17.1
68 ο Cetus 2	10	2	10	32	26	19	45.2	3	50	40	S.	— 16.9
35 Caſſiopeia, Hev.	4	2	13	33	23	51	71.1	66	32	19	N.	+ 16.8
72 ρ Cetus	4	2	17	33	56	30	43.3	13	9	6	S.	— 16.6
73 ξ^2 Cetus	4	2	18	34	31	4	47.4	7	36	12	N.	+ 16.7
76 σ Cetus	4	2	23	35	46	15	42.5	16	4	57	S.	— 16.3
82 δ Cetus	3	2	30	37	26	16	45.8	0	29	48	S.	— 15.9
83 ε Cetus	3	2	30	37	35	37	43.2	12	40	57	S.	— 15.9
13 θ Perſeus	4	2	31	37	49	10	59.7	48	25	0	N.	+ 15.9
35 Mouc. Lyſ.	4	2	32	38	5	2	52.2	26	53	33	N.	+ 15.8

STARS.

Names and Magnitudes of the Stars.		Mean Right Ascension, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
86 γ Cetus	3	2	33	38	22	5	46.4	2	25	50 N.	+ 15.7
87 μ Cetus	4	2	35	38	40	11	48.0	9	18	22 N.	+ 15.7
89 π Cetus	3	2	35	38	46	14	42.6	14	40	2 S.	− 15.6
1 τ^1 Eridanus	4	2	36	39	3	28	41.5	19	22	57 S.	− 15.6
39 γ B. Lys	4	2	37	39	9	24	52.7	28	27	5 N.	+ 15.6
η Perſeus, 9 Hev.	4	2	37	39	13	51	64.0	55	5	50 N.	+ 15.6
16 P^1 Perſeus	4	2	39	39	39	26	55.7	37	31	44 N.	+ 15.5
41 γ A. Lys	4	2	39	39	42	26	52.3	26	28	15 N.	+ 15.4
18 τ Perſeus	5	2	41	40	12	57	62.4	51	58	39 N.	+ 15.3
2 τ^2 Eridanus	4	2	42	40	36	17	40.7	21	47	31 S.	− 15.2
21 Perſeus	4.5	2	46	41	26	48	53.9	31	9	41 N.	+ 15.0
22 π of Perſeus	4	2	47	41	39	50	56.6	38	53	36 N.	+ 15.0
3 η Eridanus	3	2	47	41	47	17	43.8	9	39	32 S.	− 15.0
91 λ Cetus	4	2	50	42	23	8	47.8	8	8	36 N.	+ 14.8
23 γ Perſeus	3	2	51	42	46	44	63.7	52	45	13 N.	+ 14.7
92 α Cetus	2	2	52	43	5	20	46.7	3	20	15 N.	+ 14.7
25 ρ Perſeus	4	2	53	43	15	37	56.6	38	5	44 N.	+ 14.6
11 Eridanus	4	2	54	43	30	15	39.7	24	22	28 S.	− 14.6
10 ρ^3 Eridanus	4	2	55	43	44	13	43.9	8	20	59 S.	− 14.5
26 β Perſeus, *var.*	2.5	2	56	43	57	48	57.8	40	12	54 N.	+ 14.5
27 κ Perſeus	4.5	2	57	44	10	54	59.4	44	7	43 N.	+ 14.4
57 δ Aries	4	3	1	45	11	41	50.8	19	0	2 N.	+ 14.2
12 Eridanus	3.4	3	4	45	59	53	37.7	29	44	38 S.	− 13.9
13 ζ Eridanus	3	3	7	46	39	8	43.5	9	31	56 S.	− 13.8
33 α Perſeus	2	3	11	47	42	12	63.0	49	10	30 N.	+ 13.5
16 Eridanus	3.4	3	11	47	45	57	39.8	22	27	19 S.	− 13.5
97 κ^2 Libra	4	3	11	47	47	50	46.7	2	59	4 N.	+ 13.5
2 Gira. Hev.	4	3	14	48	26	44	71.0	59	15	54 N.	+ 13.3
1 ο Taurus	4	3	15	48	39	3	48.1	8	21	11 N.	+ 13.3
4 Gira. Hev.	4.5	3	16	48	53	56	67.2	54	46	59 N.	+ 13.2
2 ξ Taurus	4	3	17	49	13	14	48.3	9	3	49 N.	+ 13.1
35 σ Perſeus	5	3	17	49	18	37	62.3	47	19	41 N.	+ 13.1
5 *f* Taurus	5	3	20	50	5	56	49.2	12	16	38 N.	+ 12.9
17 Eridanus	4.5	3	21	50	17	54	44.4	5	44	1 S.	− 12.8
37 ψ Perſeus	5	3	23	50	45	38	62.8	47	32	57 N.	+ 12.7
18 ε Eridanus	3	3	24	50	59	47	42.3	10	6	29 S.	− 12.6
19 Eridanus	4	3	25	51	20	59	39.5	22	16	35 S.	− 12.5
10 Taurus	4.5	3	27	51	47	48	45.9	0	12	23 S.	− 12.4
39 δ Perſeus	3	3	29	52	21	45	63.0	47	10	8 N.	+ 12.3
41 ν Perſeus	4	3	32	53	4	56	60.3	41	58	1 N.	+ 12.1
23 δ Eridanus	3	3	34	53	32	18	42.9	10	24	50 S.	− 12.5
25 η Pleiades	3	3	36	54	3	7	53.1	23	30	29 N.	+ 11.8
26 π Eridanus	4	3	37	54	17	27	42.3	12	42	17 S.	− 11.7
27 Eridanus	4	3	39	54	40	10	38.7	23	48	59 S.	− 11.6
44 ζ Perſeus	3	3	42	55	33	12	55.9	31	18	32 N.	+ 11.4
46 P. Cat. 1712	5	3	42	55	35	0	63.8	47	18	6 N.	+ 11.4
g Eridanus	4	3	42	55	35	18	33.6	36	46	51 S.	− 11.3
45 ε Perſeus	3	3	45	56	17	7	59.6	39	26	59 N.	+ 11.2
33 Eridanus	4.5	3	46	56	24	23	38.1	25	10	48 S.	− 11.1
34 γ Eridanus	3	3	49	57	17	32	41.8	14	3	21 S.	− 10.9
35 λ Taurus	4	3	50	57	32	27	49.5	11	56	42 N.	+ 10.8
36 *k* Eridanus	4	3	52	57	57	24	38.2	24	53	39 S.	− 10.7
47 λ Perſeus	4	3	52	58	7	13	66.0	49	49	22 N.	+ 10.6
38 ν Taurus	4	3	53	58	15	52	47.5	5	27	15 N.	+ 10.6
37 A^1 Taurus	4.5	3	53	58	22	10	52.8	21	33	10 N.	+ 10.5

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
51 μ Perſeus	4	4	1	60	14	54	65.1	47	54	50 N.	+ 10.0
38 ο Eridanus	4	4	3	60	38	55	43.7	7	20	26 S.	− 9.9
49 μ Taurus	4	4	5	61	18	24	48.5	8	24	28 N.	+ 9.7
54 γ Taurus	3	4	9	62	14	52	51.0	15	9	31 N.	+ 9.4
41 Eridanus	3.4	4	11	62	40	35	33.8	34	16	5 S.	− 9.2
61 δ^1 Taurus	3.4	4	12	62	59	49	51.5	17	5	16 N.	+ 9.1
64 δ^2 Taurus	4.6	4	13	63	17	17	51.4	16	59	42 N.	+ 9.1
42 ξ Eridanus	3.4	4	14	63	33	20	44.6	4	11	34 S.	− 9.0
43 *d* Eridanus	4	4	17	64	13	31	33.6	34	28	3 S.	− 8.7
74 ε Taurus	3.4	4	18	64	23	0	52.3	18	44	52 N.	+ 8.6
87 Aldebaran	1	4	25	66	15	25	51.4	16	7	1 N.	+ 8.0
47 Eridanus	-	4	25	66	15	45	43.1	8	38	14 S.	− 8.1
50 υ^1 Eridanus	4	4	26	66	30	53	35.3	30	9	18 S.	− 8.0
48 ν Eridanus	4	4	27	66	42	26	44.7	3	44	57 S.	− 8.0
51 C. Eridanus	4	4	28	67	0	42	45.0	2	51	42 S.	− 7.9
52 υ^2 Eridanus	4	4	28	67	2	32	34.9	30	57	29 S.	− 7.8
53 Eridanus	3.4	4	29	67	22	11	40.9	14	40	59 S.	− 7.6
54 Eridanus	3	4	32	68	2	0	39.1	20	2	35 S.	− 7.5
9 Camelopardalis	4	4	35	68	48	53	87.8	66	0	5 N.	+ 7.3
57 μ Eridanus	4	4	36	69	0	4	44.7	3	36	41 S.	− 7.2
1 Orion	4	4	40	69	52	57	48.2	6	37	10 N.	+ 7.0
2 π^1 Orion	4	4	40	70	3	55	48.8	8	33	52 N.	+ 6.9
3 Orion	4	4	41	70	16	26	47.7	5	16	17 N.	+ 6.8
4 o^1 Orion	4.5	4	42	70	26	53	50.6	13	55	28 N.	+ 6.8
8 z Orion	4	4	44	71	5	22	46.6	2	7	15 N.	+ 6.5
3 ι Auriga	4	4	45	71	9	29	58.1	32	51	13 N.	+ 6.5
9 o^2 Orion	4.5	4	46	71	25	27	50.4	13	12	20 N.	+ 6.4
10 Camelopardalis	4.5	4	47	71	38	42	79.1	60	8	51 N.	+ 6.4
7 ε Auriga	4	4	48	72	5	18	64.2	43	31	42 N.	+ 6.2
10 Orion	4.5	4	49	72	10	36	46.4	1	24	47 N.	+ 6.2
8 ζ Auriga	4	4	49	72	18	21	62.4	40	47	5 N.	+ 6.1
102 ι Taurus	4	4	52	72	56	11	53.5	21	18	21 N.	+ 5.9
10 η Auriga	4	4	53	73	18	10	62.6	40	57	48 N.	+ 5.8
2 ε Lepus	4	4	57	74	21	13	37.9	22	38	0 S.	− 5.4
67 β Eridanus	3	4	59	74	37	40	43.9	5	20	29 S.	− 5.4
69 λ Eridanus	4	5	0	75	0	41	42.8	9	0	21 S.	− 5.2
Capricornus	1	5	3	75	40	4	66.2	45	47	24 N.	+ 4.6
5 μ Lepus	4	5	4	76	5	57	40.2	16	26	18 S.	− 4.9
19 Rigel	1	5	5	76	21	7	43.1	8	25	49 S.	− 4.7
20 τ Orion	4	5	8	77	5	49	43.5	7	3	33 S.	− 4.5
112 β Taurus	2	5	14	78	34	20	56.7	28	26	3 N.	+ 3.9
28 η Orion	3	5	15	78	43	55	45.0	2	34	53 S.	− 4.0
24 γ Orion	2	5	15	78	44	8	48.1	6	10	1 N.	+ 3.9
9 β Lepus	3.4	5	20	80	1	37	38.5	20	55	9 S.	− 3.5
34 δ Orion	2	5	22	80	34	30	45.7	0	27	0 S.	− 3.3
36 υ Orion	4	5	23	80	41	10	43.4	7	26	59 S.	− 3.3
11 α Lepus	3	5	24	81	5	14	39.5	17	58	1 S.	− 3.1
ε Columba	4	5	24	81	7	0	31.8	35	36	56 S.	− 3.1
39 λ Orion	4	5	25	81	10	8	49.3	9	47	50 N.	+ 3.1
44 ι Orion	3.4	5	26	81	32	9	43.8	6	2	34 S.	− 3.0
123 ζ Taurus	3	5	26	81	34	24	53.5	21	0	57 N.	+ 3.0
46 ε Orion	2	5	27	81	38	36	45.4	1	20	1 S.	− 2.9
125 Taurus	5	5	28	81	59	28	55.5	25	46	45 N.	+ 2.8
48 σ Orion	4	5	29	82	18	7	45.0	2	43	7 S.	− 2.5
50 ζ Orion	2	5	31	82	47	36	45.2	2	3	12 S.	− 2.6

STARS.

Names and Magnitudes of the Stars.		Mean Right Afcenfion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
α Columba	2	5	33	83	11	33	32.5	34	10	57 S.	− 2.4
13 γ Lepus	3.4	5	37	84	8	6	37.4	22	31	7 S.	− 2.1
132 Taurus	4	5	37	84	20	22	55.0	24	29	33 N.	+ 2.0
14 ζ Lepus	4	5	38	84	35	7	40.6	14	54	5 S.	− 1.9
53 ϰ Orion	2.3	5	39	84	41	11	42.6	9	44	45 S.	− 1.9
15 δ Lepus	3.4	5	43	85	47	11	38.3	20	54	5 S.	− 1.5
33 δ Auriga	4	5	44	85	58	14	73.7	54	15	14 N.	+ 1.5
β Columba	3	5	44	86	4	0	31.5	35	50	50 S.	− 1.4
58 α Orion	1	5	45	86	13	18	48.6	7	21	39 N.	+ 1.4
34 β Auriga	2.3	5	46	86	23	53	66.0	44	54	48 N.	+ 1.3
37 θ Auriga	3.4	5	47	86	41	32	61.1	37	11	12 N.	+ 1.2
16 η Lepus	4	5	48	86	56	18	40.9	14	12	37 S.	− 1.1
γ Columba	4	5	51	87	42	3	31.8	35	18	59 S.	− 0.8
61 μ Orion	4	5	52	87	58	56	49.3	9	38	14 N.	+ 0.8
1 H. of G. Prop.	5	5	53	88	8	32	54.6	23	15	45 N.	+ 0.7
67 ν Orion	4.5	5	57	89	10	48	51.3	14	46	50 N.	+ 0.3
18 θ Lepus	4	5	58	89	23	21	40.6	14	55	42 S.	− 0.3
2 Lynx	4	6	3	90	42	42	79.3	59	3	41 N.	− 0.2
7 η Gemini	2.3	6	3	90	51	5	54.4	22	32	58 N.	− 0.2
13 μ Gemini	3	6	11	92	51	55	54.5	22	35	57 N.	− 1.2
1 ζ Canis Major	2.3	6	13	93	15	15	34.4	29	59	7 S.	+ 1.1
8 Monoceros	4	6	14	93	25	28	47.6	4	40	49 N.	− 1.2
2 β Canis Major	2.3	6	14	93	34	59	39.6	17	52	18 S.	+ 1.2
3 λ Canis Major	4	6	15	93	47	32	32.8	33	20	48 S.	+ 1.3
18 ν Gemini	4	6	18	94	25	12	53.3	20	19	18 N.	− 1.5
13 Monoceros	4	6	23	95	39	22	48.5	7	27	42 N.	− 1.9
24 γ Gemini	2.3	6	27	96	40	57	51.9	16	33	0 N.	− 2.4
15 Monoceros	4	6	31	97	37	40	49.5	10	3	45 N.	− 2.6
42 Camelopardalis	4.5	6	31	97	46	8	94.5	67	45	41 N.	− 2.6
27 ε Gemini	4	6	32	98	3	29	55.3	25	18	27 N.	− 2.8
43 Camelopardalis	4.5	6	33	98	17	21	97.8	69	5	14 N.	− 2.8
31 ξ² Gemini	4	6	35	98	39	21	50.5	13	5	30 N.	− 3.0
9 Sirius	1	6	37	99	11	34	39.8	16	27	49 S.	+ 4.2
18 Monoceros	4	6	38	99	29	14	46.8	2	36	44 N.	− 3.3
34 θ Gemini	4	6	40	100	3	47	59.5	34	10	37 N.	− 3.5
13 ϰ² Canis Major	4	6	43	100	41	12	33.5	32	17	43 S.	+ 3.7
18 μ Canis Major	4	6	47	101	51	8	41.1	13	48	22 S.	+ 4.1
20 ι Canis Major	4	6	48	101	54	59	40.0	16	48	54 S.	+ 4.1
21 ε Canis Major	3	6	51	102	47	22	35.3	28	43	15 S.	+ 4.4
43 ζ Gemini	3	6	53	103	12	29	53.4	20	50	21 N.	− 4.5
22 Canis Major	4	6	54	103	32	16	35.7	27	40	11 S.	+ 4.7
24 o² Canis Major	4	6	55	103	46	20	37.4	23	33	47 S.	+ 4.7
23 γ Canis Major	2	6	55	103	47	23	40.7	15	21	39 S.	+ 4.8
25 δ Canis Major	2	7	1	105	9	59	36.5	26	5	55 S.	+ 5.2
55 δ Gemini	3	7	9	107	11	27	53.9	22	19	15 N.	− 5.9
ϖ Argo Navis	3	7	10	107	36	31	31.7	36	45	45 S.	+ 6.0
60 ι Gemini	4	7	14	108	28	43	56.1	28	9	56 N.	− 6.3
31 η Canis Major	2	7	17	109	8	38	35.6	28	56	25 S.	+ 6.6
3 β Canis Minor	3	7	17	109	12	34	48.9	8	39	45 N.	− 6.7
66 α Caſtor	1.2	7	22	110	36	48	57.8	32	17	35 N.	− 7.0
69 υ Gemini	4.5	7	24	111	2	59	55.6	27	18	30 N.	− 7.1
Procyon	1.2	7	29	112	20	13	47.1	5	42	13 N.	− 8.5
26 Monoceros	4	7	32	113	2	32	43.0	9	6	56 S.	+ 7.8
77 ϰ Gemini	4	7	33	113	14	26	54.5	24	50	37 N.	− 7.9
78 β Pollux	2.3	7	34	113	25	3	55.3	28	28	27 N.	− 7.9

STARS.

Names and Magnitudes of the Stars.		Mean Right Afcenfion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
7 ξ Argo Navis	3.4	7	41	115	19	33	37.8	24	23	26 S.	+ 8.6
9 Argo Navis -	4	7	43	115	44	33	41.7	13	23	57 S.	+ 8.7
11 e Argo Navis	4	7	49	117	10	22	38.6	22	22	48 S.	+ 9.1
13 Argo Navis -	4	7	52	118	5	35	46.8	2	50	55 N.	— 9.4
ζ Argo Navis -	2	7	57	119	13	36	31.5	39	28	22 S.	+ 9.8
14 ψ^2 Cancer -	4	7	59	119	44	53	54.5	26	4	31 N.	— 9.9
15 ι Argo Navis	3.4	7	59	119	51	55	38.4	23	45	49 S.	+ 10.0
57 Camelopardalis	5	8	3	120	39	44	80.0	63	4	46 N.	— 10.1
17 β Cancer -	3.4	8	6	121	32	59	48.9	9	45	45 N.	— 10.5
1 ο Urfa Major	4.5	8	14	123	35	46	76.6	61	20	24 N.	— 10.9
30 Monocéros -	4	8	16	124	2	25	45.0	3	17	36 S.	+ 11.2
4 δ Hydra -	4	8	28	126	53	48	47.8	6	21	33 N.	— 12.0
43 γ Cancer -	4	8	32	128	4	4	52.4	22	8	36 N.	— 12.4
7 η Hydra -	4	8	33	128	19	15	47.1	4	4	25 N.	— 12.4
47 δ Cancer -	4	8	34	128	28	0	51.4	18	50	41 N.	— 12.7
31 Monoceros -	4	8	34	128	35	3	44.1	6	33	21 S.	+ 12.5
11 ε Hydra -	4	8	37	129	10	37	47.9	7	6	30 N.	— 12.6
16 ζ Hydra -	4.5	8	45	131	20	9	47.7	6	39	43 N.	— 13.2
60 α^1 Cancer -	4	8	46	131	23	9	49.3	12	20	39 N.	— 13.2
9 ι Urfa Major	3	8	46	131	32	11	63.2	48	46	45 N.	— 13.3
65 α^2 Cancer -	4	8	48	132	1	13	49.4	12	35	6 N.	— 13.5
10 n Urfa Major	4	8	48	132	4	0	59.6	42	31	39 N.	— 13.4
12 κ Urfa Major	3.4	8	51	132	39	0	62.3	47	53	57 N.	— 13.5
17 Urfa Major. Hev.	4	8	54	133	36	4	57.8	39	12	14 N.	— 13.8
76 κ Cancer -	4	8	57	134	21	44	48.8	11	25	34 N.	— 14.0
22 θ Hydra -	4	9	4	136	6	57	46.7	3	6	42 N.	— 14.4
38 Lynx -	4	9	7	136	44	41	56.5	37	35	59 N.	— 14.5
40 Lynx -	4	9	9	137	21	44	55.5	35	11	20 N.	— 14.7
1 κ Leo -	4	9	14	138	23	27	52.7	26	59	42 N.	— 14.9
24 *d* Urfa Major	4.5	9	17	139	21	54	83.3	70	39	18 N.	— 15.1
30 α Hydra -	2	9	18	139	33	43	44.2	7	50	26 S.	+ 15.1
25 θ Urfa Major	3.4	9	20	140	1	4	61.1	52	32	6 N.	— 15.9
4 λ Leo -	4	9	21	140	12	49	51.6	23	48	3 N.	— 15.4
5 ξ Leo -	4	9	22	140	25	25	48.7	12	8	12 N.	— 15.4
ψ Argo Navis	4	9	23	140	48	0	35.4	39	38	21 S.	+ 15.5
35 ι Hydra -	4	9	30	142	32	6	45.9	0	17	6 S.	+ 15.9
14 ο Leo -	4	9	31	142	44	59	48.2	10	45	5 N.	— 15.9
17 ε Leo -	4	9	35	143	45	37	51.5	24	38	38 N.	— 16.1
29 υ Urfa Major	4	9	37	144	20	46	66.2	59	55	30 N.	— 16.2
24 μ Leo -	3	9	42	145	28	59	51.8	26	53	46 N.	— 16.5
27 ν Leo -	4.5	9	48	146	59	47	48.5	13	20	49 N.	— 16.8
29 π Leo -	4	9	50	147	32	21	47.7	8	57	4 N.	— 16.9
30 η Leo -	3	9	57	149	14	24	49.2	17	41	7 N.	— 17.2
15 Sextans -	4	9	58	149	33	5	46.0	0	33	11 N.	— 17.2
32 Regulus -	1	9	58	149	33	34	48.2	12	53	30 N.	— 17.2
41 λ Hydra -	4	10	1	150	19	54	43.9	11	25	6 S.	+ 17.4
33 λ Urfa Major	3.4	10	6	151	23	47	55.3	43	51	30 N.	— 17.6
36 ζ Leo -	3	10	6	151	31	29	50.4	24	21	36 N.	— 17.6
q^1 Argo Navis	4	10	7	151	41	33	37.6	41	10	53 S.	+ 18.0
41 γ Leo -	3	10	9	152	22	10	50.0	20	47	52 N.	— 17.7
34 μ Urfa Major	3	10	11	152	44	23	54.1	42	27	2 N.	— 17.8
42 μ Hydra -	4	10	17	154	13	33	43.5	15	52	6 S.	+ 18.0
47 ρ Leo -	4	10	23	155	41	54	47.4	10	16	58 N.	— 18.2
37 Leo Minor	3	10	28	156	59	56	51.1	32	57	34 N.	— 18.5
4 ν Hydra and C.	—	10	40	160	3	48	44.2	15	12	10 S.	+ 18.8

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.				Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.		
54 Leo	4.5	10	45	161	19	32	49.2	25	45	39	N.	— 19.0
48 β Urſa Major	2	10	50	162	34	26	55.7	57	23	53	N.	— 19.1
7 α Hydra and C.	4	10	51	162	37	58	44.1	17	17	15	S.	+ 19.1
50 α Urſa Major	2	10	52	162	58	26	57.3	62	46	25	N.	— 19.3
63 χ Leo	4.5	10	55	163	48	13	46.8	8	21	45	N.	— 19.2
52 ψ Urſa Major	3.4	10	59	164	43	58	51.4	45	31	43	N.	— 19.3
11 β Hydra and C.	3.4	11	2	165	34	51	43.9	21	47	20	S.	+ 19.4
68 δ Leo	2.3	11	4	165	59	45	48.2	21	33	47	N.	— 19.6
70 θ Leo	3	11	4	166	3	49	47.4	16	28	3	N.	— 19.4
74 φ Leo	4	11	7	166	45	7	45.8	2	36	49	S.	+ 19.5
53 ξ Urſa Major	4	11	8	167	0	14	48.8	32	35	57	N.	— 19.5
54 ν Urſa Major	4	11	8	167	2	47	49.1	34	7	45	N.	— 19.5
12 δ Hydra and C.	4	11	10	167	27	42	44.9	13	45	5	S.	+ 19.5
77 σ Leo	4.5	11	11	167	50	0	46.5	7	4	11	N.	— 19.6
78 ι Leo	4	11	14	168	30	6	46.8	11	34	34	N.	— 19.6
14 ε Hydra and C.	4	11	15	168	45	18	45.3	9	49	3	S.	+ 19.6
15 γ Hydra and C.	4	11	15	168	50	58	44.8	16	38	26	S.	+ 19.6
84 τ Leo	4	11	18	169	32	25	46.3	3	54	6	N.	— 19.7
1 λ Draco	3.4	11	20	169	59	50	55.9	70	22	43	N.	— 19.7
87 e Leo	4.5	11	21	170	9	9	45.8	1	57	14	S.	+ 19.7
19 ξ Hydra and C.	3.4	11	24	170	55	13	44.0	30	48	20	S.	+ 19.8
21 θ Hydra and C.	4	11	27	171	45	42	45.5	8	45	2	S.	+ 19.8
91 υ Leo	4	11	27	171	48	17	46.0	0	13	28	N.	— 19.9
27 ζ Hydra and C.	4	11	35	173	47	8	45.4	17	17	40	S.	+ 19.9
63 χ Urſa Major	4	11	36	173	59	31	48.4	48	49	59	N.	— 19.9
3 ν Virgo	4	11	36	174	1	17	46.2	7	35	46	N.	— 19.9
93 Leo	4	11	38	174	32	35	46.7	21	16	31	N.	— 19.9
94 β Leo	2	11	39	174	50	21	46.0	15	38	4	N.	— 20.0
5 β Virgo	3	11	41	175	11	54	46.9	2	50	8	N.	— 20.0
28 β Hydra and C.	4	11	43	175	49	56	45.0	32	51	2	S.	+ 20.0
64 γ Urſa Major	2	11	44	175	56	38	48.1	54	45	3	N.	— 20.0
30 η Hydra and C.	4	11	46	176	35	11	45.6	16	5	30	S.	+ 20.0
1 α Corvus	4	11	59	179	39	29	45.8	23	40	3	S.	+ 20.0
2 ε Corvus	3.4	12	0	180	5	35	45.9	21	33	44	S.	+ 20.0
69 δ Urſa Major	3	12	6	181	29	22	45.2	58	5	20	N.	— 20.0
4 γ Corvus	4	12	6	181	30	46	46.1	16	29	4	S.	+ 20.0
15 η Virgo	3.4	12	10	182	32	50	46.0	0	23	27	N.	— 20.0
16 c Virgo	3.4	12	11	182	46	34	55.9	4	22	27	N.	— 20.0
7 δ Corvus	3.4	12	20	185	0	44	46.4	15	27	17	S.	+ 20.0
9 β Corvus	3	12	24	186	6	26	46.8	22	20	35	S.	+ 19.9
5 κ Draco	3	12	25	186	19	41	39.7	70	50	15	N.	— 19.9
23 *K* Chevel	4	12	25	186	20	31	45.0	23	40	41	N.	— 19.9
29 γ Virgo	3	12	32	188	0	30	45.3	0	24	19	S.	+ 19.9
77 ε Urſa Major	2	12	46	191	24	23	39.9	56	59	36	N.	— 19.6
43 δ Virgo	3	12	46	191	30	36	45.6	4	26	5	N.	— 19.6
12 Cor Caroli	3	12	47	191	46	50	42.7	39	20	50	N.	— 19.6
47 ε Virgo	3	12	53	193	10	48	45.0	11	59	3	N.	— 19.5
51 θ Virgo	3.4	13	0	195	1	47	46.3	4	31	14	S.	+ 19.4
53 Virgo	4.5	13	2	195	29	25	47.4	15	9	59	S.	+ 19.3
61 Virgo	4.5	13	8	197	7	28	47.7	17	14	39	S.	— 19.2
2 γ Con. Hyd.	3	13	9	197	9	10	48.3	22	9	50	S.	+ 19.2
ι Centaurus	3	13	10	197	29	19	50.2	35	42	12	S.	+ 19.1
67 α Virgo	1	13	15	198	47	58	47.2	10	9	53	S.	+ 19.0
79 ζ Urſa Major	2	13	16	199	3	49	36.3	55	55	19	N.	— 18.9
79 ζ Virgo	3	13	25	201	15	20	46.0	0	22	48	N.	— 18.7

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.				Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.		
ν Centaurus -	4	13	38	204	32	24	53.1	40	43	59	S.	+ 18.2
4 τ Charles's Wain	4	13	38	204	33	29	43.2	18	24	33	N.	− 18.2
2 *G* Centaurus -	4	13	38	204	37	10	51.4	33	29	41	S.	+ 18.2
85 η Urſa Major -	2	13	40	205	0	26	35.4	50	15	57	N.	− 18.2
5 υ Ch. Wain -	4	13	40	205	4	38	43.2	16	44	42	N.	− 18.2
8 η Ch. Wain -	3	13	46	206	24	31	42.9	19	21	17	N.	− 18.4
5 θ Centaurus -	2.3	13	56	208	53	15	52.3	35	25	40	S.	+ 18.0
11 α Draco -	3	13	59	209	48	40	24.3	65	17	14	N.	− 17.4
98 κ Virgo -	4	14	3	210	41	38	47.6	9	22	58	S.	+ 17.2
99 ι Virgo -	4	14	6	211	30	56	46.9	5	5	3	S.	+ 17.1
17 κ Ch. Wain -	4	14	7	211	39	56	32.2	52	41	0	N.	− 17.1
18 Arcturus -	1	14	7	211	44	56	40.9	20	10	38	N.	− 19.0
100 λ Virgo -	4	14	9	212	12	39	48.3	12	29	17	S.	+ 17.0
19 λ Ch. Wain -	4	14	9	212	17	25	34.5	46	57	55	N.	− 17.0
21 ι Ch. Wain -	4	14	9	212	21	31	32.2	52	14	54	N.	− 16.9
105 φ Virgo -	4	14	18	214	36	24	46.2	1	22	5	S.	+ 16.5
23 θ Ch. Wain -	4	14	19	214	41	3	31.0	52	44	5	N.	− 16.5
25 ρ Ch. Wain -	4	14	24	215	54	37	38.8	31	12	41	N.	− 16.2
27 γ Ch. Wain -	3	14	24	216	6	20	36.3	39	8	41	N.	− 16.2
5 *a* Urſa Minor -	4	14	28	217	1	33	− 4.7	76	32	30	N.	− 16.0
29 ϖ Ch. Wain -	3.4	14	32	217	57	0	42.1	17	14	26	N.	− 15.8
30 ζ Ch. Wain -	3	14	32	218	1	7	42.7	14	33	5	N.	− 15.8
107 μ Virgo -	4	14	33	218	15	49	46.9	4	49	20	S.	+ 15.8
109 Virgo -	4	14	37	219	9	45	45.3	2	42	6	N.	− 15.6
36 ε Ch. Wain -	3	14	37	219	10	18	39.2	27	52	54	N.	− 15.6
9 α^2 Libra -	2.3	14	40	220	5	48	49.5	15	14	39	S.	+ 15.3
37 ξ Ch. Wain -	4	14	43	220	39	21	41.2	19	53	51	N.	− 15.2
19 δ Libra -	4	14	51	222	42	36	47.8	7	45	17	S.	+ 14.8
7 β Urſa Minor -	3	14	51	222	51	10	− 4.8	74	56	0	N.	− 14.7
20 γ Libra or Sagit.	3.4	14	53	223	14	37	52.2	24	31	29	S.	+ 14.6
42 β Ch. Wain -	3	14	55	223	41	53	33.8	41	8	49	N.	− 14.5
24 ι Libra -	4	15	1	225	21	10	50.8	19	3	41	S.	+ 14.1
27 β Libra -	2.3	15	7	226	41	55	48.0	8	40	19	S.	+ 13.8
49 δ Ch. Wain -	3	15	8	226	57	34	36.1	34	1	55	N.	+ 13.7
δ Lupus -	4	15	9	227	14	10	58.2	39	56	52	S.	+ 13.6
31 ε Libra -	4	15	14	228	28	47	48.4	9	37	44	S.	+ 13.3
51 μ Ch. Wain -	4	15	17	229	19	48	34.0	38	3	3	N.	− 13.1
11 Urſa Minor -	4	15	17	229	20	3	− 2.4	72	30	50	N.	− 13.1
3 β Corona -	4	15	20	230	0	1	37.2	29	46	5	N.	− 12.9
12 ι Draco -	3.4	15	21	230	10	57	19.6	59	38	7	N.	− 12.8
13 γ Urſa Minor -	3	15	21	230	16	55	− 3.1	72	30	36	N.	− 12.8
35 ζ^4 Libra -	4	15	22	230	33	5	50.4	16	11	50	S.	+ 12.8
γ Lupus - -	3	15	23	230	37	48	59.1	40	30	54	S.	+ 12.8
38 γ Libra -	3.4	15	25	231	13	43	49.8	14	8	42	S.	+ 12.6
39 Libra - -	4	15	26	231	22	43	54.0	27	29	41	S.	+ 12.5
13 δ Serpens -	3	15	26	231	25	57	42.8	11	11	0	N.	− 12.5
5 α Cor. B. -	2.3	15	27	231	39	40	38.2	27	21	42	N.	− 12.5
40 Libra -	4	15	27	231	45	13	54.7	29	8	28	S.	+ 12.4
43 κ Libra -	4	15	31	232	45	17	51.5	19	3	5	S.	+ 12.2
7 ζ Corona -	4	15	32	233	3	25	33.8	37	15	41	N.	− 12.1
44 η Libra -	4	15	33	233	21	3	50.3	15	3	22	S.	+ 12.0
8 γ Corona -	4	15	35	233	41	33	37.7	26	54	21	N.	− 11.9
24 α Serpens -	2.3	15	35	233	43	44	44.2	7	1	55	N.	− 11.9
27 λ Serpens -	4	15	37	234	18	28	43.6	7	57	25	N.	− 11.7
28 β Serpens -	3	15	37	234	21	17	41.3	16	0	32	N.	− 11.7

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
32 μ Serpens -	4	15	40	234	55	44	46.7	2	50	17 S.	+ 11.5
35 ϰ Serpens -	4	15	40	235	2	53	40.4	18	44	18 N.	— 11.5
37 ε Serpens -	3.4	15	41	235	20	13	44.5	5	3	31 N.	— 11.4
10 δ Corona -	4	15	42	235	24	29	37.7	26	39	32 N.	— 11.4
45 λ Libra -	4	15	42	235	34	46	51.8	19	35	15 S.	+ 11.4
38 ρ Serpens -	4	15	43	235	43	53	39.5	21	33	30 N.	— 11.3
46 θ Libra -	4	15	43	235	45	18	50.7	16	9	40 S.	+ 11.3
5 ρ Scorpio -	4	15	45	236	17	36	55.0	28	38	50 S.	+ 11.2
6 π Scorpio -	4	15	47	236	50	41	53.9	25	33	19 S.	+ 11.0
η Lupus - -	4	15	47	236	53	25	58.8	37	50	24 S.	+ 11.0
48 ψ Libra -	4	15	47	236	53	28	50.0	13	43	12 S.	+ 11.0
41 γ Serpens -	3	15	47	236	55	11	41.0	16	17	51 N.	— 11.0
7 δ Scorpio -	3	15	49	237	16	46	52.7	22	4	8 S.	+ 10.9
16 ζ Urſa Minor -	4	15	51	237	46	58	— 36.8	78	22	22 N.	+ 10.6
51 ξ^3 Libra -	4	15	54	238	28	59	49.2	10	50	15 S.	+ 10.5
44 ϖ Serpens -	4	15	54	238	31	38	38.6	23	20	27 N.	— 10.5
8 β Scorpio -	2	15	54	238	36	7	52.0	19	16	27 S.	+ 10.5
9 ω^1 Scorpio -	5	15	56	238	55	40	52.2	20	8	33 S.	+ 10.4
13 θ Draco -	3.4	15	58	239	35	26	17.1	59	4	31 N.	— 10.2
14 ν Scorpio -	4	16	1	240	14	32	51.9	18	57	19 S.	+ 10.0
1 δ Ophiuchus -	3	16	4	241	5	57	47.0	3	11	40 S.	+ 9.7
18 Scorpio -	4	16	5	241	19	31	48.3	7	51	11 S.	+ 9.6
2 ε Ophiuchus -	3	16	8	242	4	9	47.3	4	13	8 S.	+ 9.4
20 σ Scorpio -	4	16	10	242	24	53	54.2	25	7	27 S.	+ 9.3
20 γ Hercules -	3	16	14	243	23	5	39.6	19	36	32 N.	— 9.0
22 τ Hercules -	4	16	14	243	30	32	26.8	46	46	9 N.	— 9.0
Antares -	1	16	18	244	26	36	54.9	25	59	54 S.	+ 8.7
8 φ Ophiuchus -	4	16	20	245	4	10	51.2	16	11	10 S.	+ 8.5
10 λ Ophiuchus -	4	16	21	245	20	5	45.2	2	24	39 N.	— 8.4
14 η Draco -	3.4	16	21	245	21	25	11.8	61	56	50 N.	— 8.2
27 β Hercules -	3	16	22	245	30	47	38.7	21	54	42 N.	— 8.3
29 *h* Hercules -	4	16	24	245	55	55	42.1	11	54	24 N.	— 8.2
23 τ Scorpio -	3.4	16	24	246	1	6	55.6	27	48	29 S.	+ 8.2
13 ζ Ophiuchus -	2.3	16	27	246	40	36	49.3	10	10	17 S.	+ 8.0
35 σ Hercules -	4	16	28	246	59	46	28.9	42	50	8 N.	— 7.9
15 A Draco -	4	16	28	247	6	15	— 2.6	69	10	47 N.	— 7.8
40 ζ Hercules -	3.4	16	34	248	31	48	33.8	31	57	16 N.	— 7.0
44 η Hercules -	3.4	16	36	249	5	40	30.6	39	17	27 N.	— 7.2
26 ε Scorpio -	3	16	38	249	28	17	58.5	33	56	0 S.	+ 7.1
μ^1 Scorpio -	3	16	39	249	45	18	60.4	37	42	23 S.	+ 7.0
μ^2 Scorpio -	4	16	39	249	52	19	60.4	37	40	43 S.	+ 7.0
25 ι Ophiuchus -	4	16	45	251	15	22	42.4	10	29	22 N.	— 6.5
27 ϰ Ophiuchus -	4	16	49	252	10	17	42.7	9	40	52 N.	— 6.2
58 ε Hercules -	3	16	53	253	15	18	34.4	31	12	50 N.	— 5.8
35 η Ophiuchus -	3	16	59	254	52	23	51.4	15	28	41 S.	+ 5.3
22 ε Urſa Minor -	4	17	6	256	28	5	— 99.0	82	19	51 N.	— 4.6
64 α Hercules -	3	17	6	256	29	49	41.0	14	37	1 N.	— 4.6
65 δ Hercules -	3	17	7	256	48	26	36.8	25	4	24 N.	— 4.6
22 ζ Draco -	4	17	8	257	3	58	2.2	65	56	58 N.	— 4.5
67 ϖ Hercules -	3.4	17	8	257	6	33	31.2	37	1	52 N.	— 4.5
40 ρ Ophiuchus -	4	17	10	257	24	13	53.4	20	53	40 S.	+ 4.4
53 ν Serpens -	4	17	10	257	32	11	50.3	12	38	29 S.	+ 4.4
42 θ Ophiuchus -	4	17	10	257	35	15	55.1	24	47	48 S.	+ 4.4
70 Hercules -	4	17	13	258	16	11	36.9	24	41	54 N.	— 4.1
75 ρ Hercules -	4	17	17	259	17	4	30.9	37	19	46 N.	— 3.8

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.				Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.		
34 ν Scorpio -	4	17	18	259	27	53	60.8	37	7	43	S.	+ 3.7
35 λ Scorpio -	3	17	21	260	10	41	60.7	36	56	59	S.	+ 3.5
55 α Ophiuchus -	2	17	26	261	31	44	41.6	12	42	32	N.	− 3.0
23 β Draco -	3	17	26	261	32	13	20.1	52	26	50	N.	− 3.0
55 ξ Serpens -	4	17	27	261	40	41	51.3	15	15	57	S.	+ 3.0
57 μ Ophiuchus -	4	17	28	261	52	50	48.7	7	59	26	S.	+ 2.9
24 ν^1 Draco -	4	17	28	262	6	39	17.2	55	19	7	N.	− 2.8
25 ν^2 Draco -	4	17	29	262	7	57	17.3	55	18	25	N.	− 2.8
κ Scorpio -	3	17	29	262	20	19	62.1	38	55	1	S.	+ 2.7
85 Hercules -	4	17	34	263	31	35	25.3	46	6	52	N.	− 2.3
60 β Ophiuchus -	4	17	34	263	31	20	44.4	4	39	24	N.	− 2.3
1462 ι Scorpio -	3	17	34	263	34	29	62.6	40	2	14	S.	+ 2.3
γ Teleſcopium -	4	17	37	264	13	57	60.9	36	57	59	S.	+ 2.1
28 ω Draco -	4	17	38	264	31	7	− 5.6	68	50	40	N.	− 1.9
62 γ Ophiuchus -	3	17	38	264	35	32	45.1	2	47	23	N.	− 2.0
86 μ Hercules -	3.4	17	39	264	45	0	35.4	27	50	40	N.	− 1.9
64 ν Ophiuchus -	4	17	49	267	8	32	49.3	9	44	10	S.	+ 1.1
91 θ Hercules -	3	17	50	267	26	5	30.7	37	16	58	N.	− 0.9
32 ξ Draco -	3	17	50	267	33	52	16.2	56	54	20	N.	− 0.9
92 ξ Hercules -	4	17	50	267	35	47	34.7	29	16	36	N.	− 0.9
57 ζ Serpens -	4	17	50	267	36	41	47.2	3	39	56	S.	+ 0.9
67 o^2 Ophiuchus	4	17	51	267	47	0	44.9	2	57	10	N.	− 0.8
68 *K* Ophiuchus	4	17	52	268	1	46	45.5	1	19	15	N.	− 0.7
33 γ Draco -	3	17	52	268	2	51	20.4	51	30	58	N.	− 0.8
γ^1 Sagittarius -	4	17	53	268	13	16	57.3	29	34	27	S.	+ 0.7
95 Hercules -	4	17	53	268	21	43	38.0	21	36	25	N.	− 0.6
10 γ^2 Sagittarius	3.4	17	54	268	24	6	57.7	30	24	39	S.	+ 0.6
70 *P* Ophiuchus -	4	17	56	268	57	50	45.0	2	33	40	N.	− 0.4
34 ψ^2 Draco -	4.5	17	58	269	37	23	− 15.8	72	1	15	N.	− 0.1
103 ο Hercules -	4	18	0	270	2	0	35.0	28	44	44	N.	− 0.0
13 μ^1 Sagittarius	4	18	2	270	36	1	53.8	21	5	45	S.	− 0.2
β Teleſcopium -	4	18	5	271	11	37	60.9	36	48	10	S.	− 0.4
19 δ Sagittarius -	3	18	9	272	12	26	57.6	29	53	44	S.	− 0.7
58 η Serpens -	3.4	18	11	272	52	13	46.4	2	56	14	S.	− 0.3
20 ε Sagittarius -	2.3	18	12	272	53	27	59.6	34	27	32	S.	− 0.9
109 Hercules -	4	18	16	273	54	1	38.0	21	41	45	N.	+ 1.3
22 λ Sagittarius -	4	18	16	274	3	40	55.5	25	30	49	S.	− 1.2
44 χ Draco -	4	18	24	276	6	22	− 17.8	72	39	2	N.	+ 2.2
1 *m* Aquila -	4	18	25	276	13	3	48.9	8	21	45	S.	− 2.1
3 α Lyra -	1	18	31	277	37	35	30.4	38	36	50	N.	+ 2.9
23 δ Urſa Minor	4	18	34	278	23	31	− 282.2	86	34	16	N.	+ 3.2
27 φ Sagittarius	4	18	34	278	26	41	56.2	27	10	21	S.	− 2.9
6 *l* Aquila -	4	18	37	279	16	22	47.6	4	56	22	S.	− 3.2
111 Hercules -	4	18	38	279	39	26	39.5	17	58	48	N.	+ 3.3
10 β Lyra -	2.3	18	43	280	45	56	33.2	33	8	58	N.	+ 3.6
34 σ Sagittarius	2.3	18	43	280	52	11	55.9	26	31	10	S.	− 3.6
63 θ^1 Serpens -	3.4	18	47	281	41	36	44.6	3	58	0	N.	+ 4.0
12 δ^2 Lyra -	3.4	18	48	281	57	54	31.3	36	39	52	N.	+ 4.1
47 ο Draco -	4	18	48	282	5	49	13.1	59	9	34	N.	+ 4.2
38 ζ Sagittarius -	3	18	51	282	37	44	57.4	30	8	19	S.	− 4.3
13 ε Aquila -	3.4	18	51	282	44	56	40.8	14	49	18	N.	+ 4.4
12 *i* Aquila -	4	18	52	282	52	57	48.0	5	59	39	S.	− 4.4
14 γ Lyra -	4	18	52	282	57	29	33.6	32	26	11	N.	+ 4.4
50 Draco -	4.5	18	52	283	6	12	− 27.8	75	12	10	N.	+ 4.6
39 ο Sagittarius	4	18	53	283	19	23	53.8	22	0	22	S.	− 4.6

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
40 τ Sagittarius	4	18	55	283	46	5	56.3	27	56	0 S.	− 4.7
16 λ Aquila	3.4	18	56	284	2	26	47.7	5	9	18 S.	− 4.8
52 υ Draco	4.5	18	57	284	9	57	− 10.5	71	2	29 N.	+ 4.9
17 ζ Aquila	3.4	18	57	284	10	8	41.3	13	35	28 N.	+ 4.8
41 π Sagittarius	3	18	58	284	36	52	53.5	21	18	49 S.	− 4.9
57 δ Draco	3	19	12	288	7	3	0.6	67	19	39 N.	+ 6.3
1 κ Cygnus	4	19	13	288	10	33	20.7	53	1	21 N.	+ 6.2
30 δ Aquila	3	19	16	288	58	43	45.3	2	44	47 N.	+ 6.5
60 τ Draco	4.5	19	19	289	47	2	− 15.6	72	59	56 N.	+ 6.8
58 π Draco	4	19	20	289	55	5	4.9	65	21	0 N.	+ 6.8
6 Vulpecula	4	19	21	290	11	57	37.4	24	17	23 N.	+ 6.9
6 β Cygnus	3	19	23	290	45	52	36.2	27	34	6 N.	+ 7.0
38 μ Aquila	4	19	25	291	12	2	43.6	6	59	14 N.	+ 7.2
39 κ Aquila	3.4	19	27	291	39	58	48.4	7	26	19 S.	− 7.4
41 ι Aquila	3.4	19	27	291	43	23	46.6	1	41	50 S.	− 7.4
13 θ Cygnus	4	19	31	292	50	9	24.1	49	47	9 N.	+ 7.8
5 α Sagitta	4	19	32	292	54	1	40.2	17	35	11 N.	+ 7.8
6 β Sagitta	4	19	33	293	7	41	40.3	17	2	42 N.	+ 7.8
61 σ Draco	4.5	19	33	293	10	9	− 2.8	69	20	48 N.	+ 7.9
50 γ Aquila	3	19	37	294	18	22	42.7	10	9	34 N.	+ 8.3
18 δ Cygnus	3	19	39	294	45	28	28.0	44	40	25 N.	+ 8.4
53 α Aquila	1.2	19	42	295	22	38	43.9	8	22	35 N.	+ 8.9
55 η Aquila	3	19	43	295	41	50	45.8	0	31	43 N.	+ 8.6
60 β Aquila	3	19	46	296	29	39	44.2	5	56	29 N.	+ 8.6
12 γ Sagitta	4	19	50	297	34	33	39.8	18	59	6 N.	+ 9.2
65 θ Aquila	3.4	20	2	300	22	31	46.5	1	22	31 S.	− 10.1
5 α^1 Capricornus	3.4	20	7	301	46	34	50.0	13	5	7 S.	− 10.6
30 o^1 Cygnus	4	20	7	301	49	54	28.2	46	14	49 N.	+ 10.5
6 α^2 Capricornus	3	20	8	301	52	31	50.1	13	7	25 S.	− 10.6
9 β Capricornus	3	20	10	302	34	52	50.7	15	22	16 S.	− 10.8
37 γ Cygnus	3	20	15	303	51	7	32.2	39	39	16 N.	+ 11.2
41 i Cygnus	4	20	22	305	24	33	36.6	29	44	33 N.	+ 11.6
2 ε Delphinus	4	20	24	306	2	0	43.9	10	39	59 N.	+ 11.7
4 ζ Delphinus	4	20	26	306	36	21	41.9	14	1	41 N.	+ 11.9
71 Aquila	4	20	29	307	7	48	46.4	1	45	33 S.	− 12.1
6 β Delphinus	3	20	29	307	9	32	42.1	13	56	36 N.	+ 12.2
9 α Delphinus	3	20	31	307	42	10	41.7	15	15	0 N.	+ 12.2
11 δ Delphinus	3.4	20	35	308	38	46	41.9	14	24	5 N.	+ 12.5
50 α Cygnus	2	20	35	308	44	18	30.6	44	36	25 N.	+ 12.6
2 ε Aquarius	4	20	37	309	20	46	48.7	10	10	51 S.	− 12.7
12 γ Delphinus	3.4	20	38	309	27	46	41.7	15	26	56 N.	+ 12.7
53 ε Cygnus	3.4	20	39	309	37	51	36.3	33	15	56 N.	+ 13.2
54 λ Cygnus	4	20	40	310	0	8	34.9	35	48	3 N.	+ 12.8
3 η Cepheus	4	20	41	310	20	55	18.4	61	6	2 N.	+ 13.0
6 μ Aquarius	4	20	42	310	35	57	48.5	9	41	9 S.	− 13.0
58 ν Cygnus	4	20	50	312	31	21	33.4	40	26	30 N.	+ 13.5
62 ξ Cygnus	4	20	58	314	30	23	32.5	43	10	30 N.	+ 14.0
5 γ Equuleus	4	21	1	315	16	26	43.5	9	22	30 N.	+ 14.2
64 ζ Cygnus	4	21	5	316	12	47	38.4	29	27	13 N.	+ 14.4
7 δ Equuleus	4	21	5	316	18	24	43.7	9	14	47 N.	+ 14.4
8 α Equuleus	3.4	21	6	316	34	47	44.9	4	28	13 N.	+ 14.5
65 τ Cygnus	4	21	7	316	48	8	35.5	37	14	17 N.	+ 14.6
67 σ Cygnus	4	21	10	317	29	22	35.2	38	36	12 N.	+ 14.7
1 e Pegaſus	4	21	13	318	19	29	41.4	18	59	54 N.	+ 14.9
10 β Equuleus	4	21	13	318	21	51	44.5	6	0	24 N.	+ 14.9

STARS.

Names and Magnitudes of the Stars.		Mean Right Aſcenſion, Jan. 1, 1810.					Annual Variation.	Mean Declination, Jan. 1, 1810.			Annual Variation.
		H.	M.	D.	M.	S.		D.	M.	S.	
5 α Cepheus -	3	21	14	318	30	25	21.6	61	46	58 N.	+ 14.9
34 ζ Capricornus -	4	21	16	318	56	56	51.5	23	13	31 S.	− 15.1
22 β Aquarius -	3	21	22	320	23	12	47.4	6	23	59 S.	− 15.3
8 β Cepheus -	3.4	21	26	321	32	17	12.3	69	43	40 N.	+ 15.7
39 ε Capricornus -	4	21	26	321	36	24	50.6	20	18	33 S.	− 15.7
73 ρ Cygnus -	4	21	27	321	42	37	33.6	44	45	23 N.	+ 15.7
40 γ Capricornus	3.4	21	30	322	23	12	50.1	17	30	49 S.	− 15.8
9 ι or μ Piſces A	4	21	34	323	23	45	54.0	33	53	3 S.	− 16.0
8 ε Pegaſus -	3	21	35	323	42	47	44.2	9	0	38 N.	+ 16.2
80 π^1 Cygnus -	4	21	35	323	50	24	31.7	50	19	37 N.	+ 16.2
78 μ Cygnus -	3.4	21	36	323	54	44	39.7	27	53	27 N.	+ 16.2
10 θ Pegaſus -	4	21	36	324	0	41	40.5	24	46	41 N.	+ 16.2
49 δ Capricornus -	3	21	36	324	8	5	49.9	16	58	57 S.	− 16.2
10 θ Piſces A -	4	21	37	324	8	20	53.2	31	46	11 S.	− 16.2
γ Grus - -	3	21	42	325	35	42	54.9	38	14	59 S.	− 16.5
34 α Aquarius -	3	21	56	329	0	16	46.2	1	14	13 S.	− 17.2
33 ι Aquarius -	4	21	56	329	2	24	48.7	14	47	3 S.	− 17.2
14 μ or ι Piſces A	4	21	57	329	18	53	52.9	33	54	30 S.	− 17.2
24 ι Pegaſus -	4	21	58	329	32	29	41.3	24	25	22 N.	+ 17.2
26 θ Pegaſus -	4	22	1	330	9	12	45.1	5	16	6 N.	+ 17.4
21 ζ Cepheus -	4.5	22	4	331	4	17	30.8	57	16	3 N.	+ 17.5
43 θ Aquarius -	4	22	7	331	41	57	47.5	8	43	28 S.	− 17.5
23 ε Cepheus -	4	22	8	332	0	35	31.7	56	5	57 N.	+ 17.7
48 γ Aquarius -	3	22	12	332	57	32	46.4	2	20	22 S.	− 17.9
52 π Aquarius -	4.5	22	16	333	53	36	45.9	0	25	8 N.	+ 18.0
55 ζ Aquarius -	4	22	19	334	45	37	46.2	0	59	17 S.	− 18.1
17 β Piſces A -	3	22	21	335	10	4	51.5	33	18	53 S.	− 18.2
5 Lacerta - -	5	22	22	335	24	20	37.0	46	44	16 N.	+ 18.2
27 δ Cepheus -	4.5	22	22	335	32	4	32.9	57	26	43 N.	+ 18.2
7 Lacerta -	4	22	23	335	52	10	36.2	49	18	32 N.	+ 18.3
62 η Aquarius -	4	22	26	336	23	49	46.2	1	5	30 S.	− 18.4
18 ε Piſces A -	4	22	30	337	31	46	50.0	28	1	46 S.	− 18.5
42 ζ Pegaſus -	3	22	32	337	59	49	44.7	9	50	38 N.	+ 18.6
44 η Pegaſus -	3	22	34	338	31	35	41.9	29	13	53 N.	+ 18.7
47 λ Pegaſus -	4	22	37	339	20	50	43.0	22	34	12 N.	+ 18.7
48 μ Pegaſus -	4	22	41	340	12	33	43.0	23	36	6 N.	+ 18.8
73 λ Aquarius -	4	22	43	340	40	26	46.9	8	35	9 S.	− 18.9
32 ι Cepheus -	4	22	43	340	44	14	31.6	65	12	12 N.	+ 18.9
76 δ Aquarius -	3	22	45	341	8	18	47.9	16	49	38 S.	− 18.9
Fomalhaut -	1	22	47	341	46	51	50.1	30	37	34 S.	− 18.9
1 ο Andromeda -	3.4	22	53	343	18	3	40.8	41	18	28 N.	+ 19.2
53 β Pegaſus -	2	22	54	343	38	31	43.4	27	3	21 N.	+ 19.4
4 β Piſces -	4	22	54	343	33	5	45.6	2	48	3 N.	+ 19.2
54 α Pegaſus -	2	22	55	343	49	30	44.6	14	11	9 N.	+ 19.2
88 c^2 Aquarius -	4	22	59	344	49	27	48.1	22	11	59 S.	− 19.3
90 φ Aquarius -	4.5	23	4	346	7	8	46.5	7	4	6 S.	− 19.4
6 γ Piſces -	4	23	7	346	49	31	45.8	2	14	50 N.	+ 19.5
16 λ Andromeda -	4	23	28	352	4	25	43.1	45	25	55 N.	+ 19.8
17 ι Andromeda -	4	23	29	352	12	43	43.4	42	13	3 N.	+ 19.8
19 κ Andromeda -	4	23	31	352	46	11	43.5	43	16	58 N.	+ 19.9
35 γ Cepheus -	3	23	32	352	54	53	35.5	76	34	16 N.	+ 19.9
29 Piſces - -	5	23	52	358	1	14	46.0	4	5	1 S.	− 20.0
33 Piſces - -	4	23	56	358	54	6	46.0	6	46	10 S.	− 20.0
21 α Andromeda	2.3	23	59	359	38	48	46.0	28	2	28 N.	+ 20.0
11 β Caſſiopeia -	2.3	23	59	359	46	32	46.8	58	6	4 N.	+ 19.8

To learn to know the ſeveral fixed ſtars by the globe, ſee Globe.

The parallax and diſtance of the fixed ſtars, ſee under Parallax and Distance.

Stars, *Circumpolar*. See Circumpolar.

Star, *Falling*, in *Meteorology*, a meteor, the explication of which has puzzled all philoſophers, till our modern diſcoveries in electricity have led to the moſt probable account of it. Signor Beccaria makes it pretty evident, that it is an electrical appearance, and in proof of this poſition he recites the following fact. About an hour after ſunſet, he, and ſome friends that were with him, obſerved a falling ſtar directing its courſe towards them, and apparently growing larger and larger, but it diſappeared not far from them; when it left their faces, hands, and clothes, with the earth, and all the neighbouring objects, ſuddenly illuminated with a diffuſed and lambent light, attended with no noiſe at all. During their ſurprize at this appearance, a ſervant informed them that he had ſeen a light ſhine ſuddenly in the garden, and eſpecially upon the ſtream which he was throwing to water it. All theſe appearances were evidently electrical; and S. Beccaria was confirmed in his conjecture, that electricity was the cauſe of them, by the quantity of electric matter which he had ſeen gradually advancing towards his kite, which had very much the appearance of a falling ſtar. Sometimes alſo he ſaw a kind of glory round the kite, which followed it when it changed its place, but left ſome light, for a ſmall ſpace of time, in the place which it had quitted. Prieſtl. Elect. vol. i. p. 434. 8vo. See Ignis *Fatuus*.

Star, *Morning*. See Morning.

Star, *Place of a*. See Place.

Star, *Pole*. See Pole.

Stars, *Twinkling of the*. See Twinkling.

Stars, *Unformed*. See Informes.

Star, in *Electricity*, denotes the appearance of the electric matter on a point into which it enters. Beccaria ſuppoſes that the ſtar is occaſioned by the difficulty with which the electric fluid is extricated from the air, which is an electric. See Brush.

Star, in *Fortification*, a little fort, with five or more points, or ſaliant and re-entering angles, flanking one another, and their faces 90 or 100 feet long.

Formerly, ſtar-forts were frequently made in lines of circumvallation, after two or three redoubts. See Redoubt and Sconce.

Star, in *Heraldry*, denotes a charge frequently borne on the ſhield, and the honourable ordinaries, in the figure of a ſtar. It differs from the mullet, or ſpur-rowel, in that it is not pierced as this laſt is.

It uſually conſiſts of five rays or ſpokes. When it has ſix or eight, as among the Germans and Italians, particular mention muſt be made of them in blazoning.

Stars, on *Medals*, are marks of conſecration and deification, being intended as ſymbols of eternity. F. Joubert ſays, they ſometimes expreſs the children of princes reigning, and ſometimes the children dead; and placed in the rank of deities.

Star, in the *Manege*. *White ſtars in the forehead* are eſteemed good marks in all horſes, except white and grey ones: where nature fails to produce this good criterion, our jockies have frequently recourſe to art. See Horse.

The method of making ſtars, practiſed among the Dutch, is to roaſt a large onion in hot aſhes, and when near thoroughly done, to divide it in two, and dip it in ſcalding hot walnut-oil. This done, they immediately apply the flat ſide of it to the place the ſtar is to be on, and keep it there half an hour. After taking it off, they anoint the ſcalded place with ointment of roſes; in a ſhort time, the ſcarf-ſkin falls off, and white hair grows up in its room; but the middle always continues bare of hair, which is the certain characteriſtic of an artificial ſtar.

The method moſt uſed among us is to ſhave the hair from the place it is to be made on; then to apply a little oil of vitriol with a feather, or the like, paſſing it lightly over the bald place. This eats away the roots of the former hair, which will be ſucceeded by white. The ſore is healed up with copperas, and green ointment.

Star, *To make a Black*, on a white or other coloured horſe, waſh the place to be changed frequently with fern-roots and ſage, boiled in ley; and they ſay it will breed black hairs. The ſame may be done by beating ſour milk, galls, and ruſt, together, and anointing the part with it.

Star, *A Red*, is made with an ounce of aqua fortis, a penny-worth of aqua vitæ, and ſilver to the value of eighteen-pence, all heated together in a glaſs, and the place anointed with it. This immediately turns the hair to a perfect red; but it laſts no longer than till the horſe caſts his coat.

Star, or *Starr*, *Starrum*, in our *Old Writers*. All the deeds, obligations, &c. of the Jews, were called *ſtarra*, and writ for the moſt part in Hebrew alone, or in Hebrew and Latin; one of which yet remains in the treaſury of the exchequer, written in Hebrew without points, the ſubſtance of which is expreſſed in Latin juſt under it, like an Engliſh condition under a Latin obligation: this bears date in the reign of king John; and many ſtarrs, as well of grant and releaſe, as obligatory and by way of mortgage, are pleaded and recited at large in the Plea Rolls.

Before the baniſhment of the Jews under Edward I., their contracts and obligations were denominated *ſtarra*, or ſtarrs; which, by an ordinance of Richard I., preſerved by Hoveden, were commanded to be enrolled and depoſited in cheſts, under three keys, in certain places; one and the moſt conſiderable of which was in the king's exchequer, at Weſtminſter; and no ſtarr was allowed to be valid, unleſs it were found in ſome of the ſaid repoſitories.

The word ſtarr is a contraction from the Hebrew *ſchetar*; a deed or contract.

Star, in *Pyrotechny*, a compoſition of combuſtible matters; which being borne, or thrown aloft into the air, exhibits the appearance of a real ſtar.

Stars are generally uſed as appendages to rockets, a number of them being uſually encloſed in a conical cap, or cover, at the head of the rocket, and carried up with it to its utmoſt altitude, where the ſtars taking fire, are ſpread around, and exhibit an agreeable ſpectacle. For their compoſition, ſee Pyrotechny.

Star is alſo a badge of the orders of the Garter and Bath.

Star, *Order of the*, or *Our Lady of the Star*, an order of knighthood, inſtituted by king John II. of France in the year 1351, in imitation of the order of the Garter, not many years before eſtabliſhed in England by king Edward III., ſo denominated from a ſtar they wore on the ſtomach.

At firſt there were but thirty knights; but the order, in time, became depreciated by the multitude of perſons admitted without any diſtinction. For which reaſon Charles VII. when grand-maſter thereof, quitted it, and gave it the chevalier de Guet, knight of the watch at Paris, and his archers; who ſtill wear a ſtar on their coats. But this account is contradicted by others; who will have the order inſtituted by king Robert, in 1022, in honour of the Holy Virgin, and to have fallen in diſregard during the wars of Philip de Valois.

Others ſay, that Lewis XI. having inſtituted the order of St. Michael, this order was aboliſhed by his ſon Charles VIII.

The enſign of this order was the four capital letters M. R. A. V., embroidered in gold within a ſquare on the left breaſt of the knight's garment; between the letters a mullet of eight points, the point in baſe wavy, and larger than the other; over the mullet a crown, compoſed of fleurs-de-lis and balls. The collar was three rows of gold chains; thereon roſes enamelled white and red, and placed alternately.

Juſtiniani mentions another order of the Star, at Meſſina, in Sicily, called alſo the *order of the Creſcent*. This was inſtituted in the year 1268, by Charles of Anjou, brother of St. Louis, king of the Two Sicilies.

According to others, this order was inſtituted in 1351, when the princes of the houſe of Anjou being driven out of the kingdom of Naples, and Sicily falling again under the dominion of the kings of Aragon, this order, it is ſaid, was eſtabliſhed in lieu of that of the Creſcent, which was then aboliſhed, as is this order alſo. The badge of the order was a ſtar of eight points, ſurmounted with a mullet of eight points.

Others will have it inſtituted in 1464, by Renatus, duke of Anjou, who took the title of king of Sicily. At leaſt it appears, from the arms of this prince, that he made ſome alteration in the collar of the order; for, inſtead of fleurs-de-lis, and ſtars, he only bore two chains, whence hung a creſcent, with the old French word *loz;* which, in the language of rebus, ſignified *loz in a creſcent*.

The order, being ſunk into obſcurity, was raiſed again by the people of Meſſina, under the name of the "Noble Academy of the Knights of the Star," reducing the ancient collar to a ſingle ſtar, placed on a forked croſs; and the number of knights to ſixty-two. Their device was MONSTRANT REGIBUS ASTRA VIAM: which they expreſſed by
MR
the four initial letters * with the ſtar in the middle.
AV

Star, *Order of the Polar*. See Polar.

Star *of Alexandria*, in *Botany*. See Ornithogalum.

Star-*Apple*. See Chrysophyllum.

Star-*Flower*. See Ornithogalum.

Star-*Hyacinth*. See Scilla.

Star *of Bethlehem*. See Ornithogalum.

Star *of the Earth*, the name of a plant famous for its virtues in curing the bite of a mad dog. The original account of its nature and virtues ſeems to be this: king James ſent to the Royal Society a dried ſpecimen of a plant, which had been ſent to him as the plant with which his dogs had been cured when bitten by a mad dog, and the name by which this was called was *ſtar of the earth*.

This plant was ſo ill dried, that it was not eaſily diſtinguiſhed; but at length Mr. Ray found it to be the *ſeſamoides ſalamanticum magnum*. It does not ſeem, however, clear, that this was the plant vulgarly known by that name, but rather that it was gathered by ſome ignorant perſon; neither the name ſtar of the earth at all agreeing with it, nor any account having been given before of its having ſuch virtues. Dr. Grey, in his Complete Farrier, greatly recommends the ſtar of the earth in the cure of this bite, and the plant he means is plainly the coronopus, or buck's-horn-plantain; and, upon the whole, it ſeems that this laſt mentioned is the plant properly called by this name, as its virtues have always been celebrated even in this caſe, and its leaves always are diſpoſed on the earth in the form of the rays of a ſtar. It is to be added to this, that the counteſs of Suffolk's powder, ſo famous in many places for this terrible diſeaſe, and by which ſeveral perſons have been known to be cured, is principally compoſed of this plant. Phil. Tranſ. N° 450. p. 155.

Star-*Fiſh*, called alſo the *Sea-ſtar*, in *Ichthyology*, is the general name for the Linnæan genus Asterias; under which term the ſeveral ſpecies are enumerated without deſcription. There are more than forty ſpecies, ſeparated into ſections, according as the individuals are lunate, ſtellate, or radiate.

A. *Lunate.*

Species.

Nobilis. Granulous, with a ridge round the margin, the diſk of which is glabrous. It is found in the North ſeas.

Pulvillus. Lubricous, with an entire ſimple margin. This is found in the North ſeas. It is deſcribed as having a body convex above, covered with a ſmooth ſanguineous ſkin tranſverſely in particular parts; beſet towards the margin with ſoft obtuſe white ſpines, about the ſize of a grain of millet-ſeed, and divided into ten areæ; the margin is not articulate, but rough in the angles, with about ten acute papillæ; beneath, the body is concave, ſmooth, whitiſh, with a roſy tinge, and hollowed by five grooves each ſide, covered with horizontal batons. It tinges warm water with a tawny colour.

Militaris. Every where granulous, with a granulous margin. It is found in the North ſeas.

Luna. Orbicular, entire. It inhabits India. The body is compreſſed, and every where ſprinkled with raiſed dots.

B. *Stellate.*

* Papposa. This ſpecies has from twelve to fourteen rays, the edges of which are ſurrounded with ſhort faſcicular proceſſes; the ſurface is muricate. It inhabits the European and Aſiatic ſeas. The body above is ferruginous, the diſk ſpotted with white; the rays are paler at the ends; beneath whitiſh, with paler papillæ and black grooves down the rays; the diſk is tinged with red; the rays are from 11 to 15; it is lanceolate, and a little convex above.

Spongiosa. This ſpecies is roughiſh; with five ſemicylindrical obtuſe rays, unarmed at the edges. It inhabits the Greenland ſeas, and is not three-quarters of an inch in diameter. The body is of a pale reddiſh, with a very minute and red central protuberance above, and rough, with minute crowded ſpines; the rays are inflected at the edges.

* Rubens. Lax, with five lanceolate, convex rays, covered above with ſingle ſpines, diſpoſed in rows. This is the Aſterias hiſpida of Pennant. It inhabits the ocean, and is from nine to fourteen inches in diameter. The body above is red, pale orange, yellowiſh, cinereous or black, ſometimes violet; it has from four to ſix rays, with four rows of papillæ beneath; the tubercles are ſometimes ſcattered, or diſpoſed in rows. In ſome of the individuals there are no prickles, and in ſome no briſtles.

* Seposita. With five round rays, reticulate beneath, and covered above with pectinate prickles. This is the Aſterias ſpinoſa of Pennant. It is very ſmall, and found in the European ſeas.

Endeca. With nine rays, every where covered with pectinate prickles. There is a variety of this ſpecies. It is found in the North ſeas; and the rays are from five to nine.

Minuta. With ſix rays, the edges with diſtant, projecting, faſcicular proceſſes. It inhabits the Northern ſeas. The body is of a pale yellow; about two lines and a half in diameter; and flat on each ſide.

* Glacialis. With five angular rays, the angles with prickly protuberances. It inhabits the North ſeas, and feeds on oyſters. The rays are thick and lanceolate. The body, when alive, is rufous, undulate with white, ſometimes cinereous brown, or green; the diſk above with tubercles diſpoſed in a circle, beneath hollow: the tentacula are numerous, pellucid, with a row of ſmall pinnules on each ſide; the back is marked with a round ſtriate operculum or lid.

* Clathrata. With five ſhort thick rays; hirſute beneath, and cancelled above. It inhabits the European ſeas; and is deſcribed and figured in Pennant's Britiſh Zoology.

Echinites. With twenty rays, each with two rows of ſuckers, and numerous large and ſmall moveable ſpines. It inhabits Batavia. The diſk as well as the rays are covered with ſmall moveable ſpines.

Reticulata. Rays four, reticulate with prickles. It is found in the Indian ſeas.

Phrygiana. This ſpecies is every where beſet with papillæ, which are beneath of a roſy colour. It is found on the coaſts of Norway.

Nodosa. With five convex rays, longitudinally elevated, and muricate: it is met with on the coaſts of the Indian ſeas.

* Violacea. Lax, with a grey-brown ſurface, and violet tubercles; it has five rays. Inhabits the European and Northern ſeas. The body has ſometimes a violet ſurface, and marked ſometimes with violet tubercles only; theſe are either diſpoſed in rows, or irregularly ſcattered; the diſk is orbicular; the rays lanceolate and reddiſh at the tip; beneath yellowiſh in the grooves.

Sanguinolenta. Above ſanguineous; the rays are tipt with white. It inhabits the North ſeas.

Perforata. Unarmed; with perforated dots on the back. This alſo is an inhabitant of the North ſeas.

Aranciaca. Diſk broad; rays five, ſub-depreſſed, and prickly at the margins: in the Mediterranean and North ſeas.

* Equestris. Five rays; diſk reticulate, and perforated with dots; tubercles five; margin ſub-articulate; beneath a ſingle row of tentacula: an European ſpecies.

Lævigata. With five ſemi-cylindrical, obtuſely eight-angled, unarmed rays. It inhabits the Mediterranean and Indian ſeas. The rays are covered with obſolete warts, and between them, at the ſides, are hollow dots; beneath, the warts are diſpoſed in quincunx.

* Membranacea. With five broad membranaceous rays, extremely thin and flat. Inhabits the European and Mediterranean ſeas. The rays are rough, with tubercles; beneath with five elevated convex ribs.

Granulosa. Pentangular, unarmed, each ſide teſſellate with granulations, the margin is jointed. It is found on the coaſts of the iſland of Santa Cruz.

C. *Radiate.*

Rosea. Rough, with reticulate granulations; rays round. This ſpecies is found in the Belgic and Norway ſeas, and is reckoned extremely elegant. Body above of a rich roſe-colour, ſometimes inclining to orange, with blackiſh dots between the granulations; beneath whitiſh, with dilated grooves; a quadruple row of tentaculæ, and five rows of divergent pinnules; rays white at the tip.

Pertusa. Rough, rays round, with a narrow, gibbous baſe. This inhabits the North ſeas.

* Ophiura. Diſk ſcaly; ſcale of the angles ſerrate. It inhabits the ocean, is very ſmall, and moves ſlowly. The body above is generally grey, reddiſh, or violet, rarely white; glabrous, with five rays; the diſk is orbicular; the rays are four times as long as the body, ſlender, quadrangular, flexuous, and covered with a ſingle row of ſcales. It has been aſſumed, rather than proved, that the miſchievous effects which at certain times of the year are produced by eating the common muſcle, are occaſioned by their having fed upon this ſpecies of aſterias.

Aculeata. With glabrous prickles; it is ſhorter than the diameter of the rays. It inhabits the ocean. It has five rays. The body varies in colour; it is in ſhape orbicular, with minute ſcales beneath, ſix of which reſemble a corol.

Ciliaris. With rough ſpines, longer than the diameter of the rays. It inhabits the Indian and North ſeas.

* Sphærulata. With five ſlender-jointed rays, hirſute on the ſides; with a ſmall globular head between the baſe of each ray. It inhabits the European ſeas. The body is pentangular, indented, ſmooth above the aperture, beneath it is five-pointed.

* Pentaphylla. This ſpecies is known by five ſlender rays, hirſute at the ſides, and teſſellate above, and below green, ſometimes with ſky-blue. It inhabits the Britiſh coaſts. The body is regularly pentangular.

* Varia. With five hirſute rays, annulate with red; the body is circular, with ten radiate ſtreaks; the ends are lozenge-form. This alſo is found on our own coaſts, as are the four that follow.

* Aculearis. This ſpecies is known by its five ſlender, hirſute rays; the body is round, with alternately broad and narrow ſtreaks from the centre.

* Hastata. With five hirſute, jointed rays; the body is pentagonal and indented, browniſh-red, with ten ochraceous ſtreaks, five ſlender, with javelin-ſhaped extremities.

* Fissa. With five ſlender, hirſute rays; the body is circular, with five equi-diſtant dents, penetrating deep into the ſides, and five light-coloured ſtreaks from the centre.

* Nigra. This alſo has five hirſute olive rays, teſſellate with deeper ſhades: the body is pentagonal, black, with five radiate ſtreaks of white.

Tenella. With ten pectinate rays above; and filiform ones beneath, which are thickened at the joints. It is found on the coaſts of Santa Cruz. The body is white; the ſtem of the rays is longer.

* Pectinata. With ten pectinate rays above, and fewer filiform ones beneath; the joints are equal; diſk ſmooth above. It inhabits the European and Indian ſeas. The body is covered above with five unequal valves; the colour is of a deep red; the filiform rays beneath are terminated by an incurved claw.

Multiradiata. This ſpecies has ten palmate, ſub-quadrifid, pectinate rays above, and numerous filiform ones beneath; the diſk is granulate: inhabits the Indian ocean.

* Caput Medusæ. With five divided and ſub-divided rays; diſk and rays granulate; mouth depreſſed. This ſpecies inhabits moſt ſeas, and is an extremely curious ſea-animal; the five rays dividing into two ſmaller ones, and each of theſe dividing again into two others; which mode of regular ſub-diviſion is continued to a vaſt extent, gradually decreaſing in ſize, till at length the ramifications amount to many thouſands, forming a beautiful net-work. Its colour is ſometimes pale or reddiſh-white, ſometimes brown.

Euryali. Rays divided and ſub-divided; diſk papillous, and with the rays granulate; the mouth is a little raiſed. It inhabits the Cape of Good Hope.

Oligœtes. Rays very long and ſimple, with two acute moveable ſtyles at each joint. Found near Curaſſoa, adhering to gorgoniæ. The body is pentangular, minute, ochraceous, and rather hard.

Nigrita. With five jointed rays, covered with imbricate ſcales above, and lateral patulous ramifications; the diſk is obtuſely pentangular and granulate.

TRICOLOR. With five jointed rays, pectinate at the ſides; the ramifications are rough; the diſk is hiſpid. It is found on the coaſt of the Feroe iſlands.

FRAGILIS. Diſk orbicular, muricate, ſpinous on the back: rays five, jointed and pectinate at the ſides; the ramifications ſerrato-muricate: found in the North ſeas.

The moſt frequent kind of ſtar-fiſh is that which has five rays, which iſſue in the manner of ſo many vermiform, or worm-like proceſſes: theſe therefore are called *ſtella vermiformes*, or the *worm-like* ſtar-fiſh. Another kind, nearly approaching to the nature of theſe, has more than five rays, and from the ſides of theſe other tranſverſe proceſſes are produced, which are covered with an extremely fine kind of down, or hairineſs; theſe are called the *hairy* ſtar-fiſh. A third kind is called the *aſtrophyta*, or *plant-like* ſtar-fiſh: this is compoſed of a body from whence there ariſe a great number of branches, which divaricating more and more, are at length increaſed, or divided into a prodigious number; and theſe being cylindric in figure, reſemble very much the branches of plants. Several of the ſpecies of the ſtar-fiſh are eatable, and ſome of them afford a very good nouriſhment. Some are preſcribed by phyſicians as ingredients in plaſters.

Every ray of the ſtar-fiſh is furniſhed with ſo very large a number of legs, that they cover the whole ſurface: they are diſpoſed in four ranges, each of which contains about ſeventy-four; ſo that the whole ray contains three hundred and four, and conſequently the fiſh has, upon all five of its rays, no leſs than fifteen hundred and twenty legs. With all this numerous train of legs, however, the animal moves but very ſlowly; and indeed they are ſo ſoft and feeble, that they ſcarcely deſerve the name of legs, and, more properly ſpeaking, they are only a ſort of horns, like thoſe of our garden-ſnails, but they ſerve the animal to walk with, and are therefore called legs. Mem. Acad. Par. 1710.

The amazing property of reproducing the eſſential parts, when loſt, extends to the ſtar-fiſh. M. Reaumur, on the diſcovery of this property in the polype, obſerved theſe other animals, as they lay on the ſhores of Poictou and other places, and often found that ſpecies of ſtar-fiſh which is very commonly known, and which has naturally five rays or arms, with only three or four, one or two being wanting; and on taking up and examining theſe mutilated ones, nature was always found reproducing the limb that was wanting; and on cutting and breaking other ſtar-fiſh into ſeveral parts, it was but a very little while before the broken parts cicatrized, and every part remained alive. Phil. Tranſ. N° 464. Append.

The *arboreſcent* ſtar-fiſh, *ſtella arboreſcens*, or *caput meduſæ* of Linnæus, is one of the curioſities of nature, found in ſeveral cabinets of natural rarities. See MEDUSÆ *Caput*, and *ſupra*. Grew, Muſ. Reg. Societ. part i. ſect. 5. cap. 4. p. 122.

This has been found in the north of Scotland, and on the coaſt of Cornwall. See BASKET-*Fiſh*.

STAR-*Gazer*, the Engliſh name of the uranoſcopus.

STAR-*Shot*, the common name of a gelatinous ſubſtance often found lying on the ſurface of the earth, and called by ſome *ſtar-jelly*, and *ſtar-fallen*.

The vulgar have been always of opinion, that this was produced from that meteor which they call a falling-ſtar; others have imagined it a vegetable ſubſtance, and ſuppoſed it grew out of the earth: but it is probably the half-digeſted food of herons, bitterns, crows, ſea-mews, and coddymoddies, principally when they have fed upon frogs or earth-worms.

The heads of frogs are found whole in maſſes of this matter, and alſo parts of worms: theſe birds, when ſhot, diſgorge a ſubſtance of the ſame kind. This is gelatinous, like a thick mucilage of gum tragacanth, and cold to the touch. In it are often yellow ſpecks and ſmall clots, like grumous blood. It ſmells like putrid fleſh, when kept, and is principally found in miſty mornings, and in wet weather, in autumn, winter, and ſpring. Moreton's Northampton, p. 353.

Mr. Boyle ſays, he has ſeen this jelly reſolved, by digeſtion only, into a permanent liquor, and that a phyſician of his acquaintance extolled it as a ſpecific, outwardly applied to wens. Works, Abr. vol. i. p. 310.

STAR-*Shot*, in *Artillery*, conſiſts of four pieces of iron, whoſe baſes, when ſeparate, form the quadrant of a circle; ſo that the whole being joined forms a cylinder equal to the ſhot of the cannon. Each of theſe pieces is furniſhed with an iron bar, the extremity of which is attached to a ſort of link, as keys are ſtrung upon a ring. Being diſcharged from the gun, the four branches or arms extend every way from the link in the centre. Theſe are uſed in the ſea-ſervice, and chiefly deſigned for deſtroying the ſails and rigging; but their flight and execution are very precarious at any conſiderable diſtance.

STAR-*Stone*, *Aſteria*, in *Natural Hiſtory*, the name of a kind of extraneous foſſil, of a very regular figure and ſtructure, and approaching very much to the nature of the entrochi, having the ſame ſubſtance and inner ſtructure, and being much of the ſame ſize, though different in form: it comprehends the *aſteropodia* and the *appendiculæ*, or wires of the aſteriæ. The aſteriæ are by many affirmed to be the foſſile radii of the ſtar-fiſh of the decempede, or ten-rayed kind: others have thought that ſome ſpecies of them have been the remains of the common coriaceous kinds. The encrinos, or lilium lapideum, ſeems to be a part of one of the ten-rayed kinds; and the trochitæ, and entrochi, are plainly owing to the fragments of ſeveral of theſe kinds. Linkius, de Stellis Marin.

Mr. Ellis has particularly deſcribed, and illuſtrated by figures, foſſils of this kind, as well as the animals or ſtar-fiſh to which they belong; but as the ſtem of the animal, the ſpecimen of which he examined, and from which his deſcription is taken, was broke off ſhort at the bottom, he is in doubt whether it moves about in the ſea, or is fixed to rocks and ſhells by a baſe, like corals, ſponges, and keratophytons. Phil. Tranſ. vol. lii. part i. art. 56.

The aſteropodia (ſee ASTEROPODIUM), in ſubſtance and inner ſtructure, agree perfectly with the ſhells of the echinitæ, found in our chalk-pits, and with the aſteriæ and entrochi; theſe bodies being all compoſed of obliquely-arranged plates of a tabulated ſpar: the ſeveral parts of which they are compoſed are all convex on one ſide, and concave on the other; but they are of very different ſhapes, being ſometimes roundiſh, ſometimes oblong, often quadrangular, and not unfrequently of different numbers of angles. They have frequently two, ſometimes more, ridges running acroſs them, and ſometimes they have tubercles, or ſmall protuberances, ſtanding either on their upper or under ſide: they are ſometimes found ſingle, but more frequently compound, or arranged into ſmaller or larger parcels, being placed over one another in the manner of the tiles of a houſe, and ſeem truly to have been originally part of an imbricated ſhell, or cruſt of ſome ſpecies of ſea-fiſh. They are in theſe compound maſſes even very evidently fragments, and are uſually of irregularly broken figures, though ſometimes they reſemble, in ſome degree, parts of the rays of one or other of the kinds of ſtar-fiſh. They are uſually found looſe from the aſteriæ, though lying among them; but ſometimes the aſteriæ are regularly fixed on them, juſt as the entrochi on the modioli, and are plainly ſeen to have originally grown out of them.

The aſteropodia ſeem properly the baſes of the aſteriæ, and the aſteriæ themſelves are branches of them. The aſteriæ are ſhort, and have commonly ſomewhat crooked angular columns, compoſed of ſeveral joints, each reſembling the figure of a radiated ſtar, with a greater or ſmaller number of rays in the different ſpecies: they are uſually found of about an inch in length, and of the thickneſs of a gooſe-quill. Some of them have five angles or rays, and others only four, and in ſome the angles are equidiſtant, while in others they are irregularly ſo; in ſome alſo they are ſhort and blunt, while in others they are long, narrow, and pointed; and ſome have their angles ſo very ſhort and obtuſe, that at firſt ſight they may be taken for entrocho-aſteriæ. The ſeveral joints in the ſame ſpecimen are uſually all of the ſame thickneſs; this, however, is not always the caſe, but in ſome they are larger at one end, and in others at the middle, than in any other part of the body; and ſome ſpecies have one of the rays bifid, ſo as to emulate the appearance of a ſix-rayed kind.

All the aſteriæ are naturally ſulcated between the angles, but this in a very different degree; ſome are very little ſo, while others are cut ſo deeply, that the ſingle joints of them reſemble the rowels of a ſpur. One end of the column is frequently found finely engraved along the edges of the angles, or rays, while the other end is ſmooth, or nearly ſo; and the ſame is often the caſe alſo in the ſingle joints. Not unfrequently, alſo, one end of a column is indented, and the other has five ſtriæ, running from a hollow centre to the ſulci between the rays. They are found of various ſizes and colours; the longeſt ſeldom arrive, however, at two inches; and they are found of all the intermediate bulk from this down to the length of a barley-corn: they are not unfrequently found, alſo, compreſſed and flattened, as is common to the foſſils that have been formed in animal moulds.

They are uſually bedded in ſtrata of clay, though not unfrequently in thoſe of a lax ſort of quarry-ſtone, and ſometimes in a harder. They uſually have ſea-ſhells, and other marine remains, lying about them; and ſometimes theſe ſhells adhere to the aſteriæ, and when ſeparated from them, do no injury to the aſteriæ, but themſelves ſhew a mark of the figure of the body, or part of the column, when a part has been always wanting in the ſhell.

From the columns of the aſteriæ there are ſometimes propagated certain ſmall branches, like thoſe of the entrochi; theſe are called by authors *appendiculæ aſteriarum*, or the wires of the aſteriæ. These are ſometimes two inches long, and the largeſt or thickeſt joint always adheres to the aſteria, all the ſucceeding ones growing ſmaller, and the branch more tapering toward the end. In their natural ſituation on the aſteria, they ſtand in regular circles at different diſtances one above another: there is always one wire in each of the ſulci, or channels of the body, and theſe ſtand evenly againſt one another.

Theſe wires or appendiculæ are very ſeldom, however, found in this their native ſtate, or fixed to the bodies of the aſteriæ; they are commonly found broken off, and lying looſe among them, either in fragments of different lengths, or in ſingle joints, immerſed in ſtone, or lying among the ſtrata of clay.

The aſteriæ may be reduced to two kinds; the firſt, thoſe whoſe whole bodies make the form of a ſtar; the ſecond, thoſe which in the whole are irregular, but which are adorned, as it were, with conſtellations in the parts.

Dr. Liſter, for diſtinction ſake, only gives the name *aſteria* to the former ſort, diſtinguiſhing the latter by the appellation of *aſtroites;* the other naturaliſts generally uſe the two indiſcriminately. The aſteria ſpoken of by the ancients appears to be of this latter kind.

The quality of moving in vinegar, as if animated, is ſcarcely perceivable in the aſtroites, but is ſignal in the aſteria. The former muſt be broken in ſmall pieces before it will move; but the latter will move, not only in a whole joint, but in two or three knit together. Plott, Nat. Hiſt. Oxford.

Star-*Thiſtle*, in *Botany*. See Centaurea *Calcitropa*.

Star-*Wort*. See Aster.

Star-*Wort*, *American*, or *Trailing*, of Vera Cruz. See Tridax.

Star-*Wort*, *Baſtard*, a ſpecies of *Buphthalmum;* which ſee.

Star-*Wort*, *Yellow*, a ſpecies of *Inula;* which ſee.

Star-*Chamber*, *Court of*. See Court.

Star-*Fort*, or *Redoubt*, in *Fortification*. See Star, Redoubt, and Fort.

STARADI, in *Geography*, a town of Aſiatic Turkey, in Natolia; 42 miles E. of Iſnik.

STARAPHAXAT, a name uſed by ſome of the old writers for any medicine that reſtrains fluxions from the eyes, noſe, or fauces.

STARA-RUSA, in *Geography*, a town of Ruſſia, in the government of Novgorod, near lake Ilmen; 56 miles S. of Novgorod. N. lat. 57° 40′. E. long. 31° 50′.

STARASELLA, a town of Italy, in Friuli; 8 miles N.E. of Friuli.

STARBOARD, in *Sea Language*, is the right-hand ſide of a ſhip, when looking forward from the ſtern.

END OF VOL. XXXIII.

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30

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